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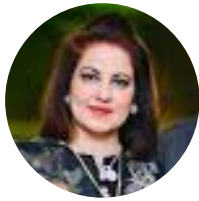
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O-001

**Antimicrobial Activity and Characterization of ZnO and Ag-Doped ZnO Nanoparticles
Fabricated Using *Leucophyllum Frutescens* Leaf Extract**

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Abstract:

The environmentally friendly production of transition-metal nanoparticles has attracted considerable interest globally. This study describes the synthesis of ZnO and Ag-doped ZnO nanoparticles utilizing the leaf extract of *Leucophyllum frutescens* via a simple green method. The synthesized nanoparticles were characterized by Ultraviolet-Visible (UV-Vis) spectroscopy, Fourier Transform Infrared (FT-IR) spectroscopy, X-ray diffraction (XRD), Transmission electron microscopy (TEM) and Scanning electron microscopy (SEM). TEM analysis showed that the crystallites were spherical and polyhedral, highly agglomerated, and had interplanar distances ranging from 0.2005 to 0.2625 nm. Antimicrobial efficacy of the developed ZnO and Ag/ZnO nanoparticles, at concentrations of 3%, 5%, and 7%, was evaluated against human pathogens, including *Bacillus cereus*, *Staphylococcus aureus*, *Salmonella typhi*, and *Escherichia coli*. The generation of reactive oxygen species (ROS) enhanced the antibacterial activity of Ag-doped ZnO nanoparticles. The results revealed that at 7% Ag doping, Ag-doped ZnO nanoparticles exhibited greater antibacterial efficacy than pure ZnO nanoparticles with the largest inhibition zones observed against *S. aureus* (11 ± 3.0 mm) and *B. cereus* (12.45 ± 0.57 mm). Overall, this plant-mediated synthesis of Ag-doped ZnO nanoparticles offers promising route for developing enhanced antibacterial agents and highlighting a green, cost-effective, and sustainable method for producing ZnO and Ag-doped ZnO nanoparticles, with various applications for future exploration.

Keywords: Green synthesis, ZnO nanoparticles, Ag-doped ZnO nanoparticles, *Leucophyllum frutescens* leaf extract, Reactive oxygen species, antibacterial activity

O-002

**Study of Regenerative Properties of *Persea Americana* Nanoparticles for Peripheral Nerve
Injury in Animal Model**

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Abstract:

Peripheral nerve injuries (PNIs) represent a major public health challenge due to their association with conditions such as neuropathic pain, numbness, paralysis, muscle atrophy, sensory and motor dysfunction, autonomic disorders, diabetic neuropathy, peripheral nerve tumors, and sciatic nerve injury. These complications affect patients' quality of life and functional recovery. The present study investigates the eco-friendly synthesis of magnesium oxide nanoparticles (MgO NPs) using the leaf extract of *Persea americana*. The synthesized MgO nanoparticles were evaluated for their potential application in peripheral nerve regeneration. Comprehensive characterization of the nanoparticles was performed using advanced analytical techniques such as FTIR, SEM and Ultraviolet–Visible (UV–Vis) spectroscopy to analyze optical properties. The findings provide valuable insights into the physicochemical properties of biosynthesized MgO nanoparticles and highlight their potential as a promising nanomaterial for biomedical applications, particularly in nerve repair and regeneration. This study contributes to the growing field of green nanotechnology and its application in regenerative medicine.

Keywords: MgO NPs, *Persea Americana*, Nerve Injury, Green Synthesis, Sciatic Nerve, Phytochemicals, Nanoparticles

O-003

The Role of Epigenetics in Species Adaptation to Climate Change

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Abstract:

The anthropogenic climate change, which is marked by a rapid change in ocean chemistry and temperature, is a serious attack on global biodiversity, and animal species require prompt adaptive actions. Although genetic adaptation through natural selection usually requires very long durations, recent findings underscore the importance of the epigenetic processes -molecular processes that do not alter the sequence of a single gene, but change the expression of specific genes- in enabling rapid phenotypic plasticity and transgenerational acclimation. The present review of literature on epigenetic-mediated adaptation in zoology will cover the essential mechanisms of adaptation including DNA methylation, histone modification and non-coding RNAs (ncRNAs). The available evidence now largely emphasizes DNA methylation as a prevailing process of interconnecting environmental stressors and adaptive responses. Evidence of genome-wide alterations in methylation with stressors such as ocean warming and acidification is seen in the work of various taxa, such as reef fish, marine cope pods, and Antarctic pteropods. The changes in most of the cases target genes that regulate metabolism, aerobic range, and cellular responses to stress allowing animals to sustain physiological functionality despite non-optimal environments. Moreover, experiments involving transgenerational transplantation indicate that not all epigenetic marks may be lost, and may even serve to precondition children in a new climate. Nevertheless, such traps in inherited variation are also suggested by the review, in which inherited modifications can have maladaptive consequences, including skewed sex ratios or mismatches between life-histories. In spite of such developments, there are still a number of gaps. Future studies should focus on: (1) the functional causality studies with CRISPR-based epigenetic editing technology to eliminate correlational studies; (2) the multi-omics integration to clarify the interplay between epigenetic and genetic differentiation; (3) the increased taxonomic coverage,

especially among K-strategists and terrestrial vertebrates; and (4) the measurement of long-term fitness in natural populations. The knowledge of these epigenetic landscapes can be crucial towards enhancing the species vulnerability models and coming up with specific conservation plans in a warming world.

Keywords: Epigenetics, DNA Methylation, Climate Change, Species Adaptation, Zoology, Transgenerational Acclimation, Phenotypic Plasticity

O-004

Comparative Evaluation of Antidiabetic, Antioxidant, and Antibacterial Potential of *Leucoagaricus Leucothites* and *Pleurotus Ostreatus*: Implications for Metabolic and Oxidative Stress-Related Disorders

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Abstract:

The rising global burden of diabetes mellitus and its associated complications, including oxidative stress and increased susceptibility to infections, presents a major challenge to human health. These metabolic disturbances are increasingly linked with neurological dysfunctions and systemic inflammation, highlighting the need for safe, natural, and multifunctional therapeutic agents. Medicinal mushrooms, rich in diverse bioactive compounds, offer promising potential in this regard. This study comparatively evaluates the in vitro antidiabetic, antioxidant, and antibacterial activities of *Leucoagaricus leucothites* and *Pleurotus ostreatus*. Ethanolic extracts were prepared using microwave-assisted extraction. Antidiabetic potential was assessed via α -amylase inhibition assay, antioxidant activity through DPPH radical scavenging assay, and antibacterial efficacy using the disc diffusion method against *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. Statistical analysis was performed using ANOVA. The findings revealed that *P.ostreatus* exhibited significantly superior bioactivity compared to *L. leucothites*. It demonstrated strong α -amylase inhibition (72.26%), indicating potent antidiabetic potential, whereas *L. leucothites* showed moderate inhibition (44.29%). In antioxidant assays, *P. ostreatus* displayed moderate free radical scavenging activity, while *L. leucothites* showed comparatively lower activity. Furthermore, *P. ostreatus* exhibited dose-dependent and broad-spectrum antibacterial activity against both Gram-positive and Gram-negative pathogens. The enhanced bioactivity of *P. ostreatus* suggests its potential role in mitigating hyperglycemia, reducing oxidative stress, and preventing infection-related complications, which are critical factors in the progression of metabolic and neurodegenerative disorders. This study highlights the potential of *P. ostreatus* as a natural source of bioactive compounds for developing nutraceuticals or adjunct therapies aimed at improving metabolic health and associated neurological outcomes. Further studies focusing on bioactive compound isolation, mechanistic pathways, and in vivo validation are recommended to support its clinical and biomedical applications.

Keywords: *Pleurotus Ostreatus*, *Leucoagaricus Leucothites*, Antidiabetic Activity, Oxidative Stress, Antibacterial Activity, Metabolic Disorders, Medicinal Mushrooms

O-005

Epidemiology and Chemotherapeutic Assessment of Gastrointestinal Nematodes in *Columba livia domestica* from Faisalabad City

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Abstract:

A total of 120 male and female domestic pigeon (*Columba livia domestica*) fecal samples of various ages were collected from an urban location. Direct microscopy was used to examine both hatched and unhatched eggs as well as dead and alive larvae. Of the 120 samples, 73 had infestations of *Capillaria longicollis*, 20 had *Ascaridia galli*, 13 had *A. columbae*, 17 had *A. columbae*, 11 had *C. obsignata*, 5 had *C. columbae*, and 7 had *C. caudinflata* in *C. livia domestica*. Anthelmintic medications of oxfendazole, fenbendazole, and levamisole were evaluated at various concentrations; however, the effects of the maximum lethal concentration (LC₅₀) were demonstrated at a dose of 20 mg/mL. For oxfendazole, fenbendazole, and levamisole, the determined LC₅₀ values were 4.966 mg/mL, 4.789 mg/mL, and 5.102 mg/mL, respectively. On the seventh day for therapy with oxfendazole and fenbendazole, the EPG level in *C. livia domestica* was greater. On days 7 and 14, however, EPG decreased in response to levamisole, indicating the deadly effects on the gastrointestinal parasites. The findings showed that levamisole was significantly more effective against gastrointestinal nematodes than oxfendazole and fenbendazole.

Keywords: Anthelmintic, Domestic Pigeon, Gastrointestinal Parasites, Infestations

O-006

Anti-Inflammatory Activities of Henna, Cinnamon and Turmeric Ethanolic Extracts in Chicken Peritoneal Macrophages

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Abstract:

Inflammation is a natural process that the body's immune system uses to respond to various kinds of triggers, such as injuries, infections, or harmful substances. It plays a vital role in the body's ability to heal and repair damaged tissues. However, if this process continues unchecked for a long period, it can lead to chronic inflammation, which is linked to several health issues. To manage inflammation, people often use non-steroidal anti-inflammatory drugs (NSAIDs) and steroidal anti-inflammatory drugs. While these are effective, they can cause side effects when used for a prolonged time in humans and animals. As a result, there has been growing interest in using herbal medicine as a safer alternative. Medicinal plants like henna, cinnamon, and turmeric have been used for centuries in traditional medicine to treat different ailments. This study aimed to compare the anti-inflammatory properties of these three herbs using a laboratory-based approach. The research involved preparation of ethanolic extracts from each of the herbs. Then, collection of peritoneal macrophages from chicken was carried out, which are a type of white blood cell that plays a key role in the immune response. These

macrophages were split into nine different groups, each receiving a different treatment. Group 1 received a standard cell culture medium called RPMI-1640. Group 2 was exposed to lipopolysaccharides (LPS), which are substances that can trigger inflammation. The other groups were treated with varying concentrations of the herbs: Group 3 received dexamethasone (a steroidal anti-inflammatory drug) along with LPS, while Groups 4-9 were treated with different concentrations of turmeric, cinnamon, and henna, combined with LPS. After the treatments, several tests were conducted to evaluate how well the herbs affected inflammation. These included a macrophage proliferation assay to measure how well the cells grew, a nitric oxide production assay to assess inflammation levels, and RT-PCR (a technique that analyzes gene expression) to study the activity of specific proteins and pathways related to inflammation. The results indicated that the higher concentration of the herbs (1000 µg/mL) had the strongest effect, showing higher phagocytic activity (meaning the macrophages were more effective at consuming harmful substances) and lower levels of nitric oxide, which is a marker of inflammation. The MTT assay, which checks for cell toxicity, showed that the treatments were not harmful to the cells. Additionally, the study found that the treatments reduced the expression of pro-inflammatory molecules by inhibiting the NF-κB and MAPK signaling pathways, which are known to drive inflammation. These findings suggest that all three herbs i.e. henna, cinnamon, and turmeric have anti-inflammatory properties. Among them, turmeric showed the most significant benefits in reducing inflammation and promoting healing.

Keywords: Henna, Cinnamon, Turmeric, Chicken peritoneal macrophages, inflammation

O-007

Prevalence and Risk Factors of Bovine Brucellosis: A Sero-epidemiological Investigation in Faisalabad Division, Punjab, Pakistan

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Abstract

Brucellosis is a major zoonotic disease, causing significant losses in livestock production, especially in low- and middle-income countries. In Pakistan, epidemiological information on bovine brucellosis

is scattered, preventing effective disease control. In this study, the seroprevalence of bovine brucellosis was determined, and the associated risk factors were identified in Faisalabad Division, Punjab, Pakistan. The study was designed as a cross-sectional study, with a sample size of 1,000 serum samples collected at 4 districts: Faisalabad, Toba Tek Singh, Jhang, and Chiniot. Rose Bengal Plate Test (RBPT), Serum Agglutination Test (SAT), and indirect ELISA (iELISA) were used to detect anti-Brucella antibodies in serum. Epidemiological data were collected and analyzed using bivariate analysis and multivariable analysis. Seropositivity was 17.90% by RBPT, 16.30% by SAT and 14.70% by iELISA. Inter-test agreement was highest between RBPT & SAT (95.8%), followed by SAT & iELISA (93.4%) and RBPT & iELISA (92.4%). Multivariable analysis using generalized linear mixed-effects models identified larger herd size, older age (>8 years), male sex, pregnancy status, and repeat breeding history as significant independent risk factors for seropositivity ($P < 0.05$). These findings confirm that bovine brucellosis is endemic in Faisalabad Division and highlight the need for active surveillance, strategic vaccination, and improved farm biosecurity.

Keywords: Bovine Brucellosis, Seroprevalence, Risk factors, RBPT, SAT, iELISA, Pakistan

O-008

Music and Emotions: Exploring the Relationship between Music Listening, Mood, and Emotional Regulation among Young Adults

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Abstract:

Nowadays, music has become an integral part of daily life, and individuals frequently use it as a means to manage their emotions and regulate their moods. Music plays an important psychological role in influencing emotional states and facilitating emotional regulation. The present study aimed to explore the relationship between music listening, mood states, and emotional regulation among young adults. In addition, the study examined whether music could help reduce stress and other negative emotional experiences. A correlational research design with a quantitative research approach was employed. A sample of 250 young adults was selected using a random sampling technique. Data were collected using a self-developed demographic information sheet along with standardized instruments, including the Emotional Regulation Questionnaire (ERQ) and the Patient Health Questionnaire Mood Scale (PHQ). The Emotional Regulation Questionnaire (ERQ) is a 10-item scale developed by Gross and John, widely used to assess individuals' strategies for regulating emotions, particularly cognitive reappraisal and expressive suppression. The Patient Health Questionnaire (PHQ) consists of 10 items designed to evaluate mood-related changes and emotional states. Statistical analysis was conducted using the Pearson Product-Moment Correlation to determine the relationship between music listening, mood states, and emotional regulation. The findings indicated a positive association between music listening and emotional experiences. The correlation between music and mood was $r = 0.07$, $p = 0.326$, while

the correlation between music and emotional regulation was $r = 0.004$, $p = 0.955$. These results suggest that music is related to emotional experiences and mood regulation among young adults, although the correlations observed in the present study were relatively weak. Overall, the study highlights the psychological importance of music as a potential tool for influencing mood and emotional processes in everyday life.

Keywords: Music, Emotional Regulation, Mood, Emotional Regulation Questionnaire (ERQ), Patient Health Questionnaire (PHQ)

O-009

Association Between Procrastination and Motor and Cognitive Fatigue Among Students: A Cross-Sectional Study

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Abstract:

Procrastination is a common behavioral tendency among students and young professionals, particularly within academically and professionally demanding environments. Cognitive fatigue is characterized by diminished concentration, impaired decision-making, and reduced memory performance, whereas motor fatigue refers to physical exhaustion and decreased physical efficiency. Both forms of fatigue can significantly disrupt daily functioning, academic engagement, and professional performance—especially in high-stress fields such as medicine. To assess the impact of procrastination on motor and cognitive fatigue among students and young professionals. It was a cross sectional study, questionnaire-based design. conducted in Ayub Teaching Hospital Abbottabad. Approximately 206 participants aged 18–25 years were recruited who showed willingness to provide informed consent. Data will be collected using a self-administered structured questionnaire about Age, educational level, and sleep duration. A 28-item, 5-point Likert-scale instrument assessing procrastination behaviors and symptoms of cognitive/motor fatigue. Data will be analyzed using SPSS version 25. Pearson correlation analysis and bivariate regression was employed to examine the relationship between procrastination and fatigue. A p-value of <0.05 was considered significant. Procrastination resulted in increased motor and cognitive fatigue depicted by positive relationship between procrastination and motor and cognitive fatigue. Pearson correlation analysis was significant at 0.01 p-value. Procrastination is a significant predictor of overall fatigue (both motor and cognitive), with higher levels of procrastination leading to increased fatigue.

Keywords: Procrastination. Motor fatigue, cognitive performance

O-010

Frequency of Aortic Root Dilatation in Patients with Long Standing Essential Hypertension

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Abstract:

Aortic root dilatation poses a potential risk factor for development of aortic dissection. In people with hypertension, aortic root dilatation is connected to left ventricular hypertrophy, indicating the susceptibility to cardiac damage. Dilatation of ascending aorta is a major risk factor for development of aortic dissection and/or rupture of aorta if not treated surgically. It signifies 50% of all thoracic aneurysms. Objective of this study was to determine the frequency of aortic root dilatation in patients with long standing essential hypertension. One hundred and three patients with essential hypertension were selected for the study. The size of aortic root was measured by two dimensional echocardiography calculating the maximum distance between the anterior and posterior aortic root walls' two leading edges at the end diastole. A parasternal long axis perspective was used to take images of the proximal aortic root. The patients' age was 51 ± 6.7 years, duration of hypertension was 10.7 ± 2.9 years and weight of 87.5 ± 6.5 Kg. Out of these patients, 79.6% were male and 20.4% were female, and out of the total, 19.4% had aortic root dilatation. Frequency of aortic dilatation was significantly higher in people older than 50 years, or having hypertension for more than 10 years. There was a high prevalence of aortic root dilatation in patients with essential hypertension.

Keywords: Essential hypertension, Longstanding, Aortic root dilatation

O-011

***Drimiopsis Maculata* Methanol Extract Ameliorates Inflammation in Experimental Rat Model of Polyarthritis: A Biochemical and Molecular Approach**

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Abstract:

Drimiopsis maculata is a member of Asparagaceae family, has been used to treat inflammatory and pain conditions since long. The intention of performing this study was to determine anti-inflammatory properties in polyarthritis in *D. maculata* methanol extract (DMME). The extract was phytochemically characterized using proximate analysis, HPLC and GCMS profiling. DMME 200, 400, and 600 mg/kg were used to evaluate in vivo efficacy in formaldehyde-induced polyarthritis rat model. Diameter of paw, body weight, arthritic score, hematological indices, and biochemical markers were among the parameters that were assessed. Levels of HSP-70, PGE-2, NO, iNOS, IL-6, TNF- α , SOD, CAT, and MDA were quantified using ELISA. Inflammatory gene expression was determined by qRT-PCR. Organ Histological and radiological examinations were also carried out. Phytochemical evaluation confirmed the presence of various secondary metabolites, with HPLC and GCMS detecting diverse bioactive compounds. In vivo, treatment with DMME showed a dose-dependent decrease in paw inflammation and polyarthritis severity. Improvements were noted in hematological and biochemical characteristics, along with histological indication of decreased inflammation, bone degradation, and pannus formation. Analysis of gene expression revealed that anti-inflammatory genes were up-regulated whereas pro-inflammatory mediators were down-regulated. The outcomes of this research study show that DMME holds strong anti-inflammatory potential and provide scientific ground supporting its conventional use in the management of inflammation in polyarthritis.

Keywords: *Drimiopsis maculate*, Methanol extract, Polyphenols, Polyarthritis, Formaldehyde, Inflammatory markers, COX-2 · NF- κ B

O-012

Design and Evaluation of Silica Based Solid Dispersion Containing Naproxen for Rheumatoid Arthritis

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Abstract:

This innovative study aims to improve naproxen's solubility and bioavailability in order to produce strong anti-inflammatory effects and reduced gastrointestinal toxicity. Naproxen (NAP), a nonsteroidal anti-inflammatory drug (NSAID) made from propionic acid, is used to treat dysmenorrhea and soften the symptoms of osteoarthritis and rheumatoid arthritis. Naproxen belongs to family of BCS class II drug having poor aqueous solubility (29 μ g/ml) and high permeability. In this study, ternary solid dispersions of naproxen were prepared by using poloxamer® 188, eudragit® 1-100 and syloid® 244FP. Ethanol was utilized as the solvent in the solvent evaporation process for incorporating the drug into nonordered mesoporous silica. Following that, solubility tests, release kinetics, drug content, FTIR, SEM, and in vivo investigations were used to describe the formulations. Due to its larger surface area, the ternary solid dispersion produced by syloid® 244FP with 40% poloxamer® 188 and eudragit® 1-100 proved to successfully increase solubility 70.51 and 70.88 times, respectively, in pH 6.8. Additionally, dissolution increased 2.27-fold and 2.01-fold in the first five minutes when contrast to the pure drug. The drug and carrier compatibility were shown by the FTIR results. Because of its larger pore size, the SEM results showed that poloxamer® 188 and eudragit® 1-100 were completely trapped in the pores of syloid® 244FP. An in vivo gastroprotective investigation in rats revealed that the pure naproxen (10 $\pm$ 1) trend of the average gastric lesion index was > F1 (9 $\pm$ 0.5) > F13 (4 $\pm$ 0.5) > F17 (2 $\pm$ 0.28) > control (0). After six hours, the percentage inhibition of swelling in rats using an in vivo anti-inflammatory study was F17 (94.54 $\pm$ 2.56) > F13 (92.34 $\pm$ 1.19) > F1 (68.24 $\pm$ 3.26) > pure drug (57.23 $\pm$ 1.56) > control (0.11 $\pm$ 0.21), and it stayed steady for seven hours. Both elevated TNF- α levels (506.33 $\pm$ 38.47 pg/ml) and elevated IL-6 levels (1433.67 $\pm$ 49.74 pg/ml) in the disease group indicated the induction of inflammation, according to the ELISA report. Compared to the disease group, which reflected the dose efficacy, Poloxamer® 188 showed significantly lower levels of TNF- α and IL-6.

Keywords: Naproxen, solid dispersion, binary solid dispersion, ternary solid dispersion, rheumatoid arthritis, Syloid 244 FP, poloxamer 188, eudragit L-100

O-013

Advanced Soluplus-Based Solid Dispersions of Glimepiride: Enhancing Dissolution and Pharmaceutical Performance for Improved Therapeutic Potential in Diabetes-Associated Complications

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Abstract:

Glimepiride is a widely used antidiabetic agent; however, its clinical performance is limited by poor aqueous solubility (BCS Class II) leading to variable dissolution and inconsistent drug release. Such limitations may affect therapeutic efficiency and glycemic control. Therefore, advanced drug delivery systems that enhance dissolution behavior are essential to improve its pharmaceutical performance. This study aimed to develop and evaluate binary and ternary solid dispersions of glimepiride using Soluplus® and PEG 8000 to improve dissolution behavior and pharmaceutical performance. Binary (Drug:Soluplus®) and ternary (Drug:Soluplus®:PEG 8000) systems were prepared using the (Solvent Evaporation) technique. Formulations were characterized via DSC, PXRD, and FTIR. Comparative in vitro dissolution studies were conducted, followed by in vivo pharmacodynamic evaluation in [Insert animal model, e.g., STZ-induced diabetic rats] to measure glucose-lowering efficacy over (Insert time, e.g., 12 or 24) hours. Solid-state characterization (PXRD and DSC) confirmed the successful conversion of Glimepiride from a crystalline to an amorphous state in both systems. FTIR indicated no chemical incompatibility. In vitro dissolution revealed that ternary solid dispersions provided significantly faster drug release compared to binary systems and the pure drug. Most importantly, in vivo results demonstrated that the ternary dispersion achieved a significantly greater reduction in blood glucose levels ($p < 0.05$) compared to the pure drug, confirming a marked improvement in systemic absorption and therapeutic efficiency. The Soluplus-based ternary solid dispersion effectively transforms the pharmaceutical profile of Glimepiride, leading to superior in vivo performance. This advanced formulation offers a robust biomedical tool for maintaining glycemic stability and mitigating the risk of diabetes-associated neuro-metabolic complications.

Keywords: Glimepiride, Solid dispersion, Soluplus, Dissolution rate, Bioavailability, Diabetes mellitus

O-014

Liposomal Nano-carriers; A Novel Therapeutic Bridge Targeting the Gut-Brain Axis

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Abstract:

The gut–brain axis (GBA) is a complex two way communication network linking the central nervous system, gut microbiota, and immune pathways, and plays a critical role in the development of neurological and metabolic disorders. Dysregulation of this axis has been responsible for a variety of

disorders, including neurodegenerative diseases, metabolic syndromes, and psychiatric conditions. However, effective therapeutic targeting of this axis remains challenging due to poor drug stability, limited bioavailability, and physiological barriers. Liposomal nanocarriers have emerged as a promising approach to overcome these limitations due to their biocompatibility, ability to encapsulate both hydrophilic and lipophilic compounds, and capacity for controlled and targeted delivery. Recent advancements in liposomal engineering, including surface modification and special targeting molecules, have further improved intestinal absorption and enhanced interactions with gut microbiota, facilitating more efficient delivery to the brain. Liposomes help in modulating the GBA, with a focus on their application in delivering bioactive compounds such as vitamins and neuroprotective agents. In the case of vitamins, they improve their stability, bioavailability and protect them from degradation in the gastrointestinal tract. Their ability to interact with gut microbiota and facilitate targeted delivery to the brain makes them a promising therapeutic tool. Their potential applications in conditions such as diabetic neuropathy and neuroinflammation highlight their role as targeted therapy for complex neurological and metabolic disorders. Liposomal delivery systems are a promising way to treat the gut–brain axis and help people to deal with complex disorders.

Keywords: Liposomes, Gut–Brain Axis, Nanocarriers, Drug Delivery, Microbiota

O-015

Mindful Eating: A Key Approach to Enhancing Nutritional Status

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Abstract:

Mindful eating is the practice of paying conscious attention to food choices, eating habits and internal cues such as hunger, fullness and emotional state. It emphasizes awareness during meals and encourages individuals to differentiate between physical hunger and emotional triggers. Practicing mindful eating has been shown to improve dietary behaviors, prevent overeating and promote healthier food choices, which together contribute to better nutritional status. It may also help in managing stress, as paying attention to the act of eating itself creates a calming effect similar to mindfulness meditation. This link between food awareness and emotional health makes mindful eating an important area of study among young adults. The core objective of the present research is to examine how mindful eating influences nutritional status, emotional stability and stress management in university students. A descriptive cross-sectional study design will be employed, with 200 students between 18 and 25 years recruited on a voluntary basis. Data collection will be carried out using validated instruments: a 24 hour recall method to capture usual dietary pattern, the Mindful Eating Questionnaire (MEQ) to measure awareness during meals, the Difficulty in Emotion Regulation Scale (DERS-36) to measure difficulties in emotion regulation and Three-Factor Eating Questionnaire (TFEQ) to assess three main dimensions of eating behavior. The present study is expected to provide meaningful insights into how mindful eating relates to emotional well-being and dietary intake. Statistical analyses including descriptive methods, regression and Pearson's correlation coefficient will be applied to identify significant associations and better understand the role of mindful eating in supporting student health.

Keywords: Mindful eating, emotion regulation, dietary patterns, cross sectional survey

Genome Annotation and In-Silico Characterization of Biocontrol-Related Genes in an Indigenous *Bacillus* Strain

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Abstract:

Globally, soil-borne fungal diseases cause large agricultural losses, making sustainable and environmentally acceptable biocontrol solutions necessary. A viable option is *Bacillus* sp. TD11, an indigenous strain that was previously obtained from a local environment and shown to be effective in controlling tomato fungal infections (Malik et al., 2022). The present study was carried out to mine the putative genes involved in the biological control of plant pathogenic fungi. For this purpose, illumina single-end whole-genome sequencing (2.95 million reads; 36–251 bp) was carried out. Raw reads were quality-filtered using Trimmomatic and assembled de novo with SPAdes, assembly quality was assessed with QUAST and CheckM. Functional genome annotation was achieved using Prokka, InterProScan and eggNOG-mapper. Biosynthetic gene clusters (BGCs) were predicted by antiSMASH and the Transformer-based neural network platform BGC-Prophet. Comparison genomic analysis used MultiGeneBlast, with the BiG-FAM database. DeepSeMs was used for the AI-guided structural prediction of secondary metabolites produced from unknown BGCs. The carbohydrate-active enzymes (CAZymes) were determined by the triple-algorithm pipeline of dbCAN3. Taxonomic placement was achieved using Average Nucleotide Identity (ANI) analysis (FastANI) and a maximum-likelihood phylogenomic reconstruction with IQ-TREE. A 6.25 Mbp assembly over 96 contigs (N50 = 378,017 bp; biggest contig = 1,028,257 bp) with 99.41% completeness and 0.16% contamination was obtained from high-quality sequencing data (2,949,212 reads; Q30+; 34% GC). Prokka annotated 6,184 CDS, 104 tRNAs, 14 rRNAs, and 1 tmRNA. Over 85% of predicted proteins were given functional domains by InterProScan, which also identified hydrolases, ABC transporters, NRPS adenylation/condensation domains, and sporulation determinants that are important for biocontrol. 47 genes in the defence and secondary metabolite categories were identified using eggNOG COG analysis. NRPS, PKS, RiPPs, terpenes, and siderophores are among the nine biosynthetic classes in which antiSMASH predicted 18 BGCs. Terpenes (65%) and alkaloids (23%) dominated the 434 projected biosynthetic areas found by BGC-Prophet. Three novel BGCs with no discernible homology to any known *Bacillus* genome were found by MultiGeneBlast and BiG-FAM analyses: a terpene cluster (NODE-1) that is predicted to encode a polyene-pyrrolidine-dione enzyme inhibitor, a sactipeptide cluster (NODE-30) that resembles stechlisin C3 and has an antimicrobial peptide function, and a bacteriocin cluster (NODE-38), which resembles tyrocidine and has broad-spectrum antibacterial activity. 97 high-confidence CAZymes were found by dbCAN3, which directly supports the possibility of fungal cell wall breakdown. The closest genomic relatedness to *Bacillus cereus* (98.41%) and *Bacillus thuringiensis* (96.22%) was validated by ANI analysis, and phylogenomic reconstruction identified TD11 as a separate lineage within the *B. subtilis* complex. This study establishes *Bacillus* sp. TD11 as a genomically robust, locally tailored biocontrol agent by providing the first complete genomic blueprint of the organism. Along with a large CAZyme repertoire, the identification of three possibly novel BGCs with anticipated antibacterial

effects offers a solid molecular basis for focused experimental validation and development as a sustainable biopesticide for regional agricultural deployment.

Keywords: Bacillus sp. TD11, genome annotation, biosynthetic gene clusters, biocontrol, antiSMASH, CAZymes, novel BGCs, in-silico characterization, indigenous strain, sustainable agriculture

O-017

Stimuli-Responsive Colon-Targeted Chitosan Nanocarriers Coated with Eudragit S-100 for Enhanced Oral Delivery of Paclitaxel in Breast Cancer Therapy

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Abstract:

Paclitaxel is one of the most effective drugs used in the treatment of breast cancer; however, its clinical benefit after oral administration remains limited because of its poor water solubility and low absorption in the gastrointestinal tract. To address these challenges, the present study developed a novel colon-targeted nanoparticle system based on chitosan and Eudragit S-100 to improve the oral delivery of paclitaxel. Initially, paclitaxel was complexed with sulfobutyl ether- β -cyclodextrin to increase its solubility. The drug complex was then encapsulated into chitosan nanoparticles using ionic gelation, followed by coating with the pH-sensitive polymer Eudragit S-100 through solvent evaporation. This innovative coating strategy was designed to protect the drug in the acidic environment of the stomach and allow controlled release in the intestinal region, where drug absorption is more favorable. The optimized uncoated nanoparticles exhibited a particle size of 281.8 ± 98.53 nm and an entrapment efficiency of $74 \pm 0.52\%$. Following coating, particle size increased to 425.01 ± 99.34 nm, while the surface charge shifted from positive to negative, confirming successful deposition of the Eudragit layer. The coated nanoparticles showed minimal drug release in acidic medium, demonstrating effective gastric protection. In contrast, a sustained release profile was observed at intestinal pH, with nearly 40% of the drug released over 24 hours. Overall, the developed nanocarrier system offers a modern and promising strategy for oral chemotherapy by enhancing the stability, protection, and controlled release of paclitaxel. Such a formulation may contribute to improved patient compliance and better therapeutic outcomes in breast cancer management.

Keywords: Paclitaxel, Breast Cancer, Oral Chemotherapy, Chitosan Nanoparticles, Eudragit S-100, pH-Responsive Drug Delivery, Colon-Targeted Nanocarriers, Controlled Release, Cyclodextrin Complex, Nanomedicine

O-018

Triptolide and Mitochondrial Toxicity

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Abstract:

Mitochondrial dynamics plays an important role in mitochondrial quality control. Mitochondrial dynamics is controlled by fusion and fission events. We observed that triptolide increased the expression of Drp1 fission protein and decreased the Mfn1 fusion protein expression in a time-dependent manner. Triptolide increased the translocation of Drp1 to mitochondria where it started fission. Increased mitochondrial fission released cytochrome c from mitochondria into the cytosol where it activated caspase-3. Co-treatment with Mdivi-1 (Drp1 inhibitor) inhibited the shifting of Drp1 to mitochondria and blocked cytochrome c release to the cytosol with subsequent deactivation of caspase-3 *in vitro* and *in vivo*. Electron micrographs showed that triptolide treatment to female Wistar rat liver tissues exhibited cristae destruction and vacuolar formation in mitochondria. Taken together these results proved that triptolide induced liver injury is linked with Drp1 associated mitochondrial apoptosis.

Keywords: Triptolide, DRP1, Mitochondria, Hepatotoxicity

O-019

A comprehensive assessment of phytochemicals from *Phyla nodiflora* (L.) Greene as a potential enzyme inhibitor, and their biological potential: An in-silico, in-vivo, and in-vitro approach

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Abstract:

This work explored *Phyla nodiflora* (L.) Greene as a potential source of the bioactive medicinal agent. In this aspect, methanol (PN-M) and dichloromethane (PN-D) extracts were prepared from the whole plant and evaluated for phytochemical composition (total bioactive contents, UHPLC-MS analysis, and HPLC-PDA polyphenolic quantification), biological (antioxidant and enzyme inhibition) potential and in-vivo toxicity. The PN-M was found to contain higher phenolic (26.08 mg GAE/g extract) and

flavonoid (50.25 mg QE/g extract) contents which might correlate to the higher radical scavenging (DPPH: 52.94 mg TE/g extract; ABTS: 72.11 mg TE/g extract) and reducing power (FRAP: 71.96 mg TE/g extract; CUPRAC: 142.65 mg TE/g extract) antioxidant potential, as well as AChE (4.33 mg GALAE/g extract), tyrosinase (125.36 mg KAE/g extract), and amylase (1.86 mmol ACAE/g extract) inhibition activity of this extract. In contrast, the PN-D extract was found to be most active for phosphomolybdenum (1.30 mg TE/ g extract) and metal chelation (54.84 mg EDTAE/g extract) assays in addition to BChE (4.70 mg GALAE/g extract) and glucosidase (0.62 mmol ACAE/g extract) enzyme inhibition activity. The PN-M extract on UHPLC-MS analysis revealed the tentative identification of 24 different secondary metabolites, most of which belonged to the flavonoid, glycoside, and terpenoid classes of phytochemicals. The polyphenolic composition of the extracts was appraised by HPLC-PDA. Seven phenolic compounds were identified in the extracts. PN-M was found to be rich in catechin (0.25 µg/extract) and 3-OH benzoic acid (0.64 µg/extract), while PN-D contained epicatechin (0.30 µg/extract), 3-OH-4-MeO benzaldehyde (0.21 µg/extract), and 2,3-Di-Meo benzoic acid (0.97 µg/extract) in higher amounts. The methanol extract was found to be non-toxic even at higher doses. Furthermore, the relationship between the phytochemicals and the tested enzymes was highlighted by molecular docking studies. In sum, this research showed that the studied extracts were effective as enzyme inhibitors and antioxidants, suggesting it would be worth investigating in more depth for further advanced studies to explore its pharmacological properties.

Keywords: *Phyla Nodiflora*, Phytochemicals, Anti-oxidants, Enzyme Inhibition, Toxicity, HPLC

O-020

Neuroprotective Effects of Troxerutin and Selenium Supplementation against Sub-Acute Cypermethrin-Induced Oxidative Stress and Behavioral Dysfunction in Mice

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Abstract:

The current research was intended to explore the potential effectiveness of single and combined supplementation of troxerutin (Trx), and selenium (Se) against cypermethrin (Cyp)-induced neurotoxicity and oxidative stress in mice. Thirty mice were randomly divided into five equal groups. The control and received a basal diet and 0.9% normal saline orally. Cyp group received 5 mg/kg of Cyp orally, Trx+Cyp group received 150 mg/kg Trx along with Cyp orally, Se+Cyp group received 25 µg/kg Se orally along with Cyp, and Trx+Se+Cyp group received 150 mg/kg Trx and 25 µg/kg Se along with Cyp orally for 28 days. The single and combined supplementation of Trx and Se in mice provided significant improvement in motor impairment, anxiety, and memory dysfunction caused by Cyp. Trx and Se single and combined supplementation decreased the serum ALT, AST, creatinine, and urea concentrations compared to Cyp group. Moreover, Trx and Se single and combined supplementation reduced the Cyp-induced oxidative stress and increased the SOD activity in serum, brain, liver, and kidney tissues. Combined supplementation of Trx and Se enhanced brain acetylcholinesterase activity compared to Cyp group. The results indicate that the single as well as combined supplementation of Trx and Se were equally effective in reducing the Cyp-induced sub-acute

neurotoxicity by improving the behavioral attributes, redox status, liver and kidney health markers in mice.

Keywords: Acetylcholinesterase, Antioxidant enzymes, Behavior tests, Cypermethrin, Neurotoxicity, Oxidative stress, Selenium, Troxerutin

O-021

Isolation, Molecular Characterization and Prevalence of Shiga Toxin Producing *Escherichia Coli* from Pasteurized and Unpasteurized Milk Samples in District Faisalabad

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Abstract:

Milk plays vital role in providing nutrients and essential elements. It is a rich source of valuable proteins and vitamins. It may also harbor harmful contaminants like heavy metals and diverse types of pathogenic bacteria such as *Escherichia coli*. Among various milkborne bacterial pathogens, *E. coli* is commonly isolated pathogen. Microbiological analysis of dairy product is essential to ensure the quality. Number of shiga toxin producing *E. coli* (STEC) infections have been increasing rapidly due to consumption of raw milk. The purpose of this study was to isolate *E. coli* from milk samples, to evaluate the prevalence of STEC, resistance pattern of STEC, and genome identification of virulent genes *stx1* and *stx2*. A total of 150 milk samples (100 for unpasteurized, 25 for pasturized) were collected from different areas of District Faisalabad. The milk samples were cultured on MacConkey agar. Isolated colonies were confirmed by biochemical testing and Gram staining. Molecular characterization of isolates was done by performing PCR by using specific primers. Antibiotic resistance of isolates against specific antimicrobial drugs like Cefixime, Ciprofloxacin, Amoxicillin, Amikacin and Ampicillin, was determined by using disc diffusion method. 32 positive samples of *E. coli* (19 from Sahiwal cow and 13 positive samples were from cross breed cow milk) from UAF farms. 29 positive samples of *E. coli* (21 positive for Cross breed and 9 positive from Sahiwal cow) were collected from Ghulam Muhammad Abad Farms. Pasteurization was done under controlled condition. There was no growth detected in 50 pasteurized samples. Prevalence and distribution of STEC in milk samples, were monitored to ensure food safety and mitigate the risk of STEC-related infections. Statistical data was analyzed by using ANOVA.

Key words: *Escherichia coli*, Shiga toxin, Milk, STEC, Antibiotic Resistance, Infections

O-022

Waste to Wealth: Valorization of Food By-products into Nutraceuticals and Functional Ingredients

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Abstract:

The growing production of food waste has turned out to be a significant worldwide issue that is raising huge challenges to the environment, economy and society. The waste valorization notion has gained popularity in recent years as a sustainable approach of transforming agro-industrial by-products into

value-added products. This paper discusses the possibility of conversion of residues of food processing, including the fruit peels, vegetable trimmings, cereal brans, and dairy by-products, into nutraceuticals and functional ingredients possessing health-promoting properties. These by-products are highly concentrated in bioactive compounds, such as polyphenols, dietary fibers, peptides, vitamins, and essential fatty acids, which have antioxidant, anti-inflammatory, antimicrobial, and cardio protective properties. High-tech technologies like enzymatic hydrolysis, microbial fermentation, ultrasound-assisted extraction, and other processes designed using green technologies have made the process of extracting these useful compounds more efficient and sustainable. Such technologies not only enhance the yields of extraction, but also guarantee low environmental effects. Moreover, the inclusion of these functional ingredients in food systems helps in enhancing some healthy food products and also lowers the use of synthetic food additives. This solution is in line with the principles of a circular economy because it reduces wastage, maximizes the use of resources and generates economic opportunities in the food industry. Although this has great potential, scalability, regulatory limitation, and consumer acceptance are some of the most vital issues of consideration. Thus, further studies and invention are necessary to make the most of food waste valorization. This study highlights the importance of sustainable practices in transforming food by-products into high-value nutraceuticals, thereby contributing to environmental sustainability, food security, and improved human health.

Keywords: Food waste valorization, Nutraceuticals, Functional ingredients, Bioactive compounds, Circular economy, Sustainable food systems, Agro-industrial by-products, Green extraction technologies

O-023

Nanoplastic Ingestion and Cellular Integrity: Mechanistic Insights into Genotoxicity and Oxidative Stress in Human Intestinal Models

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Abstract:

The widespread occurrence of nanoplastics (NPs) in the food chain has raised a lot of concerns about the effect of the nanoparticles on the long-term human gastrointestinal health. This paper reviews the process by which ingested NPs, such as polystyrene and polyethylene, induce cellular integrity and oxidative stress as well as genotoxicity in high-order human intestinal models, including Caco-2 monocultures and Caco-2/HT29-MTX/Raji B co-cultures. We demonstrate that NPs can be easily taken up by intestinal epithelial cells, and uptake efficiency, and subsequent toxicity, is highly determined by the physical-chemical characteristics of the particles and protein corona build-up. After internalization, NPs cause severe and concentration-dependent oxidative stress, which is marked by an increase in the level of reactive oxygen species (ROS) and intense mitochondrial dysfunction. Above all, these data suggest that NPs are the major inducers of indirect genotoxicity, with disruption of DNA damage response (DDR) signaling and silencing of genes necessary to repair DNA damage, and not necessarily

due to induction of direct DNA strand breaks. Moreover, long-term exposure was also observed to affect the functioning of epithelial barriers, however, co-culture models with mucus-producing cells offer some degree of cell defense. These findings offer a molecular-based comprehensive view of the dangers in nanoplastic ingestion either revealing the possibilities of chronic exposure to destabilize intestinal homeostasis and encourage genomic instabilities.

Keywords: Nanoplastics, Oxidative Stress, Genotoxicity, Caco-2 Co-culture, DNA Damage Response

O-024

Green Synthesis of Zinc-Oxide Nanoparticles Using *Achyranthes Aspera* Leaf Extract and their Potent Action Against the Poultry Pathogens

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Abstract:

Nanotechnology is an emerging field worldwide because of its tremendous properties linked to the high surface area to volume ratio, improved pharmacokinetic profile, and targeted drug delivery. In the current study, zinc oxide nanoparticles (ZnO NPs) were synthesized from *Achyranthes aspera* leaf extract, characterized by UV/Visible spectroscopy, XRD, SEM, FTIR, AFM and evaluated for antibacterial efficacy against poultry pathogenic bacterial strains. UV-visible absorption peak was found at 370 nm. XRD showed hexagonal wurtzite structure of ZnONPs while SEM results indicated an average size less than 100 nm with a minimum and maximum size of 28.63 and 61.42 nm, respectively. Further analysis of synthesized nanoparticles by FTIR showed stretching frequency at 3393.14 cm⁻¹, 2830.99 cm⁻¹, 2285.23 cm⁻¹, and 2108.78 cm⁻¹. The antibacterial activity of newly developed nanoparticles was investigated against common poultry pathogens *Salmonella gallinarum* and *Salmonella enteritidis* by the disk diffusion method. It showed zones of inhibition with a diameter of 27.6 and 28.8 mm. The minimum inhibitory concentration was 0.39 and 0.195 mg/mL, respectively, which was quite interesting compared to extract zero activity at this concentration. Characterization with different techniques showed a uniform and stable synthesis of ZnO NPs. Furthermore, the findings confirm the higher activity of nanoconjugate in comparison to leaf extract and pure drug against pathogenic bacteria.

Keywords: Poultry pathogens, green synthesis, *Achyranthes aspera*, surface characterization, zinc oxide nanoparticles

O-025

Astaxanthin Preserve Chicken Meat Quality Under Heat Stress by Exerting Anti-Oxidative and Anti-Inflammatory Effects

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Abstract:

Global climate change has intensified heat stress (HS), negatively affecting poultry performance, immune function, and meat quality. HS disrupts water-holding capacity, texture, and oxidative stability, leading to economic losses. Astaxanthin (AST), a red carotenoid pigment with potent antioxidative and anti-inflammatory properties, may enhance poultry resilience under HS conditions. This study examines the effects of dietary AST supplementation on Frizzle chicken meat quality, focusing on antioxidant defense, muscle fiber integrity, and inflammatory regulation. A total of 180 Three Yellow curly feathered female chickens (aged 138 days) were assigned to five experimental groups (A–E). Group A was maintained under thermoneutral conditions, while Groups B–E experienced HS ($32^{\circ}\text{C} \pm 1^{\circ}\text{C}$) for two weeks. AST supplementation was provided at 20 mg/kg, 40 mg/kg, and 80 mg/kg to Groups C, D, and E, respectively. Meat quality parameters including pH, color, shear force, cooking loss, and drip loss were assessed alongside texture profile analysis (hardness, adhesiveness, chewiness, gumminess, resilience). Muscle fiber morphology was examined via hematoxylin-eosin (H&E) staining, while gene expression related to oxidative stress, lipid metabolism, and inflammation (SOD, CAT, GPX, FAS, ACC, PPAR- α , NF- κ B, MyD88, TLR-4, IL-6, TNF- α) was analyzed via RT-qPCR. Statistical analysis was performed using one way ANOVA, with $P < 0.05$ considered significant. Meat quality analysis results indicated Group B had significantly higher shear force (26.5 ± 2.167 , $P = 0.001$) and cooking loss (40.55 ± 2.597 , $P = 0.0391$) than Group A. AST supplementation at 40 mg/kg (Group D) improved shear force (17.9 ± 1.065 , $P = 0.001$) and moisture retention, enhancing tenderness. No significant differences were observed in pH ($P = 0.9757$) and drip loss ($P = 0.9932$) among groups, except for a slight increase in cohesiveness ($P = 0.0795$) in Group E. Muscle fiber analysis revealed significant atrophy in heat-stressed chickens, with fiber cross-sectional area reduced in Group B ($1760 \pm 95.12 \mu\text{m}^2$, $P = 0.0055$) compared to Group A ($2342 \pm 158.1 \mu\text{m}^2$). AST supplementation restored fiber perimeter (Group D: $181 \pm 3.945 \mu\text{m}^2$, $P = 0.0465$), reinforcing AST's muscle protective effects. AST supplementation significantly modulated gene expression under HS. GPX expression in thigh muscle (Group D: 1.498 ± 0.1625 , $P = 0.0295$) and SOD expression in liver (Group D: 1.535 ± 0.1693 , $P = 0.0069$) were upregulated, indicating improved antioxidant defense. NF- κ B and TLR-4 expression in liver (Group B: 1.705 ± 0.1331 , $P = 0.0045$) indicated heightened inflammation; however, AST supplementation reduced NF- κ B expression (Group D: 0.6433 ± 0.05702 , $P = 0.0846$). AST also normalized FAS and ACC expression, preventing excessive fat accumulation and preserving meat quality. The results suggested that AST supplementation at 40 mg/kg effectively mitigates HS-related effects, improving antioxidant enzyme activity, regulating fat metabolism, and suppressing inflammatory markers. This study provides valuable insights for optimizing feed additives in the poultry industry, particularly under heat stress conditions.

Keywords: Climate Change, Heat Stress, Astaxanthin, Meat Quality, Poultry

O-026

Synthesis Of Ca-Zn Bi-Metal Composite-Loaded Chitosan for Photocatalytic Application

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Abstract:

Rapid industrialization has increased the release of organic dyes into water, posing a threat to aquatic ecosystems and human health. Conventional wastewater treatment methods are ineffective against organic dyes due to their chemical stability and resistance to biodegradation. Photocatalysis offers sustainable technology for dye degradation using metal-oxide semiconductors. However, pure metal-oxide semiconductors have limited photocatalytic potential due to rapid charge recombination and high band-gap energies. This can be resolved by incorporating a natural biopolymer, such as chitosan, which is an efficient, biodegradable, and biocompatible component. The study aimed to develop chitosan-loaded calcium zincate (Ca-Zn) nanocomposites and evaluate their potential as effective photocatalysts. Calcium zincate (Ca-Zn) nanocomposites were synthesized via the sol-gel method and subsequently loaded with chitosan. Three different compositions were prepared with varying molar ratios (1:1, 1:2, 2:1) of chitosan and the nanocomposites. Characterization of the synthesized material was performed using Fourier transform infrared (FT-IR) and ultraviolet-visible (UV-VIS) spectroscopy. The photocatalytic potential of the synthesized catalysts was evaluated by monitoring the degradation of Methylene blue (MB) dye in an aqueous solution under sunlight irradiation. The UV-Vis spectrum revealed that the chitosan-loaded Ca-Zn nanocomposite (2:1) exhibited higher photodegradation efficiency (37%) than the pure Ca-Zn nanocomposite (16%), highlighting the role of chitosan as a stabilizing and capping agent, thereby providing efficient interaction between the nanocomposites and dye molecules.

Keywords: Photocatalysis, Chitosan, Nanocomposites, Calcium Zincate, Methylene Blue Dye

O-027

Investigation of the Relationship Between Hypothyroidism with Non-Alcoholic Fatty Liver Disease

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Abstract:

Hypothyroidism is an endocrine disorder marked by reduced thyroid hormone levels. It can be genetic or acquired, with acquired type that is primary hypothyroidism being more common. Subclinical hypothyroidism includes moderately high TSH levels (>4mIU/mL) along with normal thyroid hormones, whereas clinical hypothyroidism is defined by high levels of thyroid stimulating hormone (TSH>10mIU/L) and low free thyroxine (FT4). Non-alcoholic fatty liver disease (NAFLD) is a chronic liver condition identified by fat buildup in hepatic cells without excessive use of alcohol and is greatly linked with metabolic disorders such as insulin resistance and obesity. This cross-sectional study was aimed to examine the relationship between hypothyroidism and non-alcoholic fatty liver disease (NAFLD). Adults aged between 20-60 years of both genders were enrolled after obtaining written informed consent. Data was obtained using a standardized questionnaire to record demographic characteristics, life style factors, clinical history and laboratory findings. Statistical analysis was performed using SPSS version 20. The results showed a statistically significant association between hypothyroidism and NAFLD ($p > 0.05$), with both overt and subclinical hypothyroidism being more prevalent among NAFLD patients. NAFLD was more commonly present in obese females having sedentary lifestyle and thyroid dysfunction. This study concludes that hypothyroidism is significantly associated with NAFLD, emphasizing the importance of early management and screening.

Keywords: Hypothyroidism, Non-alcoholic Fatty Liver Disease, Thyroid Dysfunction,

Cross-sectional

O-028

Assessment of Utilization of Safe Family Planning Services Among Women in District SwatNazifa Shah^{1*}, Razia Bibi¹¹Department of Biosciences, University of Wah, Wah Cantonment***Correspondence:** Nazifa.khan2024@gmail.com**Abstract:**

Safe family planning services enhance good health of mothers and children, reduce unplanned pregnancies, and enhance the independence of women. Although these are beneficial, underutilization in most districts in Pakistan is caused by social and cultural constraints, low awareness and bad accessibility. This paper will analyze the safe family planning services in District Swat and the impediments to its utilization by women. This is a cross-sectional study that took place in a District Swat among women between the age of reproductive (15-49 years). It was structured to a focused and narrowed questionnaire to obtain data on sociodemographic, family planning awareness and knowledge, available service, current and past use of contraception, current government, and perceived obstacle. The overall utilization was determined by descriptive statistics whereas the inference regarding the factors that contributed to utilization was made using the key variables such as education, residence, parity, spousal support, and access to health services. The majority of women had heard about the family planning methods but there had been low utilization of safe family planning methods. Women who had received some education and had more health knowledge and those who had supportive husbands were more prone to using the modern methods of contraception. Fears of side effects by the participants and the misconception that birth control methods are bad and that family planning counselling is a waste of time, culture does not allow women to seek services, men prefer to make decisions, and distance and /or cost limits access. It was also revealed by the study that the higher the supply of the health workers and counselling, the more the use safe means of family planning. Knowledge, socio-cultural beliefs, and services gaps are deficient in District Swat which leads to the lack of safe family planning methods by women. This is enhanced through (a) counselling, (b) community awareness programme, and men and religious leaders. To change, there should be women-centred and culturally sensitive services with contraceptive methods available at the primary health care facility.

Keywords: Family planning services, Contraceptive utilization, Maternal health, District Swat, Pakistan, Cultural barriers, Women's reproductive health

O-029

Predisposition Of *FOXQ1* Gene Variants in Pancreatic Cancer RiskAila Ilham¹, Saba Zafar^{1*}, Haris Khurram²¹Department of Biochemistry and Biotechnology, The Women University Multan, Pakistan²Department of Sciences and Humanities, National University of Computer and Emerging Sciences, Chiniot-Faisalabad Campus, Pakistan***Correspondence:** saba.6498@wum.edu.pk**Abstract:**

Pancreatic cancer is the sixth leading cause of cancer-related mortality and the twelfth most prevalent malignancy worldwide, with adenocarcinoma being the most common form. Due to its asymptomatic

nature in early stages and late clinical presentation, prognosis remains poor despite modest improvements in survival rates. This study investigated the association of single-nucleotide polymorphisms (SNPs) in the *FOXQ1* gene with pancreatic cancer in the Southern Punjab population of Pakistan. A total of 100 participants, including 50 diagnosed patients and 50 healthy controls, were enrolled. Blood samples were collected and genotyped using the TETRA-ARMS PCR method, followed by agarose gel electrophoresis. Two SNPs, rs9502893 and rs11242679, were analysed alongside demographic and clinical factors such as age, gender, BMI, diabetes, smoking, and family history. Statistical analysis using SPSS revealed that BMI, gender, diabetes, and family history were significantly associated with increased pancreatic cancer risk. Logistic regression indicated a positive association of these factors with disease risk, while the GG genotype showed a protective effect. Classification and regression tree (CRT) analysis identified age, BMI, gender, and haplotypes as key predictors of pancreatic cancer. Specific haplotypes (TCGG, TCAA, CCGG, CCAG, TTAG) were significantly associated with increased risk, whereas others (TCAG, TTAA, TTGG, CCAA) showed no significant impact. These findings highlight the role of *FOXQ1* genetic variants and clinical factors in pancreatic cancer susceptibility, emphasizing their potential utility in risk prediction and early diagnosis.

Keywords: Pancreatic cancer, Machine learning, Single Nucleotide Polymorphism

O-030

Synergistic Chitinolytic Activity of TLP And PR1: Implications for Broad-Spectrum Plant Resistance

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Abstract:

Pathogenesis-related (PR) proteins have been combined for effective plant disease control, yet their synergistic mechanisms remain unexplored at the molecular level. This study elucidates the molecular basis of synergism between thaumatin-like protein (TLP) and PR1 using computational (in silico) methods. Analyses encompassed physicochemical properties, subcellular localization predictions, topological and domain characterization, conserved motif identification, phylogenetic relationships, secondary and tertiary structure prediction, molecular docking and simulation of TLP and PR1 individually and combined with key fungal cell wall components. Physicochemical profiling indicated TLP as a neutral, hydrophobic, thermostable protein, while PR1 was acidic, hydrophilic, and thermostable. Both were predicted to localize extracellularly, with TLP exhibiting transmembrane topology and PR1 positioned externally. Docking simulations revealed superior binding affinities for the TLP-PR1 complex versus individual proteins against chitin, chitosan, glucan, and mannan. These computational insights highlight the synergistic chitinolytic mechanism of TLP-PR1, suggesting their co-expression could potentiate broad-spectrum antifungal defense and inform strategies for engineering durable plant resistance.

Keywords: Thaumatococcus-like protein (TLP), PR1 protein, Chitinolytic activity, Synergistic antifungal defense, Molecular docking

O-031

**Antibacterial, Antioxidant and Antidiabetic Activities of Bioactive Secondary Metabolites
Extracted from *Kocuria Oceanii***

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Abstract:

The bioactive secondary metabolites (BSMs) produced by *Kocuria oceanii* exhibit potent biological activities. In the current study, BSMs from *K. oceanii* were extracted using a plate scrape extraction method with methanol as the solvent. A well diffusion assay was conducted to assess the antibacterial potential of the BSMs against selected pathogenic bacteria (*Escherichia coli*, *Staphylococcus aureus*, *Serratia marcescens*, and *Bacillus cereus*). These metabolites showed strong antibacterial activity against *E. coli*, *S. aureus*, *S. marcescens*, and *B. cereus*, with mean inhibition zones of 24±0.57 mm, 30.66±0.33 mm, 30±0.58 mm, and 31.33±0.33 mm, respectively. Additionally, the results demonstrated potent in vitro antioxidant, anti-inflammatory, anti-diabetic, and anti-lipidemic activities of the BSMs in a dose-dependent manner (25, 50, 100, 150, 300, and 600 µg/mL). Electrospray ionization mass spectrometry (ESI-MS/MS) analysis of the BSMs indicated the presence of succinic acid, meglutol, glutamic acid, and caffeic acid in negative mode. Notably, meglutol is a cholesterol-lowering agent and is reported as an anticholesteremic drug. Furthermore, a profile of 15 fatty acids present in *K. oceanii* BSMs was identified using gas chromatography-mass spectrometry (GC-MS). These analyses suggest that the production of secondary metabolites in *K. oceanii* collectively contributes to its pharmacological and biological activities.

Keywords: *Kocuria oceanii*, BSMs, ESI-MS/MS, GC-MS, Anticholesteremic drug

O-032

**Whole Exome Sequencing Identified a Novel Mutation in *GUCY2D*
Gene in a Large Consanguineous Pakistani Family that Diagnosed it to Leber Congenital
Amaurosis 1**

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Abstract:

A large inbred Pakistani family that could not be diagnosed due to differential clinical background was diagnosed to Leber congenital amaurosis 1 with the help of whole exome sequencing (WES). A potentially pathogenic novel variant in *GUCY2D* (NM_000180.4), was identified. Bidirectional Sanger sequencing was carried out for validation and segregation analysis of the variants identified within the family. A homozygous pathogenic variant was identified in *GUCY2D* at c.315C>A leading to p.Cys105Ter associated with autosomal recessive 'Leber congenital amaurosis 1. The variant introduces an early premature stop codon predicted to trigger nonsense-mediated mRNA decay, resulting in loss of transcript and protein. In silico analyses uniformly support a loss-of-function effect, with truncation of all essential catalytic and transmembrane domains and strong evolutionary conservation at the affected residue. Absence from population databases and consistent pathogenic classification in ClinVar confirm its role in Leber congenital amaurosis (LCA1) and related retinal dystrophies. This variant has never been reported in other patients, and the results of Sanger sequencing revealed that the variants segregates in the pedigree. All the affected members were homozygous for the change and parents were heterozygous.

Key words: Genetic disorders, Leber congenital amaurosis, Consanguinity, molecular diagnosis

O-033

Prevalence Of Hyperprolactinemia and its Association with Infertility in Females of District Chakwal

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Abstract:

Hyperprolactinemia is an endocrine disorder characterized by high levels of prolactin, a hormone produced by the anterior pituitary gland that has major role in lactation and fertility control. This hormonal imbalance can disrupt ovulation, leading to infertility in women. It may also lead to amenorrhea, anovulation, and galactorrhea. Infertility is defined as the inability to conceive after 12 months of trying, and it affects almost 8-12% of couples worldwide. This cross-sectional study aimed to determine the prevalence of hyperprolactinemia and its association with female infertility among women in District Chakwal. Infertile females aged between 18 and 45 years were listed after obtaining written informed consent. Data was obtained using a standardized questionnaire to record demographic characteristics, reproductive history, clinical features, hormonal profiles, and lifestyle factors. After data collection, statistical analysis was performed using SPSS version 20. The findings showed a statistically significant association between hyperprolactinemia and infertility, as the p-value is less than 0.05 ($p < 0.05$). Hyperprolactinemia is frequently observed among infertile females having menstrual abnormalities. This study highlights that higher prolactin levels may play an important role in female infertility by causing monthly irregularities and hormonal imbalance. Early treatment and detection of hyperprolactinemia should be regarded as an important part of infertility assessment in women.

Keywords: Hyperprolactinemia, Female infertility, prolactin levels, Menstrual irregularities

O-034

FIB-4 Index as a Predictor of Symptomatic Intracranial Haemorrhage After Reperfusion Therapy in Acute Ischemic Stroke: A Systematic Review and Meta-Analysis

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Abstract:

Symptomatic intracranial haemorrhage (sICH) is one of the most serious complications following reperfusion therapy in patients with acute ischemic stroke. Identifying reliable predictors of sICH is crucial for risk stratification and treatment decision-making. The Fibrosis-4 (FIB-4) index, a non-invasive marker of liver fibrosis based on age, platelet count, and liver enzyme levels, has been associated with systemic inflammation, coagulopathy, and vascular dysfunction. Emerging evidence suggests that higher FIB-4 scores may be associated with an increased risk of hemorrhagic Transformation. However, findings across individual studies remain inconsistent. Therefore, we conducted a systematic review and meta-analysis to evaluate the prognostic value of the FIB-4 index for predicting sICH in patients with acute ischemic stroke undergoing reperfusion therapy. We systematically searched PubMed for observational studies. 3 studies were included. Odds Ratios (ORs) with 95% CI were extracted. We used R version 4.5.2 meta package to run Inverse Variance meta-analysis. Results: Three observational studies were included in the meta-analysis. Patients with higher FIB-4 scores had a significantly increased risk of symptomatic intracranial haemorrhage compared with those with lower FIB-4 scores. The pooled analysis demonstrated a significant association between elevated FIB-4 and sICH risk (OR=3.16, 95% CI 1.03-9.70; p= 0.0449). Moderate to substantial heterogeneity was observed among the included studies (I²= 85.6%). Sensitivity analysis using the leave-one-out method showed that the overall effect estimate remained generally consistent, although heterogeneity decreased when individual studies were excluded, indicating that the results were partially influenced by study-level variability. Elevated FIB-4 index is associated with a significantly increased risk of symptomatic intracranial haemorrhage after reperfusion therapy in patients with AIS. However, the substantial heterogeneity among studies highlights the need for larger prospective studies to confirm its prognostic value.

Keywords: Acute Ischemic Stroke, Symptomatic Intracranial Hemorrhage, Reperfusion therapy, FIB-4, Hemorrhagic transformation

O-035

Nanoparticles of Quercetin-Gellan Gum Conjugate for the Controlled Delivery of Fluconazole

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Abstract:

The aim of the study was to formulate the polymeric nanoparticles for the controlled delivery of fluconazole (FCZ) to enhance its absorption, mucosal adherence, and bioavailability. FCZ-loaded gellan gum-quercetin conjugate (GQC) nanoparticles (FCZ-loaded NGQ) were prepared by ionic gelatin method using GQC, surfactants, co-surfactants, and cross-linker. The nanoparticles were then characterized by various physical and chemical analytical tools such as ¹H NMR, FTIR, XRD, DSC, TGA, particle size, zeta potential, and SEM analysis. All the nanoparticles have a nanosized range from 108 nm to 123 nm with a zeta potential of 12 mV to 20 mV which shows their stability. The NGQ3 (optimized formulation) loaded with FCZ have a PDI of 0.20 ± 0.02 and % entrapment efficiency of 32.3 ± 2.8 %. These studies also showed promising results of 85 % drug release, the value for zero order kinetics of R² was 0.999, mucosal adherence of 24 h, and the highest values of permeation was shown by NGQ3 of 60 %. The improved antifungal activity of prepared NGQ3-DL against *Candida albicans* was observed compared to the pure drug. The nanoparticles may offer enhanced bioavailability.

Keywords: Quercetin, Gellan gum, Quercetin-Gellan gum conjugate, *In-vitro* drug release, Controlled delivery

O-036

Synergistic Integration of Machine Learning and Colorimetric Sensing for Early Oxalic Acid Detection Via Drug-Mediated CuO Nanoparticles

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Abstract:

Hyperoxaluria is a significant clinical condition associated with an elevated risk of kidney stone formation, progression to chronic renal failure, and potential cardiovascular complications. In this context, copper oxide nanoparticles (CuO NPs) have attracted considerable attention due to their intrinsic colorimetric properties, cost-effectiveness, and suitability for global health monitoring. In the present study, novel paracetamol-mediated CuO NPs were successfully synthesized and comprehensively characterized using UV–Visible spectroscopy, FTIR, XPS, XRD, SEM, and HRTEM. The machine learning-assisted analytical framework was developed, incorporating four predictive models: Random Forest, Linear Regression, XGBoost, and Decision Tree Regression. UV–Visible analysis confirmed nanoparticle formation, exhibiting a characteristic surface plasmon resonance peak at 225 nm, while FTIR analysis revealed a distinct band at 850 cm⁻¹ corresponding to Cu–O stretching vibrations. Structural and morphological analyses via XRD and SEM indicated an average particle size of 27.51 nm with predominantly spherical morphology. The synthesized CuO NPs demonstrated pronounced intrinsic colorimetric behavior, observable both spectroscopically and visually, with a gradual fading of blue coloration upon increasing oxalate concentration. The developed

sensing platform enabled selective detection of oxalate over a concentration range of 1–120 μM , achieving a limit of detection of 0.23 μM and a limit of quantification of 0.78 μM . Validation using spiked real samples confirmed the applicability of the sensor for oxalate detection in urine, highlighting its potential for clinical diagnostics. Overall, the proposed biosensor provides a reliable approach for oxalate quantification, facilitating early diagnosis of hyperoxaluria and prevention of calcium oxalate kidney stone formation. Furthermore, the integration of machine learning significantly enhances the accuracy and robustness of colorimetric concentration prediction.

Keywords: CuO NPs, oxalic acid, kidney stone, hyperoxaluria, biosensor

O-037

Evaluation of Antidepressant Activity and Safety Profile of B-Calm and Barley Water in Comparison with Fluoxetine in a CUMS-Induced Depression Model in Sprague-Dawley Rats

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Abstract:

The present study aimed to evaluate the antidepressant potential and safety profile of B-Calm and Barley Water in comparison with Fluoxetine in a chronic unpredictable mild stress (CUMS)-induced model of depression in Sprague-Dawley rats. Depression was induced using the CUMS protocol. Animals were divided into control and treatment groups receiving B-Calm (low and high doses), Barley Water, Fluoxetine, and a combination of Barley Water with Fluoxetine. Behavioral assessments were conducted using the Sucrose Preference Test (SPT), Open Field Test (OFT), Tail Suspension Test (TST), and Forced Swim Test (FST) to evaluate anhedonia, locomotor activity, and behavioral despair. Safety evaluation included acute toxicity studies at doses up to 5000 mg/kg for B-Calm and 2000 mg/kg for Barley Water, along with sub-acute toxicity studies assessing behavioral changes, body weight, hematological and biochemical parameters (liver and kidney function tests), and histopathological analysis. Results Both B-Calm and Barley Water demonstrated significant antidepressant-like effects in the CUMS-induced model. Treated animals showed increased locomotor activity and body weight, along with reduced behavioral despair and anhedonia. B-Calm at a higher dose exhibited strong efficacy in SPT, OFT, and TST, whereas Barley Water showed marked effectiveness in the FST. Fluoxetine also produced significant antidepressant effects across all behavioral tests and served as a standard reference. Notably, the combination of Barley Water with Fluoxetine demonstrated enhanced antidepressant activity compared to individual treatments. Acute toxicity studies revealed no signs of morbidity or mortality at the tested doses, indicating that the oral LD₅₀ values were higher than the administered doses. Sub-acute toxicity studies showed no significant adverse effects on behavior, body weight, hematological indices, biochemical parameters, or tissue histology. Conclusion The findings of this study suggest that B-Calm and Barley Water possess significant antidepressant activity with a favorable safety profile, comparable to Fluoxetine in an experimental model of depression. These results support their potential as safe and effective natural therapeutic options. However, further investigations focusing on biochemical, molecular, and neurochemical mechanisms, along with well-designed clinical studies, are necessary to validate their efficacy and safety in humans.

Keywords: Depression, Chronic Unpredictable Mild Stress, B-Calm, Barley Water, Fluoxetine, Antidepressant Activity, Behavioral Tests, Sucrose Preference Test, Forced Swim Test, Toxicity Studies

O-038

Anti-Arthritic and Antioxidant Potential of *Gerbera Jamesonii* in Complete Freund's Adjuvant-Induced Arthritis Model

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Abstract:

Arthritis is chronic inflammatory condition characterized by advancing oxidative stress and joint degeneration, leads to development of effective and safer therapeutic agents. Medicinal plants are valuable source of biologically active constituents because of their rich phytochemical composition and good safety profile. The current study intent to evaluate anti-arthritic activity of *Gerbera jamesonii* using a Complete Freund's Adjuvant (CFA)-induced arthritis rat models. The entire plant was shade-dried, extracted and administered orally at doses of 50, 150 and 200 mg/kg. Treatment with extract at different doses leads to significant decrease in paw edema and prevention of weight loss, and marked improvement in locomotor activity. The extract suppressed significant pro-inflammatory cytokines, including TNF- α and IL-6. Biochemical investigation demonstrated a reduction in lipid peroxidation and evident increase in superoxide dismutase activity, signal increased antioxidant defense. Histopathological assessment showed reduced cartilage erosion, pannus formation and synovial hyperplasia which confirms fading of joint damage. In conclusion, Plant *Gerbera jamesonii* displays potent antioxidant and anti-arthritic activities, potentially driven by regulation of oxidative stress and inflammatory pathways. These results highlight its potential as a promising natural therapeutic agent for arthritis management and call for further phytochemical investigations.

Keywords: Phytochemical, Antioxidant, Anti-Arthritis, Anti-Inflammatory

O-039

Preventive role of Diosmetin on Amyloid- β -25–35-induced in Vitro Alzheimer's Disease Model

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Abstract:

Alzheimer's disease is a progressive neurodegenerative condition in which amyloid-related toxicity contributes to neuronal loss and functional decline. Experimental models using amyloid fragments offer a controlled way to study early cellular events linked to neurodegeneration. This study aimed to evaluate whether diosmetin, a plant-derived flavonoid, can protect neuronal cells against A β 25–35-induced cytotoxicity and explore the possible mechanism of action. Methods: An Alzheimer's-like injury model was established by exposing differentiated SH-SY5Y cells to A β 25–35. Cell viability following treatment with various concentrations of diosmetin (10–80 μ M) was quantified using the MTT assay. Cellular Damage was further examined with PI and DAPI staining. To investigate the

involvement of specific pathways, inhibitors were used in combination with diosmetin. Results: Exposure to A β 25–35 resulted in a marked reduction in cell viability. Diosmetin treatment produced a concentration-dependent increase in cell survival, with noticeable protection observed within the range of 10–80 μ M. Fluorescence staining showed a visible decline in cellular damage features in diosmetin-treated cells. The significant loss of protection in the presence of pathway inhibitors indicated that diosmetin's effect is mediated through MEK Kinase signaling pathway. Diosmetin attenuated amyloid-induced cytotoxicity in SH-SY5Y cells and reduced cell death, suggesting a neuroprotective effect. These findings highlight diosmetin as a potential therapeutic candidate that warrants further investigation in Alzheimer's disease models.

Keywords: Alzheimer's Disease, Apoptosis, Neurodegeneration, Neuroprotection, Diosmetin, Flavonoids

O-040

Exploring Antidiabetic Molecular Mechanism of Essential Oil of *Acacia Modesta* Wall

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Abstract:

Diabetes mellitus is a complex metabolic disorder characterized by chronic hyperglycemia, oxidative stress, and progressive organ dysfunction, posing a significant global health challenge. Conventional therapies often provide limited control over long-term complications and may involve adverse effects. Consequently, plant-derived bioactive compounds are increasingly explored for safer and more effective management strategies. Although essential oils from medicinal plants have demonstrated antidiabetic potential, the molecular mechanisms underlying the antidiabetic potential of *Acacia modesta* essential oil remain inadequately elucidated. Specifically, its impact on oxidative stress pathways, insulin-regulating genes, and tissue-level restoration has not been comprehensively studied. Additionally, the comparative effectiveness of its nanoemulsion form versus conventional formulations has not been systematically evaluated, limiting insights into its enhanced bioavailability and therapeutic performance in experimental diabetic models. This study aimed to evaluate the antidiabetic efficacy of *Acacia modesta* essential oil nanoemulsion in alloxan-induced diabetic rats. Nano emulsion effects on biochemical parameters, antioxidant activity, gene expression related to oxidative stress and insulin regulation, and histopathological changes were determined. The diabetic control, normal control, standard drug group (Glb 10mg/kg), and three treatment groups with AMNE 250mg/kg/b. w, 500mg/kg/b. w, and 750mg/kg/b. w were experimental groups. Diabetes was induced by a single ip injection of alloxan monohydrate at the dose of 140mg/kg/b. w After 28 days of treatment, all the rats were decapitated. Serum blood glucose, lipid profile, and liver enzyme levels were measured. Gene expression analysis of oxidative stress and insulin-related markers was performed using RT-PCR. Histopathological examination of liver and pancreatic tissues was conducted, and data were statistically analyzed to determine treatment efficacy. All treatment groups exhibited significant reductions in fasting blood glucose, improved lipid profiles, and decreased HbA1c levels. Antioxidant biomarkers,

including SOD and CAT, were elevated, while MDA levels were reduced in both serum and tissues. PCR analysis showed upregulation of Nrf2, GCLM, and insulin pathway genes (INS-1, Pdx-1, Ngn3), along with downregulation of Keap1 in pancreatic tissues. Histological examinations confirmed the preservation and restoration of pancreatic and hepatic architecture in treated animals. The nano emulsion exhibited dose-dependent efficacy, with the highest dose producing effects comparable to the standard drug. These results address the identified gap by providing mechanistic evidence and highlighting the superior therapeutic potential of nanoemulsion-based delivery. This study advances the theoretical understanding of plant-based antidiabetic therapies by elucidating the molecular and genetic mechanisms of *Acacia modesta* essential oil. It also demonstrates the practical advantage of nanoemulsion systems in enhancing bioavailability and therapeutic outcomes. These findings support the development of novel, natural, and effective treatment strategies for diabetes, with potential implications for pharmaceutical formulation in metabolic disease management.

Keywords: Acacia Modesta, Nano Emulsion, Diabetes Mellitus, Oxidative Stress, Gene Expression, Antidiabetic Activity

O-041

Potential of Nigella Sativa L.-Derived Metal and Bimetallic Nanoparticles as Nano biofertilizers for Enhancing Chickpea Performance Under Salinity

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Abstract:

Green chemistry and nanobiotechnology offer sustainable approaches for developing eco-friendly agricultural inputs with improved efficiency over conventional materials. In the present study, *Nigella sativa* L. seed extract was used as a bioreducing agent for the green synthesis of copper oxide (CuO), zinc oxide (ZnO), and bimetallic CuO-ZnO nanoparticles, which were evaluated as potential nanobiofertilizers for chickpea (*Cicer arietinum* L.) under salinity stress. The synthesized nanoparticles were characterized by UV-Visible spectroscopy, Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), dynamic light scattering (DLS), and X-ray diffraction (XRD). Chickpea plants were treated with nanoparticles through foliar application at 100, 250, and 500 mM, while salinity stress was imposed using 100 and 150 mM NaCl. Salinity stress markedly reduced plant growth and development, as reflected by decreases in shoot length, root length, fresh and dry biomass, number of leaves, and lateral root formation. However, foliar application of all three nanoparticle types alleviated the adverse effects of salt stress and improved both morphological and biochemical attributes of chickpea plants in a concentration-dependent manner. The most pronounced improvement was generally observed at 500 mM. In addition to promoting growth under both normal and saline conditions, nanoparticle treatments enhanced antioxidant defense responses, particularly catalase and peroxidase activities, indicating improved physiological adaptation to salinity. Among the tested formulations, CuO nanoparticles showed the highest effectiveness in mitigating salinity stress, followed by ZnO nanoparticles, while the CuO-ZnO nanocomposites also produced beneficial effects. Overall, the findings demonstrate that *Nigella sativa*-mediated metal nanoparticles, especially CuO

nanoparticles, have strong potential as eco-friendly nanobiofertilizers for improving chickpea growth and salinity tolerance. This study highlights their possible application in sustainable agriculture for enhancing crop performance in salt-affected soils.

Keywords: Nigella Sativa L., Biosynthesized Nanoparticles, CuO nanoparticles, ZnO nanoparticles, Bimetallic Nanocomposites, Chickpea, Salt Stress Tolerance, Growth Promotion, Oxidative stress mitigation, Sustainable Crop Production

O-042

Molecular Detection of Coronaviridae in Rodents from Bahawalpur

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Abstract:

Coronaviruses, belong to the family Coronaviridae and are associated with severe illness, epidemics, and death in humans and animals. Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS-CoV) are significant examples of zoonotic diseases. Rodents are the largest order of mammals composed of more than 2000 species, representing more than 40% of all mammalian species. Rodents are the major zoonotic source of human infectious diseases; often live at high densities and hence may harbor high levels of microbial diversity. This study was aimed to assess the prevalence of Coronaviridae in rodent populations in Bahawalpur, Pakistan using improved detection method such as reverse transcription PCR (RT-PCR). Between February and June 2024, 59 local rats were captured and fecal, oral, urinary swabs and organs were collected for analysis. We specifically targeted the RNA-dependent RNA polymerase gene (RdRP) using specific primers with RT-PCR. According to the results, eleven out of 20 sampled pools were tested positive for Coronaviridae showing 55% positivity rate. Results imply the prevalence of Coronaviridae in the population of rats in the Bahawalpur and their significant role in zoonotic transmission. The results underscore the need for ongoing wildlife surveillance to monitor coronaviruses proactively, thereby reducing the risk of unknown outbreaks and the spread of other infectious diseases.

Keywords: Coronavirus, Epidemiology, Rodents, RT-PCR (Reverse Transcription Polymerase Chain Reaction), Zoonotic

O-043

Anti-Arthritic and Toxicological Evaluation of Ethanolic Extract of Alternanthera Bettzickiana in Rats

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Abstract:

In many developing countries, medicinal plants have long been used for therapeutic purposes due to their low cost and toxicity. This study evaluated the safety and anti-arthritic potential of Alternanthera

bettzickiana ethanolic extract (ABEE). Acute oral toxicity (OECD 425) was tested in the safety evaluation. A limit test was used to identify the LD50 value. For an acute oral toxicity study a dose of 2000 mg/kg of ABEE was given orally to the treatment group, and the control group received distilled water at a rate of 10 ml/kg. Biochemical, hematological, and histopathological analyses were performed after 14 days. A formaldehyde 2% w/v solution was injected via i.p. to rats of all groups to prepare the arthritic model. Five groups were divided into control (D.H2O), standard (Diclofenac), and three groups receiving the plant extract at dose levels of 125 mg/kg, 250 mg/kg, and 500 mg/kg respectively. Treatment was continued for 10 days. Paw diameter and hematological and biochemical variables were quantified. ELISA was performed for the estimation of inflammatory cytokines. In the acute oral toxicity study, no mortality or morbidity were observed, so the LD50 of this plant was greater than 2000 mg/kg. ABEE decreased the paw diameter with the restoration of hematological and biochemical changes. SOD and CAT levels were increased while decreasing the MDA, NO, TNF- α , and IL-6 levels in arthritic rats. It is concluded that the use of *A. bettzickiana* has low toxicity, and it can be used for the treatment of arthritis.

Keywords: *Alternanthera Bettzickiana*, Toxicity, Ethanolic Extract

O-044

Assessing The Impact of Gellan Gum/Gelatin Interpenetrating Microbeads on Mucoadhesion, Antibacterial Potential and Metronidazole Release

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Abstract:

In the recent era, scientist have tempted to enhance the therapeutic effectiveness of drugs by improving their oral bioavailability. Researchers combated the drawbacks of the narrow therapeutic window, low bioavailability and limited stomach retention period of drugs by developing various gastroretentive drug delivery system (GRDDS). For pursuing this endeavor, a mucoadhesive interpenetrating (IPN) based hydrogel microbeads were developed, which ensures uniform and controlled release of the metronidazole at the target site i.e. stomach. To prepare metronidazole loaded microbeads, a mucoadhesive polymer i.e. gellan gum was blended with gelatin as an interpenetrating polymer via ionotropic gelation. During swelling studies, microbeads initially swelled and afterwards their size decreased, which is possibly due to polymeric erosion. Furthermore, the swelling was also affected by changing the concentration of tannic acid and glutaraldehyde, i.e. swelling decreased with increasing concentrations of tannic acid and glutaraldehyde and vice versa. The SEM photographs revealed wrinkled surface due to adequate drying. FTIR studies revealed absence of interaction between the drug and polymers. XRD pattern of drug-loaded formulations did not revealed drug peaks, which indicates drug is homogenously dispersed in the formulations. An antibacterial assay was conducted to assess the antibacterial activity of all formulations (T1, T2, T3, G1, G2 and G3) against *Staphylococcus aureus* (S aureus) and *Escherichia coli* (E coli). Based on antibacterial assay and other suitable tested parameters, T3 and G3 were considered optimized formulations. These formulations (T3 and G3) released the metronidazole in a controlled manner in gastric media by Fickian diffusion. Thus, this IPN-based mucoadhesive microbeads will be a prospective carrier for the controlled release of metronidazole in stomach.

Keywords: Microbeads, metronidazole, Gastro retentive drug delivery system (GRDDS), IPN, hydrogel

O-045

Characterization of Bacteria Isolated from Diseased Labeo Rohita and Their Control Through Selected Plant-Derived Antimicrobial Extracts

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Abstract:

Labeo rohita (Rohu) is a commercially significant species of freshwater fish in South Asia, but production through aquaculture is grossly limited by bacterial diseases that cause excessive morbidity and economic loss. The current research study was conducted to characterize bacteria isolated from diseased *L. rohita* and to determine the antimicrobial potential of the selected medicinal plants against these bacteria. Infected fish were collected from different rivers, ponds and farms of district Kohat. Fish (n=50) were dissected and bacteria were isolated from various organs followed by the bacterial identification and determination of antibiotic resistance pattern. Antibacterial activity (MIC) of selected medicinal plant extracts of *Calotropis procera*, *Azadirachta indica*, *Caralluma tuberculata*, and *Malwa neglecta* were checked against bacteria isolated from diseased *L. rohita* using agar well diffusion method. A total of 106 bacteria were identified including *Pseudomonas* spp (n=36, 34%), *Klebsiella* spp (n=28, 26%), *Aeromonas* spp (n=21, 20%), *Escherichia coli* (n=11, 10%), *Staphylococcus* spp (n=5, 5%), and *Salmonella* spp (n=5, 5%). All bacteria showed resistance mostly to the beta lactam group of antibiotics. *C. procera* showed higher zone of inhibition (40mm) against *Staphylococcus* spp, followed by *A. indica* (22mm) against *Aeromonas* spp, *C. tuberculata* highest zone (35mm) against *Klebsiella* spp, and *M. neglecta* (37mm) against *Pseudomonas* spp.

Keywords: *L. rohita*, AMR, *Aeromonas*, MIC, MBC

O-046

Response of Wheat (*Triticum Aestivum* L.) Varieties to Foliar Application of Selenium and Salicylic Acid Under Salt Stress

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Abstract:

One of the primary abiotic factors that negatively impacts the germination, growth, and development of various crops is salinity. A pot experiment was conducted to explore the effect of foliar application of selenium and salicylic acid on two wheat varieties i.e., var. (MH-21) and var. (DilKash-20) under salt stress. There were 4 levels of foliar application i.e., non spray, selenium (1 mM), salicylic acid (1 mM) and combination of selenium and salicylic acid (1:1 ratio). There were 2 levels of salt stress i.e., (0 mM NaCl) and (100 mM NaCl) in full strength Hoagland's nutrient solution. Salt stress was applied after 3 weeks of germination. Foliar application was performed after 3 weeks of salt stress application. Seeds of two wheat (*Triticum aestivum* L.) varieties were collected from Ayub Agricultural Research Institute (AARI), Jhang Road Faisalabad, Pakistan. The experiment was performed in a completely randomized design (CRD) with three replicates. Data of 8 weeks old wheat plants was collected for the

determination of various growth, morpho-physiological and biochemical parameters of wheat plants. Yield was taken at maturity. Fresh leaf samples of wheat plants were collected in plastic zipper bags for analysis of membrane permeability (%), hydrogen peroxide (H₂O₂) contents, malondialdehyde (MDA) contents, total soluble proteins, superoxide dismutase (SOD), catalase (CAT), peroxidase (POD) activities and anthocyanin contents. The data was exposed to analysis of variance (ANOVA) by using an appropriate computer software.

Keywords: Antioxidants, Malondialdehyde, Mineral Ions, Photosynthesis, Salicylic Acid, Salt Stress, Selenium, Wheat

O-047

Histomorphological Effects of Deep Dry Needling on Myofascial Trigger Points in Skeletal Muscle of Wistar Rats

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Abstract:

Myofascial pain is caused by myofascial trigger points in skeletal muscle. This study aims to address the lack of comprehensive data on the histomorphological effects of deep dry needling on myofascial trigger points (MTrPs) in a Wistar rat model, which could potentially improve treatment protocols for myofascial pain syndrome (MPS) and advance understanding of cellular pain management. It also focused on histomorphometrical changes of deep dry needling in skeletal muscle tissue and myofascial trigger points. A total of 40 male and female Wistar rats age group of 6-7 weeks old, weighing approximately 200-280 grams were divided into four groups: Group-1 (Negative control), Group-2 Deep Dry Needling (DDN), Group-3 Trigger Points (MTrps induction using neostigmine 0.1/kg b.w) and Group-4 (MTrps+DDN induction) ten wistar rats per group. Group 2 and 4 received single session of deep dry needling, myofascial trigger points were induced via neostigmine injection. Tissue samples were collected on days 1, 4, and 7 for histological analysis through H&E and Masson Trichome staining. Pain behaviour was evaluated using rat grimace scale, the findings revealed notable pathological changes due to neostigmine induction, with significant increases in muscle fascicle, fiber diameters and count, as well as scarring and fibrosis were evident via collagen deposition over various time points indicating acute inflammatory hypertrophy and early fibrotic remodeling. Fascicle diameters increased from 0.368 mm on Day 1 to 0.5297 mm by Day 7 for the MTrP group, compared to the normal saline control. Conversely, DDN alone preserved near normal histology across the study duration, yet when combined with MTrPs, it resulted in significant reductions in muscle fiber diameter, muscle fiber count, and scar tissue via collagen deposition by Day 7 via muscle repair mechanism. The statistical analysis indicated that DDN significantly has less facial pain soreness, as reflected in RGS scores averaging 1.083 for DDN alone and 1.583 for the combination of MTrP+ DDN, with a p-value>0.05. DDN significantly contributed to the normalization of morphometric parameters and decreased nociception in induced MTrPs, while DDN alone primarily maintained baseline histological

integrity. DDN improved histomorphological parameters and reduced nociception in MTrPs, supporting its potential as an effective therapeutic approach for myofascial pain syndrome.

Keywords: Dry needling, myofascial trigger points, skeletal muscle, histomorphology, myofascial pain, rat grimace scale

O-048

Formulation and Evaluation of Piroxicam Solid Dispersion for Enhanced Solubility and Nociceptive Response

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Abstract:

Piroxicam (Px) is a BCS class II nonsteroidal anti-inflammatory drug (NSAID) with poor water solubility, which limits its dissolution, bioavailability, and therapeutic effectiveness. This study aimed to overcome these limitations by developing polymer-mediated solid dispersions (SDs) incorporated into topical gels. SDs were prepared using kneading, solvent evaporation, and freeze-drying methods with natural polymers (chitosan and locust bean gum) and synthetic polymers (polyvinylpyrrolidone K30 and Soluplus). The SDs were evaluated for physicochemical properties, saturation solubility, and in vitro dissolution at pH 6.8, followed by characterization using FTIR, SEM, DSC, and PXRD analyses, which indicated improved molecular dispersion, reduced crystallinity, and drug-polymer interactions. SDs prepared with synthetic polymers (especially PVP K-30) showed better performance than those with natural polymers. The optimized formulation (SPS3) exhibited an approximately 32-fold increase in solubility and released about 82% of the drug within 30 min. Topical gels prepared using the optimized SD included C3 (Carbopol 940), N5 (sodium alginate), and L4 (locust bean gum). C3 showed the highest drug release (80%), followed by N5 (78%), while L4 exhibited the lowest release (53%). In vivo studies demonstrated that C3 significantly enhanced localized analgesic and anti-inflammatory effects compared to pure Px and other gel formulations, with effects comparable to standard diclofenac. In conclusion, PVP K-30 polymer-mediated SDs enhance the solubility and dissolution of Px, and their incorporation into Carbopol 940 gel provides a reliable approach to improve the analgesic and anti-inflammatory effect of poorly water-soluble drugs.

Keywords: Carbopol 940, in vitro drug release, in vivo analgesic efficacy, locust bean gum, piroxicam, solid dispersion, topical anti-inflammatory activity.

O-049

Isolation and Identification of Cholesterol Lowering Bacterial Strain from Indigenous *Cucumis sativus* (Cucumber) in Pakistan

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Abstract:

Probiotics are live, non-pathogenic microbiological substances that, when administered in sufficient amounts, have a favorable effect on the host body by boosting intestinal epithelial resilience and digestive health. The ability of lactic acid bacteria with probiotic features to decrease cholesterol is one of its most appealing traits. *Streptococcus* spp., *Lactococcus* spp., *Lactobacillus* spp., *Bifidobacterium* spp., *Pediococcus* spp. and *Bacillus* spp. are the widely used probiotic bacteria in the food industry. *Cucumis sativus* samples (n=30) were collected from different areas of Rawalpindi and Islamabad. By using different microbiological techniques bacteria were isolated from *Cucumis sativus* samples. Performed molecular procedures PCR and then visualized PCR products on Gel Doc by using Gel Electrophoresis. Bacterial genome was sequenced by using a Sanger Sequencing. The Genomic data was analyzed using the online NCBI BLAST Tool and identified strains *Pediococcus pentosaceus* and *Lactococcus lactis* showed 99.7% and 96% similarity respectively. Multiple sequence alignment of sequenced strains was checked through MSA NCBI Database tool to check the similarity of the sequences. For phylogenetic analysis MegaX tool was used to evaluate the evolutionary relationships. The genome data set's structures and functions were investigated together with the genetic placements. Cholesterol lowering activity assay was performed and results were observed through electron microscopy. Astonishingly, strains exhibited the greatest probiotic characteristics, as well as in vitro lowering cholesterol with 0.3% bile salt addition and survivability with bile acids. It also completely susceptible to the available antibiotics. Thus, the identified strains may be evaluated as possible selected probiotics in functional ingredients that decrease cholesterol.

Keywords: *Cucumis Sativus*, Probiotics, Phylogenetic Analysis, Cholesterol, Lactic Acid Bacteria

O-050

Mindful Eating: A Key Approach to Enhancing Nutritional Status

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Abstract:

Mindful eating is the practice of paying conscious attention to food choices, eating habits and internal cues such as hunger, fullness and emotional state. It emphasizes awareness during meals and encourages individuals to differentiate between physical hunger and emotional triggers. Practicing mindful eating has been shown to improve dietary behaviors, prevent overeating and promote healthier food choices, which together contribute to better nutritional status. It may also help in managing stress, as paying attention to the act of eating itself creates a calming effect similar to mindfulness meditation. This link between food awareness and emotional health makes mindful eating an important area of study among young adults. The core objective of the present research is to examine how mindful eating influences nutritional status, emotional stability and stress management in university students. A descriptive cross-sectional study design will be employed, with 200 students between 18 and 25 years recruited on a voluntary basis. Data collection will be carried out using validated instruments: a 24 hour recall method to capture usual dietary pattern, the Mindful Eating Questionnaire (MEQ) to measure awareness during meals, the Difficulty in Emotion Regulation Scale (DERS-36) to measure difficulties in emotion regulation and Three-Factor Eating Questionnaire (TFEQ) to assess three main dimensions of eating behavior. The present study is expected to provide meaningful insights into how mindful eating relates to emotional well-being and dietary intake. Statistical analyses including descriptive

methods, regression and Pearson's correlation coefficient will be applied to identify significant associations and better understand the role of mindful eating in supporting student health.

Keywords: Mindful eating, emotion regulation, dietary patterns, cross sectional survey

O-051

Role Of Speed and Accuracy of Ball on the Perfection of Penalty Shootouts of Male Football Players

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Abstract:

The present study aimed to examine the role of ball speed and accuracy on the perfection of penalty shootouts among male football players. An experimental research design was used, consisting of pre-test and post-test measures with control and experimental conditions. A sample of male football players was assessed for ball speed and accuracy during penalty shootouts. A total sample of 5 male football players was selected using purposive sampling technique. Before the intervention, pre-tests were conducted to measure the initial ball speed and accuracy of both groups during penalty shootouts. Ball speed was measured using a speed formula, while accuracy was assessed by dividing the goalpost into 9 zone. After the pre-test, the experimental group underwent a structured training program designed to improve penalty kick speed and accuracy, while the control group continued with routine practice. Following the training period, post-tests were conducted to measure improvements in both variables. Ball speed was calculated using the formula $\text{Speed} = \text{Distance} / \text{Time}$, while accuracy was measured using $\text{Accuracy} = (\text{Successful Shots} / \text{Total Shots}) \times 100$. Pre-test results indicated moderate levels of speed and accuracy among players. Following the intervention, improvements were observed in both variables during the post-test. The mean ball speed increased from 19.37 ± 3.03 km/h in the pre-test to 20.87 ± 3.48 km/h in the post-test. Similarly, mean accuracy improved from $40.00 \pm 8.16\%$ to $60.00 \pm 8.16\%$. These findings demonstrate that enhanced ball speed and accuracy significantly contribute to better performance in penalty shootouts. Ball speed and accuracy are critical factors contributing to the perfection of penalty shootouts in football. The findings highlight the importance of specialized training programs for enhancing these performance variables among male football players. It is recommended that football coaches and trainers should place greater emphasis on structured training programs specifically designed to improve both ball speed and accuracy during penalty shootouts. Since the results indicated a clear improvement in performance after the intervention, incorporating targeted drills such as repetitive shooting practice, goal zone targeting (9-zone method), and time-based kicking exercises can significantly enhance players' effectiveness.

Keywords: Ball speed, Accuracy, Enhancing Performance, Football Players

O-052

Rising Antiviral Resistance in the Management of Viral Infections

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Abstract:

Antiviral resistance in Hepatitis C virus (HCV) infection is an emerging clinical challenge that reduces the effectiveness of direct-acting antiviral (DAA) therapies due to viral genetic mutations enabling persistent infection despite treatment. In high-burden settings such as District Multan, this problem is exacerbated by inconsistent treatment practices, poor adherence, and limited patient monitoring. This study aimed to evaluate the impact of antiviral resistance on treatment outcomes in HCV patients in District Multan and to identify associated contributing factors, particularly non-adherence and inappropriate antiviral use. A review-based analytical approach was applied using relevant clinical reports and published literature, focusing on antiviral usage patterns, adherence levels, and resistance-associated outcomes. The analysis indicates that antiviral resistance is linked to reduced sustained virological response (SVR) rates, with key contributors including irregular follow-up, incomplete therapy, and inadequate diagnostic surveillance. These factors collectively contribute to prolonged infection and increased risk of community transmission. In conclusion, antiviral resistance significantly compromises Hepatitis C treatment outcomes in District Multan, highlighting the need for improved adherence to DAA regimens, strengthened surveillance systems, and rational antiviral use to control resistant HCV strains.

Keywords: Hepatitis C virus (HCV), Antiviral resistance, Direct-acting antivirals (DAAs), Sustained virological response (SVR)

O-053

The Role of Digital and AI-Based Nutritional Counseling in Personalized Health Management

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Abstract:

Technology is moving fast and digital and artificial intelligence based nutritional counseling is a new way to manage health. This new way uses applications and wearable devices and artificial intelligence driven algorithms to give people personalized advice on what to eat. It looks at what's happening with their body right now and their health and how they live. Digital platforms are different from the way of doing things because they can watch what people are doing all the time and give them feedback right away. They can also change what they are telling people to eat based on how they're doing. This helps people stick to their diet and be more interested in what they're doing. Digital and artificial intelligence based nutritional counseling uses things like how much people're moving and how their body is working to give them advice on what to eat. This makes the advice more accurate. Helps people take care of themselves. It also helps people who live away from cities because they can get help from their computer or phone. There are also things like chatbots and virtual coaches that help people make changes in their life. They keep people motivated. Help them track how they are doing. Even though digital and artificial intelligence based nutritional counseling is really helpful there are still some problems. We have to make sure peoples information is safe and that they know how to use the technology. Some people also want to talk to a person. Using technology to help people with what they eat is a really good idea. It can help people be healthy and not get sick much. It can also help people

eat in a way that's good for them and the Earth. Digital and artificial intelligence based nutritional counseling is a change, in how we take care of ourselves. It is an efficient way to help people and it can be used by a lot of people.

Keywords: Digital nutrition counseling, Artificial intelligence (AI), Personalized health management, Digital health platforms

O-054

Comparative Analysis of Public and Private Hospitals Regarding to the Surgical Hand Scrubbing Protocols

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Abstract:

Proper surgical hand scrubbing is crucial for preventing infections in healthcare settings, making regular monitoring essential by evaluating knowledge, compliance and providing feedback. The current study assessed how well healthcare workers in public and private hospitals adhere to hands scrubbing guidelines. A descriptive cross-sectional study was conducted over three months in 2025 across major public and private hospitals in Multan to evaluate operating room staff's knowledge and adherence to World Health Organization surgical hand scrubbing protocols. Statistical analysis was performed using IBM SPSS version 25.0. Descriptive analyze apply to find frequency and percentage and Independent-t test apply to compare outcomes between public and private hospitals. This comparative analysis revealed a distinct pattern in surgical scrubbing practices between public and private hospital staff. The private hospital demonstrates stronger adherence to the core mechanical scrub protocol, as evidenced by significantly higher mean scores for variables such as entering the OR with hands elevated (Private: 1.91 and Public: 1.36) rinsing without a back-and-forth motion (Private: 1.93 and Public: 1.65) and using a sterile nail cleaner (Private: 1.83 and Public: 1.41). Conversely, the public hospital shows superior performance in specific knowledge-based areas critical for maintaining sterility after the scrub, particularly in keeping hands elevated during rinsing for proper drainage (Public: 1.91 and Private: 1.61) and using their back instead of their hands to open OR doors (Public: 1.49 and Private: 1.65). Both groups reported identical compliance in immediately re-scrubbing if a non-sterile surface is touched, indicating a shared understanding of this critical corrective action. Operating room staffs in private hospitals consistently adhere to surgical hand scrubbing guidelines, unlike those in public hospitals. This gap stems not from a knowledge deficit but from systemic pressures in public hospitals, including time constraints, high patient volume and resource shortages, which hinder consistent compliance despite their awareness.

Key words: Surgical Hand Scrub, Infection Control, Operating Room Protocols, SSI Prevention

O-055

In Vitro Assessment of the Antibacterial Properties of Korean Red Ginseng Extract Against E. Coli Obtained from Mastitis infected Bovine Milk

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Abstract:

The widespread emergence of antimicrobial-resistant (AMR) *Escherichia coli* in bovine mastitis poses a major threat to dairy health and productivity, underscoring the need for alternative therapeutic agents. This study investigated the antimicrobial activity of Korean red ginseng extract (*Panax ginseng*) against antibiotic-resistant *E. coli* isolated from bovine mastitis cases in Rawalpindi, Pakistan. A total of 150 milk samples were collected from cattle and buffaloes exhibiting clinical and subclinical mastitis. Fifty samples tested positive for mastitis using the Surf Field Mastitis Test and were subjected to bacteriological analysis. Forty-six *E. coli* isolates were confirmed through cultural, morphological, and biochemical identification using the API 20E system. Molecular characterization by multiplex PCR revealed that 40% of isolates harbored both *stx1* and *eaeA* genes, 10% carried all three (*stx1*, *stx2*, and *eaeA*), and 57% and 43% possessed the *bla*TEM and *tetA* resistance genes, respectively. Antibiotic susceptibility testing showed complete resistance to ampicillin and penicillin, with high resistance to erythromycin (90%) and moderate resistance to gentamicin and cefotaxime (60%). The antibacterial assay demonstrated that Korean red ginseng extract produced dose-dependent inhibition zones ranging from 5.0 mm to 15.3 mm, with 58% of isolates showing susceptibility at 400 µl concentration. Although ginseng extract displayed moderate efficacy, it effectively inhibited several multidrug-resistant isolates, indicating the presence of bioactive constituents capable of suppressing resistant *E. coli* growth. These findings suggest that Korean red ginseng may serve as a promising natural antimicrobial alternative or adjunct for the management of bovine mastitis, contributing to the reduction of antibiotic dependency and resistance in the dairy sector.

Keywords: Bovine Mastitis, *Escherichia Coli*, Antimicrobial Resistance, Korean Red Ginseng Extract, *Panax Ginseng*, Multidrug-Resistant Isolates, Virulence Genes, Natural Antimicrobial Therapy

O-056

Biogenically Synthesized Iron and Selenium Nanoparticles as Protective Agents Against Microplastic-Induced Cardiotoxicity in swiss albino rats

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Abstract:

Microplastic (MPs) are commonly found in the environment, raising concerns about their potential harm to living things. Due to their small size and long-lasting nature, MPs can cause oxidative stress, damage to tissues, and chronic inflammation in organisms. Iron oxide nanoparticles, especially selenium nanoparticles, have gained a lot of attention because of their many medical and environmental uses. However, we still do not know how these nanoparticles affect living organisms when they interact with MPs. This study aimed to examine the effects of MPs alone and with iron oxide nanoparticles (FeNPs) and selenium nanoparticles (SeNPs) on the heart tissue of male *Rattus norvegicus*. Seventy

sexually mature male rats weighing between 150 and 170 grams each were used in the study and they were split into seven groups control, vehicle control, and treatment groups. For 27 days, the animals were given MPs, FeNPs, and SeNPs orally, both separately and in combination. Rats were dissected after the treatment period, and cardiac tissues were gathered, processed, and checked for histopathological changes, and blood samples were collected for creatine kinase (CK-MB) and malate dehydrogenase (MDH) testing. One-way ANOVA was used to analyze the results. The control group's enzymatic parameters were found to be significantly different from other treatment groups. Myofiber disarray, inflammation, and cardiomyocyte destructions were observed in heart tissues. Results showed that MPs have cardiotoxic effects, however iron and selenium nanoparticles are able to protect heart damage induced by MPs.

Keywords: *Rattus norvegicus* Microplastic, Iron oxide nano-particles Selenium nano-particles, Cardiotoxicity, and Histopathology

O-057

Amino Acid Conjugates of 2-Mercaptobenzimidazole Ameliorate High-Fat Diet-Induced Hyperlipidemia in Rats via Attenuation of HMGCR, APOB, and PCSK9

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Abstract:

This study aimed to investigate the antihyperlipidemic effects of amino acid derivatives of 2-mercaptobenzimidazole (4J and 4K) in rats fed a high-fat diet (HFD). Male Sprague-Dawley rats were divided into nine groups, with some receiving a standard diet and others an HFD for 28 days. Blood samples were collected on day 27 from HFD-fed rats to confirm hyperlipidemia. The hyperlipidemic rats then received daily treatments of either vehicle, simvastatin (SIM; 20 mg/kg), or 4J/4K compounds (10, 20, and 30 mg/kg) for 12 consecutive days. On day 40, the rats were sacrificed, and blood samples were taken to analyze serum lipid profiles and liver function parameters. Liver tissues were harvested for histopathological, antioxidant, and qPCR analyses. Molecular docking of the tested compounds with HMGCR was performed to evaluate binding affinities. 4J and 4K dose-dependently reduced serum levels of total cholesterol, triglycerides, low-density lipoprotein, very low-density lipoproteins, alanine transaminase (ALT), and aspartate aminotransferase (AST), while significantly increasing high-density lipoproteins. However, SIM failed to decrease AST and ALT levels. Additionally, the compounds exhibited antioxidant effects by increasing superoxide dismutase and glutathione levels. Histopathological analysis revealed protective effects of 4J and 4K against HFD-induced fatty liver and hepatic damage. Furthermore, 4J and 4K downregulated the transcript levels of HMGCR, APOB, PCSK9, and VCAM1, supported by molecular docking results that indicated strong binding affinities. This study suggests that 4J and 4K exert their antihyperlipidemic effects by modulating multiple targets involved in lipid regulation.

Keywords: Antihyperlipidemic Activity, HMG-CoA Reductase (HMGCR) Modulation, PCSK9, APOB Regulation, Oxidative Stress, Antioxidant Defense, Hepatic Lipid Metabolism

Anti-Diarrheal Potential of *Persicaria Vivipara* Phytochemical Analysis and Anti-Diarrheal Potential of *Persicaria Vivipara* Targeting Opioid Receptor Pathway Through In Vivo and In Silico Investigation

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Abstract:

The advent of antibiotic-resistant bacteria has escalated the exploration for novel antidiarrheal drugs. *Persicaria vivipara*, a perennial herb of Polygonaceae family commonly present in high-elevation areas. Hence the aim of the present study was to investigate phytochemical analysis and *in vivo* and *in silico* antidiarrheal potential of methanolic extract of *Persicaria vivipara* roots (MEPV). Phytochemical analysis performed by GC-MS analysis and characterize by total phenolic content (TFC), total flavonoid content (TPC) and antibacterial assay. Swiss albino mice were alienated into five groups. Group I was treated with normal saline, Group II was treated with Loperamide and Group III-V received 100,200 and 400mg/kg MEPV in castor oil and gastrointestinal motility test. Furthermore, Swiss ADME and molecular docking with Mu-opioid receptor were conducted to identify potent antidiarrheal secondary metabolites. GC-MS analysis unraveled presence of 29 secondary bioactives. Methanolic extract has 124.76±1.33 mg GAE/g and 34.68±1.35mg GAE/g Phenolic and flavonoid content respectively. It showed 11 mm and 12 mm inhibition zone against *S. aureus* and *E. coli* as compared to ciprofloxacin (28 mm). The methanolic extract substantially reduced distance covered by charcoal marker, and inhibit diarrhea (p<0.0001 and p<0.001). In castor oil induced diarrheal test, MEPV reduced commencement of diarrhea, fecal weight and number as compared to control group (p<0.0001, p<0.001, p<0.01). SwissADME showed phytocompounds followed Lipinski rule of five and underwent docking study. Molecular docking study revealed Neoisolongifolene,8-oxo-, - (Acetoxymethyl)-3 (methoxycarbonyl)biphenylene has highest binding affinity -9.6 and -7.8kcal/mol with opioid receptors 4DKL and 6DDE protein. Consequently, scientific study of mechanistic pathway of phytocompounds can lead to improvements in future therapies.

Keywords: Diarrhea, Castor Oil, Charcoal, Phenolic Content, Docking

Laparoscopic Appendectomy in Pediatric Patients: A Single-Center Retrospective Analysis of Outcomes and Complications

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Abstract:

This study focuses on Laparoscopic Appendectomy in children and presents the results of a single-center retrospective study of clinical outcomes and complications. Acute appendicitis is the most frequent known surgical emergency amongst children, and the conventional open appendectomy

surgery presents the chances of wound infection and long term healing. Minimally invasive laparoscopic procedures have been on the rise, although few data on pediatric long-term outcomes exist. To assess the safety, efficacy and short-term outcomes of laparoscopic appendectomy among pediatric patients (2-18 years old) in a tertiary care center of Lahore. We performed a retrospective research on 150 cases in a series of cases between January 2023 and December 2025. Inclusion criteria were established of confirmed appendicitis through ultrasound/CT. Operative time, length of stay (LOS), 30-day readmission rates and complication rates (Clavien-Dindo classification) were the primary outcomes. Chi-square tests and t-tests ($p < 0.05$ significant) were used to statistically analyze data. Mean operative time was 45 ± 12 minutes, with LOS of 1.2 ± 0.8 days. Perforation was 12% and complicated appendicitis had happened in 28% of cases. The rate of overall complication was 8% (mostly Grade I-II), and 2% readmission. No conversions to open surgery occurred. Laparoscopy had better results compared to historical open data (LOS decreased 40, $p < 0.001$). Laparoscopic appendectomy can be considered safe and effective when used in pediatric appendicitis associated with the shortest LOS and low rate of complications even in complicated cases. Such results validate its use as the initial treatment, which may save healthcare expenses. The use of laparoscopic appendectomy in children suffering pediatric appendicitis should be adopted to reduce morbidity and recovery time. Perspective trials must be carried out in the future with the focus on the comparison of more sophisticated techniques of imaging guidance of perforated cases.

keywords: Pediatric Surgery, Appendectomy, Laparoscopy, Outcomes, Complications

O-060

Multifunctional Moxifloxacin and Essential Oil Loaded Sodium Alginate/ Thiolated Karaya Gum Hydrogel Dressings for Improved Wound Healing

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Abstract:

Numerous efforts have been done to develop wound dressings for effective wound treatment, remains a considerable challenge. The aim of current research work was to prepare multifunctional sodium alginate/ thiolated karaya gum hydrogel dressings containing moxifloxacin in combination with artemesia/cedarwood essential oil. Thiolation of karaya gum was achieved by esterification reaction with 3 mercapto-propionic acid and synthesis of blended sodium alginate and thiolated karaya gum hydrogel films without (S1/TK1) and with moxifloxacin and artemesia/cedarwood oil (S1/TK1.DA1, S1/TK1.DC1) was achieved using solvent casting technique and were evaluated for fourier transform infrared spectrum and thermogravimetric analysis. Increasing the concentration of thiolated karaya gum substantially enhanced the bioadhesion, with a 350 % increase in bioadhesion-force and 353 % improvement in bond-strength while exhibiting balanced mechanical properties with an increase rate of 166 % in tensile strength and 73 % in percent-elongation. Incorporation of both moxifloxacin and artemesia/cedarwood oil also considerably enhanced the antibacterial activity of Optimized S1/TK1.DA1 and S1/TK1.DC1 formulations by 286 % and 253 % against s. aureus and 367 % and 269 % against e. coli respectively. Furthermore 2, 2 - di phenyl picryl hydrazyl (DPPH) and superoxide anion scavenging potential of S1/TK1.DA1 and S1/TK1.DC1 were enhanced by 1587 %, 1379 % and by 1384 % and 1245 % respectively. In vivo wound healing efficacy in cutaneous rat model also

confirmed almost complete wound closure ($\approx 99\%$), collagen deposition and anti-inflammatory activity, enabling rapid wound recovery in twelve days. In conclusion, prepared hydrogel dressings might be an outstanding choice for wound healing applications.

Keywords: Hydrogel wound healing, Multifunctional, Essential oil, Moxifloxacin

O-061

Impact Of Plant Based Diet on Insulin Sensitivity and Diabetes Management

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Abstract:

Type 2 diabetes mellitus (T2DM) is a rapidly increasing global health problem characterized by insulin resistance and poor glycemic control, which may lead to complications such as cardiovascular disease, neuropathy, and kidney damage. Along with pharmacological treatment, dietary modification plays an important role in diabetes management. Plant-based diets, rich in fiber, antioxidants, vitamins, minerals, and low in saturated fats, have gained attention for their ability to improve insulin sensitivity, regulate blood glucose levels, and support overall metabolic health. This descriptive cross-sectional study was conducted to evaluate the impact of plant-based dietary patterns on insulin sensitivity and diabetes management among patients with T2DM. Data were collected from 220 participants using a structured Google Forms questionnaire related to dietary habits, blood glucose monitoring, medication use, physical activity, and diabetes management practices. Statistical analysis was performed using SPSS version 31. The majority of participants were aged between 35–60 years, and 58.6% were females. Approximately 64.5% of participants regularly followed a plant-based diet. Among these individuals, 61.8% showed better blood glucose control, 54.1% reported improvement in energy levels and overall health, and 47.3% demonstrated improved insulin sensitivity markers. In addition, 42.7% showed reduced HbA1c levels, 39.5% experienced weight reduction, and 36.8% reported improved cholesterol levels after dietary modification. Statistical analysis showed a significant association between adherence to a plant-based diet and improved diabetes management outcomes ($\chi^2 = 12.45$, $p = 0.021$). These findings suggest that plant-based nutrition is an effective, affordable, and sustainable approach for improving glycemic control, metabolic health, and prevention of diabetes-related complication.

Keywords: Plant-based diet, Type 2 diabetes mellitus, Insulin sensitivity, Glycemic control, HbA1c, Blood glucose, Diabetes management, Metabolic health, Lipid profile, Weight reduction.

O-062

Targeting Stress-Induced Cognitive Impairment via BDNF–TrkB Modulation: A Conceptual Framework for Natural Product-Based Neurotherapeutics

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Abstract:

Chronic stress is a key contributor to cognitive impairment through sustained activation of the hypothalamic pituitary adrenal (HPA) axis, resulting in elevated glucocorticoid levels that disrupt hippocampal and prefrontal cortex function and impair memory and executive processes. A central mechanism underlying this dysfunction involves the downregulation of brain-derived neurotrophic factor (BDNF) and its receptor tropomyosin receptor kinase B (TrkB), which are critical regulators of synaptic plasticity, neurogenesis, and cognitive resilience. These alterations are strongly implicated in stress-related cognitive decline and neuropsychiatric disorders, highlighting the need for effective and safe therapeutic strategies. This study presents a conceptual and literature-backed framework to evaluate the neuroprotective potential of natural products through modulation of the BDNF-TrkB signaling pathway. A structured review of peer-reviewed studies from PubMed and Scopus (2014-2026) was conducted, focusing on chronic stress, neuroplasticity, BDNF/TrkB signaling, and neuroactive phytochemicals. Evidence indicates that diverse phytochemical classes, including flavonoids, polyphenols, and triterpenes, enhance neurotrophic signaling and cognitive function by upregulating BDNF expression, activating TrkB-mediated pathways (e.g., PI3K/Akt, MAPK/ERK), and attenuating neuroinflammation and oxidative stress. For instance, *Centella asiatica* triterpenes (asiaticoside, madecassoside) have demonstrated significant increases in BDNF expression and cognitive improvement in preclinical models, while clinical studies of flavonoid-rich diets report parallel enhancements in serum BDNF and cognitive performance. Furthermore, emerging in-silico approaches integrating virtual screening, molecular docking, network pharmacology, and ADMET prediction provide a powerful platform for identifying and optimizing phytochemical candidates targeting neurotrophic pathways. Collectively, this framework highlights the translational potential of targeting the BDNF-TrkB axis using natural product-based interventions and supports the integration of neuropharmacology with AI-assisted drug discovery to accelerate development of novel therapeutics for stress-induced cognitive impairment.

Keywords: BDNF, Trkb, Chronic Stress, Cognitive Impairment, Neuroplasticity, Natural Products, Flavonoids, Triterpenes, Computer-Aided Drug Design, Neuropharmacology

O-063

Effect of False Memories on Episodic and Semantic Memory in patients with Hippocampal Lesions

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Abstract:

The hippocampus plays a crucial role in the formation of episodic memory, spatial navigation, and emotional regulation. Damage to hippocampus may lead to cognitive and emotional deficits, particularly episodic and semantic memory impairments. Previous researches have done extensive research on hippocampal dysfunction, but the role of multimodal false memory induction in individuals with acute hippocampal lesions is yet to be explored. This study explored the effects of sequential (first and second order) false memory induction (visual, auditory, and combined modalities) on episodic memory retrieval, semantic association and recognition, and amnesiac symptoms in patients with acute hippocampal damage as compared to healthy individuals. The findings revealed that individuals with

hippocampal lesions showed heightened susceptibility to false memories, especially with combined auditory-visual stimuli. Particularly in episodic memory retrieval, whereas semantic memory tasks suggested potential regulatory factors. Whereas, healthy individuals depicted a consistent decline in performance across tasks during false memory induction. These findings highlight the hippocampus' critical role in defying false memory formation and focus its interactions with other neural systems in memory reconstruction.

Keywords: Multisensory False Memory, Episodic Memory, Semantic Memory, Amnesia, Hippocampal Damage, Healthy Individual

O-064

With the Help of Artificial Intelligence, Reducing Academic Stress, During the Study in Bachelor of Science in Nursing

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Abstract:

The Bachelor of Science in Nursing (BSN) program is widely recognized as one of the most academically and emotionally demanding undergraduate curricula worldwide. Nursing students face a confluence of stressors, including heavy course loads, clinical placements, patient care responsibilities, high-stakes examinations, and the persistent fear of failure, which collectively impair their mental health, academic performance, and long-term professional resilience. This article examines how emerging artificial intelligence (AI) tools and platforms can serve as practical, scalable, and evidence-informed interventions to reduce academic stress among BSN students. Drawing on current literature in educational psychology, nursing education research, and AI technology, the paper explores adaptive learning systems, AI powered mental wellness applications, intelligent tutoring, virtual simulation, AI-driven time management tools, and ethical considerations in AI deployment within clinical education. The article argues that when thoughtfully integrated into nursing curricula, AI has the potential not only to improve academic outcomes but to meaningfully safeguard the psychological wellbeing of the next generation of nurses thereby aligning with the conference theme of reshaping mental health in an AI-driven era.

Keywords: Artificial intelligence, Nursing education, BSN, Academic stress, Mental health, Adaptive learning, Intelligent tutoring, AI wellness tools

O-065

Neuroendocrine Pathways Connecting Human-Farm Animal Interaction, Stress Regulation and Human Well Being

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Abstract:

Research on human-animal interaction (HAI), human-animal relationships (HARs) and bond (HABs) have largely emphasized companion animals while everyday interactions with farm animals have received far less attention despite their importance in agricultural work and daily human routines. This conceptual review presents an integrative framework to examine how routine engagement with farm animals including cattle, sheep and goats, and horses shapes human stress regulation and well-being through neuroendocrine processes. From the animal's point of view, a bad human-animal relationship (HAR) is a limiting factor that affects both the welfare and productivity of farm animals. This interaction including touch and shared environments that can influence stress processing by neuro-hypothalamic system. Through these mechanisms, routine interaction with farm animals may contribute to changes in autonomic balance and other physiological processes relevant to adaptive stress responses. This also emphasizes the variable factors including animal species, the temperament, welfare conditions, human experience and expectations, and the broader agricultural context in which interactions occur. By bringing together insights from neuroendocrinology, stress physiology, and agricultural science, this review offers a biologically grounded perspective on how sustained interaction with farm animals may become embedded in human stress regulation and well-being. It also highlights key gaps in current knowledge and provides direction for future interdisciplinary research that accounts for the interdependence of human outcomes and animal welfare in agricultural systems.

Keywords: Human-Farm Animal Interaction, Stress Regulation, Mental Well-Being, Animal Welfare, Agriculture

O-066**Purineric Signalling Potentiates Chemotherapeutic Cytotoxicity**

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Abstract:

Cancer remains one of the leading causes of death worldwide and its treatment is still a major challenge due to heterogenous patient response to the current therapies. The immune system activation offers a promising approach to improve disease management. Certain chemotherapeutic agents such as doxorubicin (DOX) can elicit immunogenic cell death (ICD) by triggering the integrated stress response (ISR) pathway. This process is characterised by the translocation of calreticulin (CRT) from the endoplasmic reticulum (ER) to the cell surface along with the release danger associated molecular patterns (DAMP) such as ATP. The Purineric P2X7 receptor plays a key role in the activation and maturation of antigen-presenting cells (APCs). Low concentrations of extracellular ATP (eATP) potentiated the cytotoxic activity of DOX in murine Yac-1 cells. This effect was inhibited by the P2X7 specific antagonistic nanobody and further synergistically increased by an agonistic nanobody. Activation of P2X7 also enhanced the initial intracellular uptake of DOX into cells. Notably, increased cell death was also observed when DOX was removed prior to eATP exposure, suggesting convergence of downstream signaling mechanisms. Similar results were also observed with Bortezomib. In *in vivo* experiments, tumours of 4T1 breast cancer cells expressing functional P2X7 showed more T cell infiltration than those expressing a non-functional mutant. Collectively, these findings suggest that P2X7 signalling is closely connected with the ER and provides an early input into the ISR pathway,

thereby modulating the outcome of this signalling cascade when it is induced by chemotherapeutic drugs.

Keywords: Immunogenic Cell Death, Purinergic Signalling, ER Stress

O-067

Neuroprotective Effect of Sumatriptan in Pentylentetrazole-Induced Seizure is Mediated Through N-Methyl-D-Aspartate/Nitric Oxide and Camp Response Element-Binding Protein Signaling Pathway

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Abstract:

Seizure occurs as a result of uncontrolled electrical disturbances within the brain. Various biomolecules such as N-methyl-D-aspartate (NMDA), nitric oxide (NO), and cAMP response element-binding protein (CREB) have been implicated in the pathophysiology of seizure. Sumatriptan is a specific 5-Hydroxytryptamine 1B/1D receptor agonist and has neuroprotective effects in various neuropsychiatric disorders. In the current study, we tried to investigate the possible interaction of sumatriptan with NMDA/NO and CREB signaling pathway in PTZ induced seizure. For this purpose, various agonist and antagonist of NMDA such as MK-801 and Ketamine, NO precursor L-ARG, and NOS inhibitors L-NAME and 7-NI were co-administered with sumatriptan in PTZ induced seizure model. The level of nitrite in mice hippocampus was determined by Griess reaction. The gene expression of NR1, NR2A, NR2B, and CREB were quantified by quantitative real time-polymerase chain reaction (qRT-PCR). Furthermore, the involved neuronal nitric oxide synthase (nNOS) protein expression was examined via western blot analysis. Effective dose of sumatriptan (1.2 mg/kg) alone and subeffective dose of sumatriptan (0.3 mg/kg) in combination with NMDA and/or NO antagonist showed significant ($P < 0.001$) anticonvulsant activity in mice. Furthermore, sumatriptan significantly inhibited the PTZ-induced mRNA expression of NR2A ($P < 0.0001$), NR2B ($P < 0.05$), and CREB ($P < 0.01$). Also, the expression of nNOS protein in PTZ treated group was reversed by sumatriptan ($P < 0.01$). Hence, current findings suggest that the anticonvulsant effect of sumatriptan was due to down regulation of NMDA/NO and CREB signaling pathway.

Keywords: Sumatriptan, Seizure, Pentylentetrazol, Epilepsy, NMDA

O-068

Prevalence And Risk Factors Associated with Depression Among University Students in Punjab, Pakistan

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Abstract:

Mental fitness is the least priority in all countries. Student mental health is affected by academic or non-academic pressure. The purpose of this explore was to find out risk factors and results of mental problems among the youth in universities. Cross sectional design was used to collect data for the study. Multi-stage cluster sampling method was used to gather data from 1308 students between the age of

15-29 from 3 public universities of Punjab, Pakistan. Self-administered questionnaires were used for data collection which consisted of 6 sections. First section was about demographic and debatable background details. The next segment comprised questions about complaints of psychosomatic illness, health-related behaviour, and self-rated health status. In third segment we calculated speculative and non-speculative stressors. Fourth section had tools to calculate stress, symptoms, and psychological health of pupils. In the fifth section academic performance and contentment with life was studied. Last section was about the strategies adopted by students to deal with the stress. Results from this data were shown in two sections. First section was descriptive statistic section which had results in form of percentages and frequencies. Simple, binary, and multinomial logistic regression analyses were included in the second section of the inferential statistics section to test the hypothesis. This study was one of its kind and done first time in public universities. The results showed that most of the outcomes of stress were related to speculative performance and self-reported welfare of students. High frequency of mental issue reported were not even equal to the minimal health facilities at the universities. Students were highly unsatisfied with the university management and its facilities, and it seemed that there is lack of connection between students and administration. More studies like this should be done at university levels to cope up with mental health issues and diseases.

Keywords: Depression, Health, Mental Issue, Psychological Management

O-069

Study of Mass Flow Dynamic in Capsule Filling Using AI Based Validation

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Abstract:

Powder filling behavior can be affected by any change in their physical parameters. Powders filling behaviors are studied in this study by changing their density, shape and particle size. The change in any powder's density, shape and particle size highly influence their flowability, processing, uniform filling and overall dose uniformity. The changes in powders densities were evaluated and compared by drying and milling of powder samples. The comparison in powders and granules flowability was also observed for same powders by making its granules using two different methods. Granules made by wet sieving method were compared with granules made by extrusion and spheronization. Five commonly used tablet fillers are used to conduct this study as they make up the large volume of the formulation. Starch, calcium carbonate, calcium phosphate, lactose, and microcrystalline cellulose (MCC) were used to conduct this study. Bulk densities and tapped densities are measured for all the forms of powder samples. The change in their behavior is studied in order to understand what changes can improve the flow quality of powders. This data is then integrated with AI based validation to predict the powder flow behavior. Initial observations show variations in density and flow properties in different physical forms studied. The granules show improved flow behavior as compared to untreated powders but it is comparable among the two granulated forms. This study is expected to provide understanding of powder characteristics and influence of physical changes on it. Studying these properties enable to understand and modify critical material attributes that can ensure uniform capsule filling across different machines and reducing dose variations.

Keywords: Capsule Filling, AI Based Validation, Density, Powder Flowability, Drying, Milling, Granulation

Multivariate Analysis of Potentially Toxic and Essential Elemental Levels in Human Pathological Thyroid TissuesHafiz M. Abdul Qayyum^{1*}¹Department of Chemistry, Division of Science & Technology, University of Education, Lahore, Pakistan***Correspondence:** hmaqayyum@ue.edu.pk**Abstract:**

The technological advancements and climate changes immensely enhanced the exposure of trace/toxic elements to mankind which may be a possible precursor of thyroid diseases including cancer development. However, the data linking them to this malignancy are generally lacking. The current study was designed to explore the role of selected elements that could contribute to the pathogenesis of thyroid diseases. Wet digestion procedure was adopted by using nitric acid perchloric acid mixture and selected elements were measured by flame and hydride generation atomic absorption spectrophotometry. The method was validated by linearity, accuracy, limits of detection and limits of quantification. Average levels ($\mu\text{g/g}$) of Zn (6.344), Ca (51.61), Cd (0.432), Se (1.995), Cu (1.781), Mg (32.54), Na (491.1), Ni (4.658), Fe (40.99) ($p < 0.001$) and Hg (0.047) ($p < 0.01$) were significantly elevated in the thyroid tissues of malignant patients, while mean contents ($\mu\text{g/g}$) of Mn (0.931), Co (3.078), Li (0.973), As (0.040), Sb (1.759) at $p < 0.001$, K (286.2) ($p < 0.01$) and Cr (1.258) ($p < 0.05$) showed appreciable rise in benign patients. Most of the elements exhibited significant disparities in different types of thyroid cancer patients along with higher accumulation of Cd, Cr and Li were noticed in advanced stages as compared to stage I. Multivariate principal component analysis and hierarchical cluster analysis exhibited diverse apportionment of the elements in both donor groups. The correlation study demonstrated the mutual role of essential and trace/toxic elements in the advancement of thyroid diseases. The comparison among the tissues of malignant and benign patients revealed disproportions in their elemental concentrations. The AAS technique proved to be adequate, as it exhibited good linearity, sensitivity and accuracy for the quantification of elements. Thus statistical mode of elemental analysis may be used as an additional tool for the prediction and progression of the thyroid diseases, including thyroid malignancy.

Keywords: Thyroid Tissues, Elements Chemometric Analyses AAS**Misuse of Mobile Phones in Children Brain Diseases, Neurological Risks and International Laws**Kamal Rabani^{1*}¹Lincoln University College Malaysia***Correspondence:** drkamalrubani@gmail.com**Abstract:**

The proliferation of mobile phones among children and adolescents has emerged as one of the most urgent public health challenges of the 21st century. This article provides a comprehensive, evidence-based review of how excessive and inappropriate mobile phone use affects the developing brain, cataloguing the neurological conditions linked to screen overuse, and surveying the legal and regulatory frameworks that governments worldwide have enacted or are enacting to protect minors. Drawing on

peer-reviewed studies from leading institutions including the NIH, Imperial College London, Macquarie University, Frontiers in Psychiatry, and the World Health Organization (WHO), this review finds consistent evidence that mobile phone misuse is associated with structural and functional changes in the developing brain, including impaired prefrontal cortex development, dysregulated dopamine pathways, sleep disorders, Attention Deficit Hyperactivity Disorder (ADHD)-like symptoms, anxiety, depression, and internet/smartphone addiction disorder. Internationally, more than 79 national education systems have enacted school smartphone bans by end of 2024, and landmark legislation banning social media for minors under 16 has been passed in Australia (effective December 2025), with similar laws rapidly following in Brazil, Denmark, Norway, Spain, France, and others. This article calls for unified global standards, parental education, and age-sensitive digital literacy programs.

Keywords: Mobile Phone Misuse, Children, Brain Development, ADHD, Smartphone Addiction, International Law, Screen Time, Neurological Disorders, Prefrontal Cortex, Dopamine

O-072

Nanocomposite Films of Halloysite Nanotubes with Gellan Gum for The Delivery of Terbinafine Hydrochloride

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Abstract:

Millions of people worldwide suffer from fungal infections, which are becoming more difficult to treat because of resistance, biofilm formation, and the limited effectiveness of current antifungal medications. Despite its widespread use, the well-known antifungal drug terbinafine has drawbacks in terms of resistance and bioavailability. In this work, new nanocomposite films made of magnesium sulfate (MgSO₄), gellan gum (GG), halloysite nanotubes (HNTs), and terbinafine hydrochloride (TRB) are developed and characterized. The purpose of the films was to increase antifungal potency, sustain release, and improve drug entrapment. Different ratios of drug-loaded HNTs integrated into a GG polymer matrix, with or without MgSO₄, were used to prepare the formulations. SEM, XRD, FTIR, DSC, and TGA structural characterization verified successful incorporation, decreased crystallinity, and enhanced stability. In optimized formulations, entrapment efficiency was over 90% and drug loading ranged from 34% to 42%. Compared to the pure drug, in vitro tests showed significantly larger inhibition zones against *Aspergillus niger* (A.N) and *Candida albicans* (C.A), as well as prolonged TRB release with non-Fickian diffusion kinetics. Rat intestinal mucosa penetration tests showed improved drug flux, especially in films loaded with MgSO₄. Increased half-life, plasma concentration, and bioavailability were demonstrated by pharmacokinetic evaluation in vivo, and toxicity studies verified safety without appreciable changes in hematology or biochemistry. These results demonstrate the potential of nanocomposite films as a drug delivery system, providing enhanced pharmacokinetics, long-lasting therapeutic effects, and synergistic antifungal activity. In the treatment of resistant fungal infections, such formulations might offer safer and more efficient substitutes.

Keywords: TRB, GG, HNTs, MgSO₄, *Aspergillus niger*, *Candida albicans*

O-073

The Relationship of Financial Stress, Coping Strategies, Social Support and Life Satisfaction Among Young Adults

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Abstract:

The present study examined the relationship among financial stress, coping strategies, social support, and life satisfaction, along with the mediating role of social support and the moderating role of coping strategies. A sample of 101 participants was taken (male = 56 and female = 45) from literate adults aged 18-35 years from Pakistan, while individuals below 18 years and those with diagnosed psychiatric disorders were excluded. A correlational research design was used. Data were collected via an online Google form using the APR Financial Stress Scale, Brief COPE, Multidimensional Scale for Perceived Social Support, and Satisfaction with Life Scale. The data was analyzed using statistical techniques. Findings indicate a significant negative correlation between financial stress and life satisfaction ($r = -.433$, $p < .001$). An independent-samples t-test show no significant difference in financial stress between males and females ($t = 1.14$, $p > .05$), while a significant difference is found in coping ($t = 2.23$, $p < .05$), with males scoring higher than females. Multiple regression analysis indicate that the model significantly predicted life satisfaction, explaining 49% of the variance ($R^2 = .49$, $p < .001$). Financial stress ($\beta = -.19$, $p < .05$) and perceived social support ($\beta = .59$, $p < .001$) is significant predictors, whereas coping strategies is not. There is a significant mediation effect of social support and no significant moderation effect of coping strategies. These findings emphasize strengthening social support and reducing financial stress to improve life satisfaction among adults.

Keywords:

O-074

Formulation and Characterization of Sol-Gel Processed Microspheres of Lidocaine HCl and Nitrofurazone and Their Loading in Sodium Alginate Scaffold

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Abstract:

Microspheres loaded scaffold (MLS) containing lidocaine HCl and nitrofurazone was developed as a controlled drug delivery system for the treatment of acute and chronic exudative wounds. Drug-loaded microspheres (DLMS) were prepared using the sol-gel method with ethyl silicate. The microsphere formulation showed sustained drug release (30% nitrofurazone and 33.3% lidocaine at 8 hours), high yield (81%), and good entrapment efficiency (71.9%). Characterization studies (SEM, XRD, FTIR, zeta potential, and thermal analysis) confirmed spherical morphology, successful drug entrapment, stability, and absence of significant interactions. Drug release followed the Higuchi model, indicating diffusion-controlled release. Microspheres were incorporated into sodium alginate scaffolds using the freeze-gelation method. The scaffold exhibited high water uptake (81%) and porosity (86%), with SEM confirming uniform microsphere distribution and a porous structure. Overall, the developed MLS system demonstrates promising potential as a controlled-release wound dressing for burns, ulcers, and diabetic wounds, though further in-vivo studies are required for clinical application.

Keywords: Lidocaine Hcl, Nitrofurazone, Sol–Gel Processed Microspheres, Sodium Alginate Scaffold, Freeze-Gelation, Controlled Drug Delivery, Sustained Drug Release, Wound Healing

O-075

Nanosuspension Of Resveratrol Accelerates Recovery of Sciatic Nerve Injury in Mouse Model

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Abstract:

Over the last few decades, plant-based natural compounds have been found as potential therapeutic agents against almost all types of ailments. Over the last decade, great progress in nanotechnology has facilitated the introduction of nanoformulations of drugs and natural products. Such sustain-releasing systems maintain a controlled delivery of bioactive ingredients over extended time periods. Generally, drugs and natural bioactive compounds experience limited bioavailability owing to their pH sensitivity, chemistry and low adsorption across biomembranes. The formulations with nanocarriers improve the bioavailability of poorly soluble pharmaceuticals with controlled delivery thus enhancing their bioactivity profiles. Naturally occurring resveratrol (Res), is a highly active nonflavonoid polyphenol, showing several bioactivities including anticancer, antioxidant, antidiabetic and anti-inflammatory potential. In this study, the nanosuspensions (NS) of Res were prepared with and without D- α -tocopheryl polyethylene glycol 1000 succinate (TPGS) as a stabilizing agent. Further, the prepared NS1 (Res only) and NS2 (TPGS + Res) were administered through daily gavage (20mg/mL) to accelerate functional recovery and regeneration following peripheral nerve injury (PNI) in a mouse model.

Keywords: Nanoformulations, Peripheral Nerve Injury, Sensory Functions Recovery, Motor Functions, PNI

O-076

Beyond the White Matter: Identifying Multiple Sulfatase Deficiency in the Leukodystrophy Landscape

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Abstract:

Multiple sulfatase deficiency (MSD) is an ultra-rare genetic disorder caused due to mutation in the *SUMF1* gene. This gene encodes formyl glycine generating enzyme (FGE) which is involved in the activation of sulfatases. Mutation in FGE leads to accumulation of sulfatases in different tissues like

skin, brain, liver, and skeleton which leads to different clinical symptoms. Till date, total 150 cases are reported globally. As the disease course is progressive so symptoms are different from mild to severe in neonatal, juvenile, and late infantile form. The present study describes three cases of late infantile form of MSD from Pakistan for the first time. A multiplex family with currently two affected kids (female 8 years; IV-1, male 6 years; IV-2) were recruited for genetic investigations. Symptoms appeared at the age of 2.4 years for both of them. Their remarkable presenting features included ichthyosis, presence of irritability, poor social response, speech, neurodegenerative symptoms as well as hearing loss and P1 later died at the age 8 years while she remained bed-ridden for the last 7 years, P2 is also on bed since last 5 years. Third sibling (IV-3; asymptomatic) was under the age of two when sampled for screening purpose. Segregation analysis of the Whole exome sequencing (WES)-identified variant of *SUMF1* c.536G>Cp. (Trp179Ser) was carried out. Sanger sequencing showed heterozygous status of parent and paternal grandmother confirming autosomal recessive mode of inheritance. IV-2 and IV-3 both were homozygous for the said variant. This study indicates the importance of genetic testing for identification of late onset diseases before appearance of symptoms that helps in proactive approach for disease management. This finding will help the family's understanding from 'carrier risk' to 'pre-symptomatic diagnosis and informed family planning.

Keywords: SUMF1, Autosomal recessive, Multiple Sulfatase Deficiency

O-077

Examining the Impact of NHE6 Gene Modulation on Gene Expression Profiles Associated with Alzheimer's

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Abstract:

Alzheimer's disease (AD), the most frequent neurodegenerative disease, is characterized by significant cognitive impairment. Extracellular A β (amyloid beta) plaques and intracellular hyperphosphorylated tau tangles, which result in synaptic dysfunction and neuronal cell death, are histological characteristics of AD. AD and other neurodegenerative diseases are also associated with endolysosomal mechanisms, indicating that the pathophysiology of these conditions may include NHE6-mediated pH control. The SLC9A6 gene encodes NHE6, which belongs to a broader family of eukaryotic Na⁺/H⁺ exchangers that have been conserved throughout evolution. NHE proteins control ion homeostasis, cell growth and migration, cell size and osmotic balance, vesicular traffic and vesicle recycling, cell and organelle pH, and signaling pathways. Applying endosomal-alkalinizing agents or modulating NHE6 expression to alter vesicular pH may represent a promising treatment option for patients with AD. In this study, the effects of increased and decreased expression of the SLC9A6 gene on AD-related genes (APP, PSEN1, IRS1, and CK1 ϵ) were investigated. Suppression of SLC9A6 expression by siRNA was associated with reduced relative expression of genes associated with AD and reduced intracellular levels of A β (1-42). In the SH-SY5Y (F+A+siRNA) group, expression levels of APP, PSEN1, IRS1, and CK1 ϵ were significantly decreased by 5.2-fold ($p < 0.05$), 6.9-fold ($p < 0.0001$), 17.33-fold ($p < 0.0001$), and 2.7-fold ($p < 0.0001$), respectively. Intracellular A β (1-42) levels were also reduced to 0.31-fold (%CV<20). These findings suggest that NHE6/SLC9A6 inhibition may influence

AD-related molecular pathways in vitro; however, further studies are needed to clarify its potential relevance for AD pathophysiology and therapeutic development.

Keywords: Alzheimer's Disease, NHE6, Gene Expression Modulation, Endolysosomal System

O-078

Development and Characterization of Bacterial Peroxidase-Titanium Oxide Nano-Bioconjugates for Enhanced Wastewater Treatment

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Abstract:

The increasing presence of persistent organic pollutants in wastewater poses significant environmental and public health challenges due to their resistance to conventional treatment methods. This study focuses on the synthesis of bacterial peroxidase–titanium dioxide (TiO₂) nano-bioconjugates to develop an efficient and sustainable approach for wastewater treatment. Bacterial isolates capable of producing peroxidase were cultured, and TiO₂ nanoparticles were synthesized through controlled chemical methods. The enzyme was subsequently conjugated onto the nanoparticle surface to enhance catalytic performance and stability. The synthesized nano-bioconjugates were successfully formed, as indicated by structural and compositional analyses. The conjugation of bacterial peroxidase with TiO₂ nanoparticles improved enzyme stability and provided a larger reactive surface area, facilitating enhanced catalytic activity. Compared to free enzyme systems, the nano-bioconjugates demonstrated improved functional efficiency, suggesting their potential for robust application in wastewater environments. These findings highlight that the integration of biological and nanomaterial systems can significantly improve enzyme performance, offering a promising strategy for advanced wastewater treatment technologies. The study contributes to the development of cost-effective, stable, and environmentally friendly solutions aligned with sustainable water management goals.

Keywords: Peroxidase, Peroxidase-Titanium Oxide Nano-Bioconjugates, Wastewater

O-079

Comparative Analysis of Microbial Community Structure and Functional Metabolic Diversity Across Different Aquatic Ecological Niches

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Abstract

This study presents a comparative analysis of microbial community structure and functional metabolic diversity across distinct aquatic ecological niches, including marine, freshwater, and subsurface environments. Using integrated molecular and bioinformatics approaches, the research evaluates how physicochemical gradients such as temperature, light availability, nutrient concentration, and oxygen levels shape microbial composition and metabolic potential. Results reveal that each ecological niche harbors unique microbial assemblages characterized by specialized functional traits adapted to local

environmental conditions. Marine systems exhibited high diversity linked to phototrophic and carbon-cycling pathways, while freshwater ecosystems showed greater variability driven by nutrient inputs and seasonal fluctuations. Subsurface habitats, in contrast, supported metabolically specialized communities adapted to low-energy, anaerobic conditions. Functional analysis indicated significant differences in key metabolic processes, including nitrogen cycling, sulfur metabolism, and organic matter degradation, reflecting niche-specific ecological roles. The findings highlight a strong correlation between microbial community structure and metabolic functionality, emphasizing the role of environmental selection in shaping ecosystem processes. This study enhances understanding of microbial contributions to global biogeochemical cycles and provides insights into how aquatic ecosystems may respond to environmental change and anthropogenic pressures.

Key words: Microbial communities, Metabolic diversity, Aquatic ecosystems, Environmental gradients, Biogeochemical cycles, Nitrogen cycling, Sulfur metabolism, Anaerobic metabolism

O-080

Comparative Evaluation of Infrared Thermography and Traditional Thermometry for Monitoring Health Status in Nili-Ravi Buffalo (*Bubalus bubalis*)

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Abstract:

Regular monitoring of core body temperature is crucial for detecting physiological as well as pathological conditions in animals. Rectal thermometry is considered the gold standard method for monitoring body temperature, but it is an offensive as well as stressful method. Conversely, infrared thermography (IRT) offers a non-contact, stress-free method to detect subtle thermal changes and health issues in Buffaloes. The study aimed to compare infrared thermography and rectal thermometry for the measurement of core body temperature. Rectal temperature was measured in randomly selected Nili-Ravi buffalo (n = 108), aged between 3 and 7 years, using a digital thermometer. Body surface temperature was measured using a pocket-sized thermal imager as maximum, minimum, and average thermal windows from ocular, vulvar, flank, shoulder, and poll regions. The maximum surface temperature (STmax) taken by IRT demonstrated the strongest agreement with rectal temperature, particularly across the eyes and vulvar region ($R^2 > 99$; ICC > 0.99), followed by flanks ($R^2 > 98$; ICC > 0.99) and shoulders ($R^2 > 97$; ICC > 0.99), showing minimal bias and narrow limits of agreement. All temperature metrics of the poll region were most affected by environmental factors and showed poor diagnostic accuracy ($R^2 > 88.77$; ICC > 0.88). Overall, IRT can serve as a rapid alternative for monitoring body surface temperature and welfare in buffalo.

Keywords: Buffalo, Infrared thermography, Rectal temperature, Surface temperature

O-081

Deep Learning-Based Image Analysis of Dried Blood Spots for Hemoglobin Classification in Cattle: A Preliminary Evaluation

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Abstract:

Hemoglobin (Hb, measured in g/dL) is one of the most reliable predictors of anemia in livestock. However, traditional laboratory methods for Hb estimation are invasive, costly, and require specialized equipment, limiting their use in resource-limited settings. Dried blood spot (DBS) sampling offers a practical alternative for quantifying Hb as a less invasive and cost-effective method. This study presents the first attempt to train deep learning (DL) models to classify Hb levels from images of DBS samples in cattle in Pakistan. The DBS images were used to create a labeled dataset (Low, Normal, High Hb levels) using reference values from the reference-standard hematology analyzer. The dataset was then randomly divided into training, validation, and testing subsets to train DL models, including a customized convolutional neural network (CNN), EfficientNetV2-B0, and MobileNetV2. The CNN model achieved the best performance with an overall classification accuracy of 87%, followed by EfficientNetV2-B0 at 76%, and MobileNetV2 at 73%. The results suggested that a custom CNN can extract meaningful patterns from DBS images and has the potential to establish an inexpensive, image-based anemia screening tool for field settings.

Keywords: Deep learning models; Dried blood spots; Hemoglobin; Image analysis

O-082

Assessment of Awareness and Reported Symptoms of Opioid-Induced Adrenal Insufficiency

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Abstract:

Chronic opioid use has been associated with suppression of the hypothalamic–pituitary–adrenal (HPA) axis, potentially leading to opioid-induced adrenal insufficiency (OIAI), a condition that is frequently underdiagnosed because of its non-specific clinical presentation. This study evaluated the prevalence of adrenal-related symptoms, associated risk factors, and patient awareness among opioid users. A cross-sectional survey was conducted among 361 participants aged 18–30 years, including 224 females (62.0%) and 137 males (38.0%). The majority were undergraduate students (82.8%). Findings revealed a high burden of symptoms suggestive of adrenal dysfunction. Extreme fatigue or shakiness following minor physical or emotional stress was reported by 84.2% of participants and showed a significant

association with opioid exposure ($p < 0.001$). Opioid-induced hyperalgesia was reported by 74.1% and was significantly associated with increased physical symptoms, including nausea and dizziness ($p < 0.001$). Other commonly reported symptoms included nausea (73.3%), shakiness (71.8%), and faintness or dizziness (64.7%), all significantly associated with greater symptom burden ($p \leq 0.001$). Cognitive symptoms such as confusion or brain fog were reported by 46.6% of participants and were significantly associated with social withdrawal ($p = 0.002$). Emotional fragility and irritability were observed in 62.4% and were linked to increased physical symptom severity ($p = 0.001$). Awareness of adrenal crisis was limited, with only 52.6% of participants reporting familiarity with the condition; lack of awareness was significantly associated with greater symptom severity ($p = 0.005$). These findings highlight the substantial burden of symptoms consistent with OIAI and emphasize the need for routine screening, patient education, and early recognition of adrenal-related complications to reduce morbidity and prevent adrenal crisis.

Keywords: Opioid-Induced Adrenal Insufficiency, HPA Axis Suppression, Chronic Opioid Use, Adrenal Crisis, Opioid-Induced Hyperalgesia, Patient Awareness

O-083

The Role of Artificial Intelligence in Medication Optimization: Perspectives of Health Professional and Medical Students at SMBBMU, Larkana

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Abstract:

Artificial Intelligence (AI) has rapidly evolved as one of the most transformative innovations in healthcare. AI-powered systems are now capable of handling tasks such as clinical decision support, disease prediction, medication optimization, and patient monitoring. According to the World Health Organization (2021), digital health tools including AI are essential. Globally, more than 3 million people die each year due to medication errors (WHO). In Pakistan, approximately 500,000 deaths annually are linked to medication errors, though official data are lacking. AI-driven systems, such as Clinical Decision Support Systems (CDSS), IBM Watson, and MedAware, have demonstrated potential in predicting adverse drug reactions, identifying unsafe prescriptions, and suggesting evidence-based dosing adjustments (Davenport & Kalakota, 2019). Health care professionals' perceptions and readiness to adopt AI are crucial in shaping how these technologies will be integrated into Pakistan's healthcare system. This descriptive cross-sectional survey (July-September 2025) included 324 undergraduate and postgraduate students from pharmacy, medicine, nursing, and allied health sciences at SMBBMU Larkana, selected through convenience sampling with the sample size calculated via Raosoft. Data were collected using a structured, pretested questionnaire adapted from TAM, UTAUT, and DHLI instruments. Analysis in SPSS v27 employed descriptive and inferential statistics including Chi-square, t-test, ANOVA, and correlation with significance set at $p < 0.05$. Results: Out of 324 respondents, 71% were aged 21–23 years and 64% were female, with 79% undergraduates and 21% postgraduates. Most were pharmacy students (52%), followed by medicine (33%), nursing (9%), and allied health sciences (6%). Awareness of AI was moderate to high in 63% of respondents, with postgraduates showing greater familiarity ($p = 0.032$). Regarding AI in medication optimization, 72% believed it could improve therapy management and reduce prescription errors, while 65% favored joint validation by physicians and pharmacists. Expected benefits included prescription

error detection (68%), adverse drug reaction prediction (61%), and personalized drug dosing (55%), with pharmacy students showing stronger agreement ($p = 0.021$). Acceptance of AI was high (74%), and 76% were willing to undergo formal training. Barriers identified included lack of training (59%), high cost (52%), limited system integration (47%), and ethical/data privacy concerns (36%). The study showed high awareness and acceptance of AI in medication optimization among SMBBMU Larkana health professional and medical students, who view it as beneficial for reducing errors and enhancing personalized care and are willing to train in AI applications. Successful adoption requires addressing systemic barriers such as lack of training, costs, integration challenges, and ethical concerns, alongside curriculum integration and institutional support. With 69% of students anticipating transformational changes in healthcare within the next decade. To overcome implementation challenges, it is recommended to focus on curriculum integration, institutional support, training and capacity building, and establishing ethical and data governance guidelines to ensure safe and effective use of AI in healthcare.

Keywords: Artificial Intelligence, Clinical Pharmacy, Drug Therapy Optimization, Health Professional Students Perception, Adoption Barriers, Larkana

O-084

Pharmacy Education Transformation for Future Workforce

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Abstract:

Pharmacy education must evolve to meet the demands of an expanding healthcare system where pharmacists play a vital role in patient care, clinical services, and public health. Traditionally, pharmacy education has focused on theoretical knowledge and drug dispensing; however, modern healthcare requires pharmacists equipped with practical, clinical, technological, and communication skills. This study aimed to assess the limitations of current pharmacy education and explore the need for transformation to prepare a competent future workforce. A cross-sectional, questionnaire-based survey was conducted using a structured Google Form distributed among pharmacy students and practicing pharmacists of our department. A total of > 250 responses were collected through Google sampling. Data were analyzed using descriptive statistics, along with inferential tests including chi-square, SPSS and ANOVA, with a significance level set at $p < 0.05$. The findings revealed that 45% of respondents consider the current curriculum outdated, while 35% emphasized the need for transformation. Key areas identified for improvement included practical and clinical training (79%), integration of digital health and emerging technologies (62%), and development of communication and patient counseling skills (80%). Additionally, 57% supported interactive and problem-based learning approaches, and 30% recommended increased internships and practicing exposure. Major challenges included lack of practical experience (82%), outdated syllabus (64%), and weak collaboration between academia and internships (45%). Cross tabulation and Chi-square analysis were performed to assess associations between variables. No significant relationship was observed between gender and perception of pharmacy education transformation ($\chi^2 = 1.95$, $p = 0.745$). However, a statistically significant association was found between academic year and students' confidence in current education ($\chi^2 = 24.54$, $p = 0.0019$).

Keywords: Pharmacy education, Clinical training, Digital health, Communication skills, Patient counseling, Problem-based learning

O-085

Targeting SARS-CoV-2 Papain-Like Protease: Structure-Based Discovery of Paraherquamide E as a Selective Inhibitor

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Abstract:

Papain-like protease is a crucial enzyme in the proteolysis process required for the replication of SARS-CoV-2. Such enzyme remains a prime target for the development of therapeutic drugs against SARS-CoV-2 which may lower mortality rates associated with it. In this study, a set of 112 ligand molecules targeting PLpro were retrieved from the ChEMBL database that showed structural features of molecular inhibitors of papain-like protease of SARS-CoV-2 underwent molecular docking against the target papain-like protease enzyme (PDB ID: 6WX4). According to the docking results, ten compounds exhibiting favorable binding energies were identified compared to other reported inhibitors, and out of them Paraherquamide E (ZINC000000603253) emerged as a leading compound with the most favorable docking score (−9.1 kcal/mol) and showed strong interaction with key residues (GLN174, SER170, PRO173, and MET206) of the target protein. The pharmacokinetics profiling studies was carried out in accordance with four principles of the Lipinski rules and that Paraherquamide had zero Lipinski violations. In addition, the compound showed favorable drug-likeness and pharmacokinetic properties assessed via ADMET and toxicity models. Overall, based on comparative molecular docking and pharmacokinetic properties, Paraherquamide E emerged as a leading compound, proving its potential as a selective molecular inhibitor of SARS-CoV-2 for future pre-clinical and clinical experimental evaluation.

Keywords: SARS-Cov-2, Papain-Like Protease (Plpro), Molecular Docking, Virtual Screening, Pharmacokinetics, Drug Discovery

O-086

Imine Derivatives of Benzoxazole Attenuate High-Fat Diet-Induced Hyperlipidemia by Modulation of Lipid-Regulating Genes

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Abstract:

Hyperlipidemia being the prominent risk factor of cardiovascular diseases and side effects associated with the current lipid-lowering drugs have attracted the interest of scientists in the quest for new alternatives. In view of the diverse pharmacological potentials of benzoxazole (BZX) compounds, this study was designed to evaluate the antihyperlipidemic activity of imine derivatives of BZX in high-fat diet (HFD)-fed rats. Hyperlipidemia was induced in Sprague–Dawley rats by using HFD for 28 days.

On the 28th day, blood samples were collected, and animals having serum triglycerides (TG) greater than 400 mg/dL and total cholesterol (TC) greater than 280 mg/ dL were selected for further study. Hyperlipidemic rats were daily treated with either a vehicle or simvastatin (SIM; 20 mg/kg) or BZX compounds (10, 20, and 30 mg/kg), for 12 consecutive days. After the specified time duration, hyperlipidemic biomarkers were evaluated in the blood samples of sacrificed rats. Liver samples were collected for histopathological and mRNA analyses. Binding affinities of BZX derivatives with different targets were assessed by molecular docking. The present study revealed that the BZX derivatives dose-dependently reduced the serum levels of TC, TG, low-density lipoprotein, and very low-density lipoprotein along with improvement in high-density lipoprotein levels. Similarly, all the compounds reduced HFD-induced alanine transaminase and aspartate aminotransferase levels except BZX-4. Histopathology of liver samples demonstrated mild to moderate fatty changes upon treatment with BZX-1, BZX-2, and BZX-4. The hepatic architecture of the BZX-3-treated samples was close to normal, and only mild inflammation was witnessed in these samples. Moreover, all the compounds significantly increased superoxide dismutase and glutathione levels, indicating their antioxidant potentials. Gene expression data showed that BZX-1 and BZX-3 reduced lipid levels by inhibiting HMGCR, APOB, PCSK9, SRB1, and VCAM1 and via improving PPAR- α and APOE mRNA levels. BZX-2 demonstrated its antihyperlipidemic effects mainly due to inhibition of APOB, while BZX-4-mediated effects appeared to be due to attenuation of APOB, PCSK9, and SRB1. BZX derivatives displayed strong binding affinities with HMGCR, APOB, and VCAM1, which suggested that some of the interactions might be required for inhibition of these target proteins. Conclusions: Based on the current findings, it can be concluded that BZX derivatives exert their antihyperlipidemic effects via modulation of multiple lipids regulating genes.

Key words: Hyperlipidemia, High Fat Diet, Cardiovascular, Lipoproteins, Apolipoproteins

O-087

Sustainable Hydrogel-Based Wound Dressings Enriched with Plant-Derived Extracts for Improved Healing Outcomes

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Abstract:

Hydrogel membranes resemble biological tissues and currently there is a tremendous interest in their development as wound healing dressings. Alpha mangostin (α -MG), being a highly active xanthone is well recognized for its wound repair potential. However, because of its poor solubility and relatively brief retention time on cutaneous wound sites, its effectiveness on wounds is compromised. Herein, α -MG was incorporated in gellan gum (GG) based hydrogel membranes by solvent casting crosslinking technique, the resulting eco-friendly films demonstrated excellent antibacterial, antioxidant and anti-inflammatory effects. Physico-chemical evaluation confirmed optimal thickness, flexibility, homogeneity and swelling ability. The structural characterization was carried out using Fourier transform infrared spectroscopy (FTIR), X ray diffractometry (XRD) and scanning electron microscopy (SEM). In vivo, the films promoted re-epithelization and reduced the

levels of pro inflammatory and apoptotic cytokines. Taken together, this novel hydrogel membranes containing alpha-mangostin support the development of sustainable pharmaceutical platform for enhanced cutaneous wound healing using natural bio actives.

Keywords: Gellan gum, α -mangostin, wound healing, hydrogel membranes, antibacterial

O-088

Keampferol-3-O-Rutinoside (K-3-R) Promotes Sensorimotor Function Recovery in a Mouse Model of Induced Sciatic Nerve Injury

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Abstract:

Functional impairment caused by peripheral nerve injury is currently a serious global health concern. Although there are numerous possible treatments available for these injuries, the lack of effective treatment continues to restrict full functional recovery. Kaempferol-3-O-rutinoside (K3R), a flavonoid derived from plants, has anti-inflammatory, anti-cancer, antidiabetic, and antioxidant qualities. K3R functions by a number of mechanisms, including as enzymatic inhibition, blocking signaling pathways, and inducing apoptosis in cancer cells. This study used a mouse model of sciatic nerve injury to assess K3R's neuroprotective potential. Three groups of twenty-four BALB/c mice were evenly divided: 1) Control, 2) Sham, and 3) K3R-treated group (n = 8). The sham and control groups received an intraperitoneal injection of DMSO. In contrast, from the day of sciatic nerve injury to the end of the trial, K3R (2.5 mg/kg, dissolved in DMSO) was administered intraperitoneally to the treated group. Behavioral analyses were used to compare and assess increased functional recovery in each group. Morphometric analysis was used to quantify the structural regeneration of muscle fibers, whilst hematological and biochemical tests were used to measure total blood count and oxidative stress indicators. Nerve regeneration was indirectly evaluated by measuring the amounts of S100 β protein and pro-inflammatory cytokines (TNF- α and IL-6). Sensorimotor functional recovery significantly improved (p < 0.001) in the K3R-treated group. Blood glucose levels and oxidative stress indicators showed a statistically significant difference across all groups. The treated group's muscle fiber diameter significantly improved, according to morphometric analysis. The K3R group showed improved nerve repair due to lower levels of TNF- α , S100 β , and IL-6. Our results indicate that K3R has neuroprotective potential by improving functional recovery following a sciatic nerve injury and considerably lowering oxidative stress.

Keywords:

Keampferol-3-O-Rutinoside (K-3-R), Oxidative stress, Total oxidative capacity (TAC), Total antioxidant status (TOS), Peripheral nerve injury.

O-089

Drug-induced Endoplasmic Reticulum Stress and its Management with *Terminalia arjuna* Bark Extract in Murine Liver Injury Model

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Abstract:

Drug-induced liver injury is a critical clinical concern, with acetaminophen overdose being a leading cause. Endoplasmic reticulum stress plays a central role in APAP-induced hepatotoxicity, leading to oxidative damage, apoptosis, and inflammation. This study evaluates the hepatoprotective effects of *Terminalia arjuna* bark extract in a rat model of APAP-induced liver injury, comparing its efficacy with the standard treatment, N-acetylcysteine, targeted at molecular roleplay of critical signaling proteins and inflammatory markers mediated by APAP-induced oxidative stress. Twenty-four Wistar rats were divided into four groups: Control Negative (CN), Control Positive (CP, acetaminophen 350 mg/kg), N-acetylcysteine (NAC, 150 mg/kg), and *Terminalia arjuna* extract (TAE, 80 mg/kg). Acetaminophen-induced liver injury was established in CP, while NAC and TAE groups received treatments for 14 days. On day 15, animals were decapitated, and samples were analyzed for liver enzymes, oxidative stress markers, gene expression (oxidative stress, apoptosis, proliferation, inflammation, ER stress), and histopathology to assess liver architecture and cellular integrity. Acetaminophen induced significant hepatotoxicity, as reflected by elevated liver enzymes, increased oxidative stress, altered gene expression, and disrupted liver histology. APAP toxicity resulted in elevated oxidative stress, apoptosis, inflammation, and ER stress, leading to significant hepatic damage. NAC and TAE treatments mitigated these effects, with TAE demonstrating superior improvement in oxidative stress markers. Gene expression analysis showed a protective shift in Keap1-Nrf2, apoptosis, and inflammation pathways in treated groups. Histopathology confirmed reduced necrosis and preserved hepatic architecture in NAC and TAE groups. These findings underscore the potential of *T. arjuna* bark extract as an effective hepatoprotective agent in drug-induced liver injury. *T. arjuna* exhibits potent hepatoprotective effects, comparable to NAC, through modulation of oxidative stress, apoptosis, and ER stress pathways. Further studies are needed to explore its clinical applicability in acute liver injury management.

Keywords: *Terminalia arjuna*, Acetaminophen, Liver Injury, Drug-induced Liver Injury, Hepatoprotection, Oxidative Stress, Genetic Studies, Rat model

O-090

Investigation of Dose-Dependent Response of *Foeniculum vulgare* on Muscle Function Restoration in a Mouse Model

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Abstract:

Peripheral nerve injury (PNI) is a devastating condition with no effective treatment till today. These injuries are among the difficult medical problems still awaiting first-line therapy. Numerous plant species and phytochemical compounds derived from plants have been suggested to process therapeutic potential for addressing various disorders, with a particular emphasis on mitigating neuronal damage. These substances indicate hope to those in need. The objective of this study was to establish the

potential of *Foeniculum Vulgare* in enhancing the rate of functional recovery following sciatic nerve injury in healthy albino mice. Following acclimatization, mice were randomly assigned to six groups. 1 sham, 1 control, 1 positive control and 3 treatment group. Muscular grip strength and the sciatic functional index were used to examine motor functional recovery, while pinprick and hot plate tests were performed to assess sensory functioning. The glucose level in the blood was also measured. While TAC and TOS were used to assess oxidative stress in the blood. Histology was carried out for morphometric analysis. Two-way ANOVA was used to evaluate statistical results. Current study result showed that methalonic extract of *Foeniculum Vulgare* improves muscle function restoration after a peripheral nerve injury with a statistically significant difference. Further research is needed to discover and characterize the active components of these plants.

Keywords: *Foeniculum vulgare*, peripheral nerve injury, functional recovery, sciatic nerve, neuroprotection

O-091

Enhancement of Dexibuprofen Solubility and Dissolution Using Hydroxypropyl- β -Cyclodextrin and Poloxamer (188/407) Inclusion Complexes

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Abstract:

Dexibuprofen (DEX), a poorly water-soluble non-steroidal anti-inflammatory drug, exhibits limited dissolution and bioavailability. This study aimed to enhance the solubility and dissolution behavior of DEX through inclusion complex formation with hydroxypropyl- β -cyclodextrin (HP β CD) and to investigate the effect of hydrophilic polymers on the solubilization efficiency of HP β CD. Binary inclusion complexes were prepared using physical trituration, kneading, and solvent evaporation methods at different drug-to-cyclodextrin weight ratios. Among these, the kneading method at a DEX/HP β CD ratio of 1:4 demonstrated significant improvement in solubility and drug release. Ternary complexes were further prepared by incorporating hydrophilic polymers, poloxamer-188 (PXM-188) and poloxamer-407 (PXM-407), at concentrations of 2.5, 5.0, 10.0, and 20% w/w, which significantly enhanced the complexation efficiency and solubility of DEX. Fourier-transform infrared spectroscopy confirmed the successful inclusion of DEX within the HP β CD cavity. Differential scanning calorimetry and X-ray diffraction analysis revealed reduced crystallinity and molecular encapsulation of DEX within the cyclodextrin matrix. The addition of hydrophilic polymers further reduced the intensity of the DEX endothermic peak and diminished crystalline characteristics. Among all formulations, PXM-188 at 10% w/w exhibited the most pronounced improvement in solubility, stability, and dissolution rate. These findings suggest that ternary inclusion complexes of DEX with HP β CD and hydrophilic polymers represent a promising approach for enhancing the physicochemical and dissolution properties of dexibuprofen.

Keywords: Dexibuprofen, Hp β cd, PXM, Inclusion Complex

Diversity and Seasonal Dynamics of Pollinators in Agricultural Ecosystem of Okara, Punjab, Pakistan

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Abstract:

The present study investigates the diversity and seasonal dynamics of insect pollinators in agricultural ecosystems of Okara, Pakistan. Data were collected from multiple crop fields, including wheat, maize, and vegetable crops, over different seasons to assess variations in pollinator abundance and composition. Standard sampling techniques such as sweep netting, pan trapping, and direct observation were employed for data collection. The study was conducted in different habitats including agricultural fields, residential gardens, roadside vegetation, and semi-natural areas of Okara, from May 2025 to April 2026, covering multiple seasons to assess the diversity and seasonal dynamics of insect pollinators. The results revealed a rich diversity of pollinator species, primarily belonging to Hymenoptera (bees and wasps), Diptera (flies), Lepidoptera (butterflies and moths), and Coleoptera (beetles). Among these, bees were found to be the most dominant and effective pollinators. Seasonal fluctuations significantly influenced pollinator diversity, with peak abundance observed during the spring season, corresponding to maximum flowering periods, while a decline was noted during extreme summer and winter months. Environmental factors such as temperature, humidity, and floral availability were identified as key drivers affecting pollinator activity and distribution. Anthropogenic influences, including pesticide use and habitat disturbance, were also observed to negatively impact pollinator populations. This study highlights the ecological importance of insect pollinators in agricultural landscapes and emphasizes the need for sustainable farming practices to conserve pollinator diversity. The findings provide baseline data for future research and contribute to the development of pollinator-friendly management strategies in the region.

Keywords: Insect pollinators, biodiversity, seasonal dynamics, agricultural ecosystems, sustainable agriculture

Neuroleptospirosis in Acute Encephalitis Syndrome Patients: A One Health Case-Control Study of Zoonotic Spillover

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Abstract:

Leptospirosis is a neglected zoonotic disease which in 10-15% of the cases has nervous involvement in the form of meningitis or encephalitis called neuroleptospirosis. Despite the seroprevalence in Pakistan reaching 40.83%, leptospirosis is not routinely tested in clinical settings. In animals, it leads to abortions or stillbirths in production animals while canines and rodents act as silent reservoirs for the organism. Bovine seroprevalence reaches 30% in flood-affected South Punjab and canine seroprevalence reaches 36% in Lahore. In India, 3% of the pediatric acute encephalitis syndrome (AES)

cases were found to be caused by leptospirosis. Although leptospirosis is the cause of AES in South Asia, there is no prospective study to measure its role in AES burden in Pakistan or measure the zoonotic and environmental risk factors involved in transmission of this disease. In this hospital-based case control study, we will enroll 100 AES cases and 100 febrile patients without neurological involvement as controls, from hospitals in Faisalabad and Lahore. The blood samples will be tested for leptospirosis using IgM ELISA. Simultaneously, we will also collect blood and urine samples for cattle, buffalo and stray dogs within 500 meters of patient's homes and test them for leptospirosis by ELISA. Serovar typing of positive samples in both animal and human samples will be done by Microscopic Agglutination Test (MAT) and for confirming active shedding of bacteria, we will perform PCR on animal samples for the lipL32 gene. Data will be collected through a questionnaire which will include any recent animal contact, floodwater contact and their occupation. GIS mapping will be done through QGIS software to map residential areas, animal infection sites and environmental features (drains and flood zones). Machine learning algorithms (Support Vector Machines, Random Forest) will be applied to predict spatial clustering of infected animals around human case homes and predict high risk zones. It is expected that AES patients will show higher seropositivity than controls, with animal cases geographically clustered around human cases, confirming zoonotic spillover events. This study will help improve the clinical diagnostics and AI driven One Health surveillance.

Keywords: Neuroleptospirosis, Encephalitis, One Health, Zoonotic spillover, ELISA, Machine Learning

O-094

Impact of Maladaptive Eating Habits on Irritable Bowel Syndrome (IBS); The Mediating Role of Dietary Choice in University Students

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Abstract:

Irritable Bowel Syndrome (IBS) is a prevalent functional gastrointestinal disorder influenced by behavioral and lifestyle factors. However, limited research has examined the mechanisms through which maladaptive eating habits contribute to IBS symptoms, particularly the mediating role of dietary choice in university students. The present study investigated the impact of maladaptive eating habits (cognitive restraint, uncontrolled eating, and emotional eating) on IBS symptoms (pain, diarrhea, and constipation), with dietary choice as a mediator. A cross-sectional correlational design was employed with undergraduate students (aged 18–23 years) from public and private universities in Faisalabad. Initially, a sample of 1,000 students was selected and 281 meeting IBS criteria were screened out through purposive sampling by using Birmingham IBS Questionnaire. Data were collected using validated self-report measures assessing eating behaviors, dietary choice, and IBS symptom severity. Data were analyzed using IBM SPSS Statistics (Version 25) and PROCESS Macro (Model 4). Pearson Product Moment correlation analyses revealed significant positive associations among maladaptive eating habits, dietary choice, and IBS symptoms. While the findings of multiple regression analysis revealed maladaptive eating habits and dietary choices are positive predictor of IBS symptoms. Furthermore, Mediation analysis demonstrated that dietary choices partially mediated the relationship between maladaptive eating habits and IBS symptoms. The results highlight the importance of targeting

maladaptive eating patterns and dietary choices in clinical and preventive interventions aimed at managing IBS symptoms among university students.

Keywords: Irritable Bowel Syndrome, maladaptive eating habits, dietary choice, cognitive restraint, emotional eating, mediation.

O-095

Methanolic Extract of *Withania somnifera* Improves Functional Recovery Following Sciatic Nerve Injury in a Mice Model

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Abstract:

Managing peripheral nerve damage remains a significant challenge. Despite advances in microsurgical techniques, functional recovery following peripheral nerve injury remains inconsistent and often incomplete. Natural products have long been used in traditional medicine for treating various disorders, making them promising candidates for promoting nerve regeneration. This study investigated the effects of *Withania somnifera* methanolic extract on peripheral nerve regeneration using a sciatic nerve crush model in albino mice. Animals were divided into control, sham, and treatment groups. The treatment group received *W. somnifera* methanolic extract (200 mg/kg) orally by gavage daily from the day of nerve crush until the end of the experimental period, while the control and sham groups received normal saline. All animals were maintained on a standard chow diet. Functional recovery was assessed using behavioral tests, including grip strength, pin-prick, hot plate, and sciatic functional index analyses. Blood glucose levels were monitored, oxidative stress was evaluated through serological analyses, and histological examination was performed for morphometric assessment of nerve regeneration. The findings demonstrated that *W. somnifera* methanolic extract significantly improved motor and sensory functional recovery following sciatic nerve injury. However, further studies are required to identify and characterize the specific bioactive constituents responsible for these neuroregenerative effects and to elucidate their underlying molecular mechanisms.

Keywords: Peripheral nervous system, Peripheral nerve injury, Nerve regeneration, Sciatic nerve, *Withania somnifera*, Phytochemicals

O-096

Antioxidant and Anti-Inflammatory Potential of *Psidium guajava* Leaf Extract in Acetic Acid–Induced IBD in Rats

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Abstract:

Inflammatory bowel disease (IBD) is a chronic, relapsing inflammatory disease that is characterized by inflammation of the gastrointestinal tract that causes ulcerations and destruction of the gastrointestinal mucosa. Crohn's disease and ulcerative colitis are two major forms of IBD

distinguished by the pattern of inflammation and the location of the disease in the intestinal tract. The pathogenesis of IBD involves the combination of gut dysbiosis, immune dysregulation, genetic and environmental factors. The objective of this study is to evaluate the cytoprotective and regenerative potential of *Psidium guajava* leaves extract in acetic acid induced IBD rat model (n=24). In the current study, IBD was induced in rats by use of acetic acid (AA) intrarectally administration of 1ml/kg of the body weight and the rats (100-150 grams) were divided into four groups named: negative control, positive control, standard group and treatment group. The Acetic acid dose was given at 1ml/kg of the body weight to the positive control, standard group, treatment group and the negative control was given only normal diet. Standard group was given the dose of Sulfasalazine 50mg/kg of the body weight orally. Treatment group was given orally administered with ethanolic extract of *Psidium guajava* leaves with the dose of 200mg/kg of the body weight. A Sampling of blood and colon tissue was done at the end day of the trial. Parameters like Hematology and Oxidative stress parameters were analyzed. RNA isolation for gene expression analysis of selected genes using qRT-PCR were evaluated. The histopathological examination was carried out for the architectural study of the colon. Statistical analysis was done by using one-way ANOVA followed by DMR. The results showed a significant increase in oxidative stress parameters (Total antioxidant capacity, Total oxidant status, Malondialdehyde) and decrease in hematological parameters (Red blood cells and hemoglobin) in the positive control group whereas remarkable improvements were shown in treatment groups. However, there was no significant changes in body weight, White blood cells and platelets count. The histological examination has revealed significant damage in intestinal epithelium in the positive control group while remarkable improvements were observed in the *Psidium guajava* treated group.

Keywords: IBD, Ulcerative colitis, Crohn's disease, *Psidium guajava* leaves

O-097

To Investigate the Dose Dependent Effect of *Betula Utilis* on Functional Recovery After Sciatic Nerve Injury in Albino Mice

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Abstract:

In the past, peripheral nerve injuries (PNIs) were a serious health issue that needed efficient first-line therapies. Due to their sensitive nature, peripheral nerves are vulnerable to acute compression or damage, which can impede motor and sensory function and even cause lifelong disability. Numerous plant-derived phytochemical substances are thought to offer therapeutic promise for treating a variety of ailments, primarily brain injury. The objective of this study was to investigate the dose-dependent effects of *Betula utilis* on functional recovery after sciatic nerve injury in healthy albino mice. After acclimatization, the mice were randomly divided into seven groups: control, positive control, sham, and four treatment groups. The treatment groups received oral doses of *Betula utilis* at 12, 25, 50, and 75 mg/kg, starting on the day of the sciatic nerve crush and continuing daily throughout the duration of the experiment. Normal saline was administered to the control and sham groups, while the positive control group received Vitamin B12. All groups were provided with a standard chow diet. Motor function recovery was evaluated using muscle grip strength and the sciatic functional index tests,

whereas sensory function was assessed through pinprick and hot plate tests. Moreover, blood glucose levels were measured. After decapitation, oxidative stress was assessed by serological analysis, and histological examination was performed for morphometric evaluation. To conclude *B.utilis* can be a potential therapeutic candidate for accelerating functional recovery after peripheral nerve injury.

Keywords: Peripheral Nerve Injury, Phytochemical, Sciatic Nerve, Nerve Regeneration, Total Antioxidant Capacity

O-098

Brain Insulin Resistance and Cognitive Decline: A Link to Type 3 Diabetes

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Abstract:

The brain requires insulin not only for energy regulation but also for supporting essential functions such as learning, memory formation, and neural communication. Although insulin is primarily known for controlling blood glucose levels in the body, it also plays an important role in maintaining normal brain activity. When the brain becomes less responsive to insulin, a condition known as brain insulin resistance, its ability to utilize energy and support neuronal signaling may gradually decline. This condition has led researchers to propose the concept of “Type 3 Diabetes,” which refers to the possible link between insulin-related dysfunction in the brain and progressive cognitive decline. While it is not an officially recognized medical diagnosis, it provides a useful way to understand how disturbances in metabolism may influence brain function and memory processes. In brain insulin resistance, nerve cells do not function as efficiently as they should. Over time, this can lead to a combination of increased cellular stress along with mild inflammation, along with a gradual reduction in synaptic efficiency, all of which slowly interfere with normal brain communication. These changes collectively disturb the neural networks responsible for memory and may contribute to progressive cognitive decline. This review examines the relationship between brain insulin resistance and cognitive dysfunction, with particular focus on the Type 3 Diabetes hypothesis. It also highlights an important ongoing question in research: whether brain insulin resistance acts as an early trigger that contributes to neurodegeneration, or whether it develops as a result of existing changes in the brain. Clarifying this relationship may help guide future strategies for early detection and therapeutic intervention aimed at protecting cognitive health.

Keywords: Brain Insulin Resistance, Type 3 Diabetes, Cognitive Decline, Neurodegeneration, Insulin Signaling, Synaptic Dysfunction, Neuroinflammation, Metabolic Dysfunction, Memory Impairment, Brain Metabolism

O-099

Rising Hyperglycemia and Its Silent Impact on Mental Health

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Abstract:

Hyperglycemia and its predominant clinical manifestation, diabetes mellitus, represent one of the fastest-growing non-communicable disease burdens globally, with estimated adult prevalence exceeding half a billion persons and projected to rise substantially in the coming decades. Uncontrolled hyperglycemia has far-reaching systemic consequences, not only on metabolic and cardiovascular systems but also on neuropsychiatric health. Emerging epidemiological evidence demonstrates that individuals with sustained hyperglycemia and established type 2 diabetes mellitus (T2DM) experience significantly higher rates of common mental health disorders, including depression, anxiety, diabetes-specific distress, and cognitive impairment, compared with normoglycemic populations. It induces brain inflammation, oxidative stress, and vascular damage, often leading to fatigue, irritability, impaired memory, and diminished processing speed. Persistent hyperglycemia damages blood vessels in the brain that carry oxygen-rich blood. When brain receives too little blood, brain cells can die. This can cause problems with memory and thinking and eventually can lead to vascular dementia. Persistent high glucose damages brain cells through oxidative stress, which may lead to structural brain changes and neurodegeneration. Also Problems with insulin regulation can disrupt cognitive function and memory. Having frequent episodes of high blood sugar can stress the brain. Globally, individuals with T2DM exhibit approximately 2-fold higher prevalence of depression and significantly increased rates of anxiety and diabetes-related distress compared to normoglycemic populations. Pathophysiological mechanisms include chronic low-grade inflammation, hypothalamic–pituitary–adrenal (HPA) axis dysregulation, oxidative stress, and impaired neurotransmitter signaling. These biological pathways, combined with psychosocial stressors and disease burden, contribute to a bidirectional relationship where poor mental health further exacerbates glycemic dysregulation. In Pakistan, diabetes prevalence has risen dramatically, affecting approximately 33 million adults, placing the country among the top globally. However, mental health comorbidities remain underdiagnosed due to limited screening, social stigma, and inadequate healthcare integration. Hyperglycemia significantly impacts mental health through complex biological and psychosocial mechanisms, contributing to increased morbidity and reduced quality of life. There is an urgent need for integrated care models incorporating routine psychological assessment and culturally appropriate interventions, particularly in high-burden countries like Pakistan.

Key words: Hyperglycemia, Mental Health, Brain, Insulin, Diabetes Mellitus

O-100

Evaluation of the Cardioprotective Efficacy of *Phoenix dactylifera* in Experimental induced Diabetic Cardiomyopathy

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Abstract:

Diabetic cardiomyopathy (DCM), a serious diabetic complication worldwide that effect about 64% of world population, is gradually increasing. Since the existing drug causes more harm and side effects than therapeutic actions, research on natural plant extracts is become an essential therapeutical option. This study examined the possible cardioprotective properties of the *Phoenix dactylifera* seed extract in experimental diabetic cardiomyopathy rat model. Initial phytochemical screening validated the anti-hyperglycemic and antioxidant qualities of extract. To evaluate this effectiveness of *Phoenix*

dactylifera seed extract in in-vivo experimental trial, total of 25 Wister albino rats was included in this study. Five rats were assigned a normal control (healthy rats) group and was fed with regular chow-diet and water. The remaining 20 rats (each group n=5) were given with high-fat diet for eight weeks. Low doses of streptozotocin (35mg/kg.bwt) were administered and fasting blood glucose level was checked after 72-hours. Rats with fasting blood glucose more than 250mg/dl were confirmed diabetic. Two weeks after the confirmation of diabetes, rats were assigned as positive control (diabetic cardiomyopathy rats) group, standard group (metformin 200mg/kg.bwt) 1, standard group (digitalis 0.01125 mg/kg.bwt) 2 and treatment group (PD seed extract 300mg/kg.bwt). After 21 days of treatment rats were sacrificed by cervical dislocation and blood sample for biochemical analysis and tissue samples of pancreas and heart were taken for histological study. One-way ANOVA was used to statistically evaluate the data utilizing prism and CoStat software. Serum total oxidative status, malondialdehyde, serum alanine transaminase, and aspartate aminotransferase, total cholesterol, serum triglycerides, low density lipoprotein, uric acid, bilirubin, lactate dehydrogenase CK-MB and fasting blood glucose level were significantly ($p \leq 0.05$) decreased in the treatment group. While, total antioxidant capacity, catalase, high-density lipoproteins, and body weight were significantly ($p \leq 0.05$) improved. ECG and histology findings confirmed significant improvements in heart tissues as ventricular remodeling and the reversal of structural changes and increased beta cell density in pancreas. In conclusion, Phoenix dactylifera seeds extract showed a significant potential for left ventricular remodeling and cardio protection in the context of diabetes-induced cardiomyopathy.

Key words: Diabetic Cardiomyopathy, Electrocardiogram, Streptozotocin

O-101

Evaluation of Antihypertensive Efficacy of *Trapa Natan* Peel Extract in Fructose Induced Hypertension

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Abstract:

Cardiovascular illness is one of the core reasons of fatality worldwide. Hypertension affects more than 1.3 billion people globally and is the most common underlying cause for cardiovascular disease and mortality. The main objective of this study was to explore the effect of methanolic extract of *Trapa natans* peel on fructose induced hypertension in rat model. The experiment included *Wistar albino* rats (n=24) weighing (150-180gram), including negative control group (n=6) which was fed with standard chow diet, while the rest of rats (n=18) fed with 10% fructose daily for 6 weeks. After the confirmation of hypertension, rats were classified into three groups, positive control group (hypertensive rats), standard group (treated with Amlodipine (5mg/kg/bwt) and treatment group methanolic extract of *Trapa natans* peel 200mg/kg orally) daily for two weeks. Decapitation was performed on 7th and 14th day of treatment to collect blood samples for serum biochemical analysis (oxidative stress markers, liver profile, lipid profile, electrolytes and RFTs) and tissues of heart, kidney and aorta for histological examination. The heart tissues were used for gene expression of the ACE, iNOS, eNOS, COX2 and NFkB through qRT-PCR. Systolic blood pressure (SBP) 171mmHg was significantly ($P \leq 0.05$) decreased to 130mmHg and diastolic blood pressure (DBP) 120mmHg was significantly ($P \leq 0.05$)

decreased to 84mmHg in treatment group in comparison to positive control group. The total oxidant status, serum malondialdehyde, low-density lipoproteins, serum triglycerides, serum cholesterol, AST, ALT, serum uric acid, creatinine, serum sodium level and heart rate were decreased significantly ($P \leq 0.05$) in treatment group in comparison to positive control group. While there was significant ($P \leq 0.05$) increase in total antioxidant capacity, high-density lipoproteins and serum potassium level as compared to positive control. Histological and ECG changes confirm the significant improvement in heart rate and resorting the myocardial alterations. The current study showed promising protective efficacy of *Trapa natans* peel by improving the structural changes in cardiomyocyte due to its significant antihypertensive potential.

Key words: Anti-inflammatory, Anti-hypertensive, Oxidative stress, Gene expression, *Trapa Natans*

O-102

Impact Of Physical Rehabilitation on Spondylolisthesis

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Abstract:

lumbar spondylolisthesis is a common spinal condition associated with low back pain, reduced functional mobility, and decreased quality of life. This study was conducted to evaluate the effectiveness of a structured physiotherapy rehabilitation program in patients diagnosed with Grade I and Grade II lumbar spondylolisthesis. A patient with aged between 25-30 years participated in a one-week treatment program consisting of core stabilization exercises, pelvic tilting, hamstring stretching, posture correction, and pain management techniques. Pain intensity was assessed using the Visual Analog Scale (VAS), while functional disability was measured through the Oswestry Disability Index (ODI) before and after treatment. The results demonstrated significant reduction in pain levels and improvement in functional activities following rehabilitation. Patients also showed enhanced spinal stability, flexibility, and posture control. The findings suggest that conservative physiotherapy management plays an important role in reducing symptoms and improving daily function in individuals with lumbar spondylolisthesis.

Key Words: lumbar spondylolisthesis, Visual Analog Scale, Oswestry Disability Index

O-103

Emerging Drug Interactions with Statins: Mechanisms and Clinical Outcomes

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Abstract:

Abstract Statins are widely used lipid lowering drugs to reduce the risk of cardiovascular diseases and are used in both primary and secondary prevention settings.. Although statins appeared quite safer to use but mostly are associated with serious adverse effects like myalgia, myopathy and rhabdomyolysis. These adverse effects are related to statin- drug interactions. These interactions are associated with pharmacokinetic and pharmacodynamic properties of drug. The severity of interactions depends upon type of specific statin involved and interacting drug. However, factors like advanced age, polypharmacy, co-morbidities increase risk of adverse effects. So various methodologies and strategies

are fulfilled to manage these adverse effects in order to increase the therapeutic efficacy. Different strategies like avoidance of high - risk drug combination, dose adjustment, use of alternative statins or other safer combination etc. are employed. It is necessary to clinically educate patients of serious statin-drug interactions. Further more, statins give synergistic effect in combination with chemotherapeutic agents. Further direction also considered in order to reduce the risk of adverse effects and increase chance of therapeutic efficacy. This article covers the mechanisms of statin drug interactions, their clinical outcomes and different strategies to overcome the adverse effects and minimizing the risk factors.

Key words: Myalgia, Myopathy, Rhabdomyolysis, Pharmacokinetic, Pharmacodynamic

O-104

Predictive toxicology using machine learning and system biology

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Abstract:

Predictive toxicology is essential in contemporary drug development and toxicological risk evaluation by integrating experimental and computational approaches to assess toxic effects efficiently and ethically. Commonly employed in vitro and in vivo methods, while informative, are often limited by time, expense, and ethical concerns, prompting increased reliance on in silico models. Machine learning has transformed predictive toxicology by enabling large-scale toxicity prediction using advanced algorithms such as support vector machines, random forests, deep learning, and physiologically based pharmacokinetic modeling. These methods allow rapid screening of chemical libraries and prediction of adverse reactions with improved accuracy. Systems biology complements machine learning by providing a holistic, network-based view of biological responses to toxicants. Through the integration of multi-omics data, network modelling, and computational analysis, systems biology reveals how molecular perturbations propagate across biological systems to produce toxic outcomes. The integration of machine learning with systems biology combines data-driven prediction with mechanistic biological insight, enhancing both predictive accuracy and interpretability. This unified framework supports human-relevant toxicity prediction, improves regulatory decision-making, and accelerates safer drug development. Despite challenges in data quality, model transparency, and biological complexity, advancements in artificial intelligence and big data are expected to strengthen the future of predictive toxicology.

Key words: Predictive Toxicology, Machine Learning, System Biology, Adverse Effects, Computational Toxicology

O-105

Environmental Contamination With Pharmaceuticals: Ecotoxicology And Public Health Implications

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Abstract:

The pharmaceuticals are extensively used both in human and veterinary sciences due to their therapeutic efficacy. Despite their bioactive components and increased medicinal values, pharmaceuticals also exert some sublethal effects on non-target organisms and eventually impacting the whole ecosystem. Public health care contributes approximately 4-5% in environmental contamination. However, pharmaceuticals affect the environment from their production, consumption to waste disposal. During 20th & 21st centuries, various quantities of pharmaceuticals were discharged in water. But Africa ranked first in detecting the pharmaceuticals in estuarine water. These wastes were mainly from hospitals and pharmaceutical industries in rivers, lakes, soil and coastal waters. Various treatment techniques can be applied to get rid of this problem. These techniques may include physical, biological and chemical processes. Waste water treatment plants are significantly important in removing pollutants from wastewater. Despite all techniques and methodologies, the negative impact of pharmaceuticals have not been eliminated significantly. The aim is to develop a system that also considers harmful impacts of pharmaceuticals along with their therapeutic effects. Regulatory authorities such as the European Union recognizes the pharmaceutical waste as a risk of contamination of water and soil. The EMA and European Commission also take initiatives in assessing the risk of pharmaceuticals. However, persistent research is still required to advance removal techniques and for their complete elimination.

Key words: Pharmaceuticals, Public Health, Estuarine Water, Waste Water Treatment, Environmental Contamination

O-106

Fabrication and In Vitro Characterization of Delafloxacin-Laden Electrosprayed Hydroxypropyl Cellulose Nanoparticulated Solid Dispersions for Enhanced Aqueous Solubility and Release Rate of the Drug

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Abstract:

With the aim of fabricating and characterizing an optimized drug delivery system (DDS) for an effective administration of poorly water-soluble delafloxacin (DFX) via the oral route, several formulations of delafloxacin-laden solid dispersions (SD) were prepared employing the solvent-evaporation and electrospraying techniques concomitantly. Solubility and release rate of the drug in the SD were assessed. Solid-state characterization was performed via the X-ray diffraction (PXRD) and differential scanning calorimetric (DSC) analyses, scanning electron microscopy (SEM) and Fourier transform infrared spectroscopic (FTIR) analysis. Amongst the prepared SD, an optimized formulation consisting of DFX, HPC, and SLS at the weight ratio of (1/8/0.2) showed about 9-fold higher solubility and 13-fold faster release rate of delafloxacin as compared to delafloxacin plain drug powder (DPDP). The drug existed in the amorphous form in the spherical particles and had no covalent interaction with any of the excipients. Thus, this optimized formulation might be a useful DDS for an effective administration of DFX.

Key words: Delafloxacin, Electrospraying, Nanoparticulated Solid Dispersion, Hydroxypropyl Cellulose, Solubility Enhancement, Dissolution Rate, Oral Drug Delivery, Amorphous Solid Dispersion

Cubosomal Nanoformulation of 1-Cyclopentyl Benzimidazole: In Vitro Characterization and Antibacterial Evaluation

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Abstract:

Benzimidazole derivatives show promising antibacterial potential but are limited by poor solubility and bioavailability. This study focuses on the development of a cubosomes-based nanoformulation of 1-cyclopentyl benzimidazole to improve its physicochemical properties. Cubosomes were prepared using glyceryl monooleate and stabilized with poloxamer 407. The formulation was characterized for particle size, polydispersity index, zeta potential, and entrapment efficiency. In vitro drug release and antibacterial activity were also evaluated. The optimized formulation demonstrated nanoscale size, uniform distribution, and sustained drug release behavior. These findings suggest that cubosomal systems can serve as an effective approach for delivering poorly soluble benzimidazole derivatives.

Key words: Antibacterial activity; Cubosomes; 1-cyclopentyl benzimidazole; In-vitro characterization

Development, In-Vitro and In-Vivo Evaluation of Ph Sensitive *Soluplus*[®] Co- Poly- (Acrylic Acid) Nanogel for Gastroprotective Delivery of Lornoxicam

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Abstract:

This research work was performed for gastroprotective delivery of Lornoxicam. For that purpose, *soluplus*[®] as hydrophilic polymer, acrylic acid as monomer, ammonium persulfate (APS) as initiator and MBA (N,N'-methylene bis acrylamide) as cross-linker were used to prepare nanogels and these formulations were prepared by free radical polymerization method. The prepared nanogels were evaluated through FTIR, DSC, SEM, XRD, particle size measurement and zeta potential analysis. Furthermore, % Drug entrapment, % Drug loading, swelling ratio, cumulative drug release were also determined. pH responsive swelling and pH dependent drug release was observed due to pH sensitive

nature of acrylic acid. Results of drug release study illustrated that nanogels presented drug release in the range of 74.46 ± 0.648 to $97.58 \pm 0.196\%$ at pH 6.8 and 10.26 ± 0.559 to $14.15 \pm 0.562\%$ at pH 1.2 after two h. % entrapment efficiency and % drug loading of drug loaded nanogels ranged from $78.39 \pm 0.943\%$ to $94.77 \pm 0.213\%$ and $78.83 \pm 0.288\%$ to $92.79 \pm 0.314\%$, respectively. In addition, particle size of optimized blank and drug loaded nanogel was 245.1 nm and 209.1 nm, respectively. These results suggested improved dissolution profile and gastroprotective delivery of Lornoxicam by nanogel formulations. Moreover, in-vivo studies were also performed to measure anti-inflammatory activity, cytokines level, and gastroprotective effect. Optimized nanogel formulation showed percentage inhibition of $95.43 \pm 1.54\%$ at $t = 0.5$ h and zero value of gastric lesion index. The in-vivo study further confirmed enhanced anti-inflammatory activity and gastroprotective potential of the prepared nanogels.

Key words: Gastroprotective, Soluplus, Free Radical Polymerization, Anti-Inflammatory Activity, PH Responsive

O-109

Antidepressant Activity of Phytochemicals of *Mangifera Indica* Seeds Assisted by Integrated Computational Analysis

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Abstract:

Mangifera indica L., also known as mango, is a tropical fruit that belongs to the Anacardiaceae family and is prized for its juiciness, unique flavour, and worldwide popularity. The current study aimed to

probe into antidepressant power (ADP) of MIS in animals and confirmation of ADP with in silico induced-fit molecular docking. The depression model was prepared by exposing mice to various stressors from 9:00 am to 2:00 pm during 42 days study period. MIS extract and fluoxetine were given daily for 30 min before exposing animals to stressors. ADP was evaluated by various behavioural tests and biochemical analysis. Results showed increased physical activity in mice under behavioural tests, plasma nitrite and malondialdehyde (MDA) levels and monoamine oxidase A (MAO-A) activity decreased dose-dependently in MIS treated mice and superoxide dismutases (SOD) levels increased in treated groups as compared to disease control. With the peculiar behaviour and significant interactions of the functional residues of target proteins with selected ligands along with the best absorption, distribution, metabolism, excretion, and toxicity (ADMET) properties, it is concluded that catechin could be the best MAO-A inhibitor at a binding energy of -8.85 kcal/mol, and two hydrogen bonds were generated with Cys406 (A) and Gly443 (A) residues of the active binding site of MAO-A enzyme. While catechin at -6.86 kcal/mol generated three hydrogen bonds with Ala263 (A) and Gly434 (A) residues of the active site of monoamine oxidase B (MAO-B) enzyme and stabilized the best conformation. Therefore, it is highly recommended to test the selected lead-like compound catechin in the laboratory with biological system analysis to confirm its activity as MAO-A and MAO-B inhibitors so it can be declared as one of the novel therapeutic options with anti-depressant activity. Our findings concluded that *M. indica* seeds could be a significant and alternative anti-depressant therapy.

Keywords: Antidepressant, *Mangifera Indica*, Molecular Docking, ADMET, Phytomedicine, Forced Swing Test, Tail Suspension Test

O-110

Development of a Plant-Based Disease-Modifying Anti-Arthritic Therapy from *Coleus Scutellarioides* Targeting RANKL/OPG and Inflammatory Cytokine Networks (TNF- α , IL-6, IL-17a): A Preclinical Study

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Abstract:

One of the most important responses for survival by the human body is inflammation, which serves to protect against infection, infestation, and injury. While the conventional therapies such as NSAIDs and Steroids provide relief on a symptomatic basis, their use for long-term is limited due to side effects. This study analyzed the analgesic, anti-inflammatory and anti-arthritis potential for the methanolic extract of *Coleus scutellarioides* (L.) Benth. "Glennis", a plant used for ornamental purposes but previously unexplored scientifically. The extract was explored phytochemically using GC-MS and HPLC, and total phenolic and total flavonoid contents were determined. Antioxidant and anti-inflammatory activities were assessed in vitro. The efficacy of the extract was determined in Wistar rats using hot plate analgesia, Carrageenan-induced acute inflammation, formalin-induced chronic inflammation, and formalin-induced arthritis. The study was validated through hematological analysis, LFTs, Oxidative stress markers (CAT, MDA, SOD), inflammatory cytokines (IL-6, TNF- α , IL-17a) and bone metabolism markers (RANKL/OPG) 21 compounds were identified by GC-MS including phytol, palmitic acid and Omega 6. Quercetin, Gallic acid, and kaempferol were confirmed by HPLC. 48% antioxidant activity (DPPH inhibition) and 69.04% membrane stabilization (Inhibition of protein

denaturation) was exhibited by extract. 25 mg/kg effectively reduced paw edema comparable to diclofenac in acute inflammation. 50 mg/kg dose presented better therapeutic activity in chronic arthritis normalizing CRP. The extract resored the pro-inflammatory cytokines and maintained the RANKL/OPG ratio, preventing the bone resorption. The plant possess anti-inflammatory and anti-arthritis properties, mediated by synergistic effects of identified components found in the methanolic extract. 50 mg/kg dose, balanced efficacy along safety, emerged as optimal therapeutic window. The findings in this study suggests that *Coleus scutellarioides* (L.) Benth “Glennis” is a promising source for the development of NOVAL disease-modifying anti-rheumatic drugs.

Keywords: *Coleus Scutellarioides*, Glennis, Rheumatoid Arthritis, Anti-Inflammatory, Analgesic, RANKL/OPG, Quercetin, Oxidative Stress

O-111

Neuroendocrine and Pharmacological Perspectives in Obesity: A Cross-Sectional Analysis of Knowledge, Perceptions, and Practices

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Abstract:

Obesity disrupts key hormonal systems—including leptin, insulin, ghrelin, cortisol, and thyroid hormones—yet awareness of these mechanisms and safe pharmacological interventions remains limited. This cross-sectional descriptive study assessed knowledge, perceptions, and practices related to hormonal dysregulation in obesity management among 306 participants, and examined associations between educational status and awareness, treatment preferences, and decision-making behaviors.

Participants included undergraduates (75.6%), graduates (19.9%), and postgraduates (4.5%). Data were collected via structured questionnaire and analyzed using descriptive statistics and Chi-square tests ($p < 0.05$) in SPSS v26. Over half (57.4%) reported obesity-related symptoms, including persistent fatigue (46.1%), dyspnea on exertion (37.9%), and PCOS/menstrual irregularities (31.6%). Only 27.8% correctly identified key obesity-related hormones ($\chi^2 = 15.02$, $p = 0.020$). While participants reported using intermittent fasting (34.7%), low-calorie (24.9%), and low-protein diets (22.4%), 59.6% achieved minimal weight loss. Notably, 61.8% preferred pharmacological interventions over dietary changes due to time constraints and adherence difficulties ($\chi^2 = 19.06$, $p = 0.025$). Most participants acknowledged hormonal imbalance as a contributor to obesity complications ($\chi^2 = 20.11$, $p = 0.018$). Educational status significantly influenced hormonal awareness and health perceptions; however, no significant associations were found for gender, stress-related eating, or perceived therapy effectiveness. Findings highlight critical knowledge gaps in hormonal mechanisms, dietary practices, and safe medication use. Targeted educational interventions and prescriber-guided counseling are essential for promoting informed, effective obesity management.

Keywords: Obesity, Hormonal Dysregulation, Leptin, Insulin, Ghrelin, Pharmacological Interventions, Dietary Practices, Educational Status, Weight Management, Metabolic Health

O-112

A Comparative Analysis Between Physical Inactivity and Blood Glucose Levels in University Students

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Abstract:

Physical inactivity is an important lifestyle factor linked to poor glucose regulation and a greater risk of type 2 diabetes among young adults. This study examined the relationship between physical activity and blood glucose levels in university students aged 18–28 years. A two-month cross-sectional survey was conducted using the International Physical Activity Questionnaire (IPAQ-Short Form) along with questions related to diet, sleep, and family history of diabetes. A total of 160 students participated, while 40 also underwent blood glucose testing using a portable glucometer. Statistical analysis was performed to evaluate the association between activity levels and glucose values. The average age of participants was 21.6 years, and 58% were female. Based on IPAQ results, 42% of students had low physical activity, 38% had moderate activity, and 20% had high activity levels. The mean fasting blood glucose level was 95.7 mg/dL. Students with lower physical activity showed higher glucose levels compared to highly active students. A moderate negative correlation was identified between physical activity and blood glucose levels, indicating that increased activity was associated with healthier glucose control. The findings highlight that sedentary behavior during early adulthood may negatively influence glucose metabolism and increase the future risk of diabetes. Encouraging regular exercise and active lifestyles may help maintain healthy blood sugar levels and support long-term metabolic health.

Keywords: Physical Inactivity, Diabetes, Blood Sugar Level, Youth, University Student

O-113

AI-Optimized Polysaccharide Nanocarriers for Targeted Blood-Brain Barrier Crossing in Stress-Induced Neuroinflammation

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Abstract:

The blood-brain barrier (BBB) has been shown to severely limit the clinical management of central nervous system (CNS) pathologies due to its capacity to maintain neural homeostasis and paradoxically protect diseased tissues to more than 98 small-molecule drugs and close to 100 large-molecule therapeutics. The neuroinflammation in chronic stress, which is caused by psychological or environmental stressors, also complicates the delivery by causing neurovascular pathological remodeling (NVU). The microglial polarization to M1-like and transcriptional repression of important tight junction proteins like Claudin-5 and ZO-1 are the hallmarks of this dysfunction. This discussion examines the concept of nanoarchitectonics, a system that merges natural polysaccharide biopolymers with Artificial Intelligence (AI) and Machine Learning (ML), to speed up the process of identifying and optimizing delivery systems. We compare the efficacy of biopolymers such as chitosan, hyaluronic acid, and alginate in traversing the BBB by using special pathways. The prediction of BBB permeability (BBB+ vs. BBB-) and optimization of particle size, shape, and ligand density are done using AI methodologies, such as Random Forest (RF), Support Vector Machines (SVM), and Convolutional Neural Networks (CNNs). Nanocarriers based on polysaccharides (chitosan-based, approximately 80

nm), show increased accumulation in the brain through temporary opening of tight junctions and adsorptive-mediated transcytosis (AMT). Delivery by the CD44 receptor, which is upregulated on activated microglia and astrocytes, and Vascular Cell Adhesion Molecule-1 (VCAM-1) offer greatly increased cerebral accumulation in inflamed models over traditional targets. Random Forest and ML models performed well (ACC: 0.91, AUC: 0.93) in predicting successful BBB crossing based on chemical descriptors such as lipophilicity (log P) and Polar Surface Area (PSA). The introduction of AI-optimized polysaccharide nanocarriers brings a paradigm shift in the use of traditional "trial and error" methods of data-driven intelligent drug delivery systems. For translational success of next generation neurotherapeutics it is important to address current research gaps that include the gut-brain-immune axis, and the long-term safety of biopolymer bioaccumulation in CNS.

Keywords: Blood-Brain Barrier (BBB), Neuroinflammation, Polysaccharide Nanocarriers, Artificial Intelligence, Nanoarchitectonics

O-114

Synergistic Modulation of Uterine Fibroid Regression by Vitamin D, Magnesium, and Zinc in an MSG-Induced Rat Model

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Abstract:

Uterine fibroids also called as leiomyoma are monoclonal, benign tumors in the uterus of women in their reproductive age leading to menorrhagia, pelvic pressure, abdominal pain & infertility. There are several underlying factors that promote the risk of development of uterine fibroids but the main cause is still not known. The objective of this study was to analyze the impact of vitamin D alone and in combination with magnesium & zinc on the size of fibroids in female rat model with induced uterine fibroids using MSG (monosodium glutamate). This was a randomized control trial with five groups of animals. The groups included 1- NC-(Negative control), 2- PC- Positive control & 3 Treatment groups: T1 Treated with Vitamin D (880 IU) T2- Treated with Vitamin D (880 IU) + Magnesium (106 mg) & T3- Treated with Vitamin D (880 IU/kg BW) + Magnesium (106 mg/kg BW) + Zinc (1.4 mg/kg BW). Fibroid size was measured using ultrasound technique which showed significant reduction in the fibroid size in T1 (13.49%) T2 (19.18%) & T3 (32.08%), with highest reduction in T3 which was 32.08%. The size reduction was confirmed by histopathological analysis. Serum vitamin D concentration was increased in the treated groups with highest increase in T3. This indicated that combination of Vitamin D with magnesium and zinc has a synergistic effect on the size reduction of uterine fibroids and serum vitamin D concentration. LFT's & RFT's were performed to assess the safety of intervention. Their outcomes suggested the intervention biochemically safe. All of the outcomes were analyzed statistically and interpreted accordingly.

Keywords: Leiomyoma, Mono-sodium glutamate, Vitamin D, Fibroid size reduction

O-115

Integrative System Pharmacology and *In Vivo* Approaches to Identify the Potential Phytochemicals of *Cannabis Sativa* and Their Molecular Mechanism for Promoting Regeneration of the Injured Peripheral Nerve

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Abstract:

Peripheral nerve injuries are the most prevalent medical issue, which can have major physiological complications that cause the impacted person to become disabled for the rest of their life. Managing peripheral nerve damage remains a significant challenge. Even with improvements in microsurgical methods, nerve restoration outcomes have remained inconsistent and unsatisfactory. Ancient remedies often relied on natural compounds for treating ailments, prompting this study to delve into the potential of these compounds for sciatic nerve injuries. The current study used to examine the restoration of muscle functions after sciatic nerve injury through methanolic leaves extract of *Cannabis Sativa*. Albino mice were used, divided into control, sham and a treatment group. The treatment group was given with methanolic extract of *C. Sativa* by gavaging for 9 days. The calculated dose of *C. Sativa* was given to treatment group i.e. 100mg/kg respectively from the day of nerve crush continue until the trial end. Normal saline was given to control and sham group. A normal chow diet was given to all groups. Molecular docking and network pharmacology were performed to investigate the bioactive components and target interactions of *C. Sativa*, providing insights into its underlying therapeutic mechanisms. To assess the sensorimotor function recovery, behavioral analyses such as grip strength, pin prick, hot plate, and sciatic functional index test were performed. Serum and hematology analyses were performed to determine the impact of treatment on oxidative stress and the systemic index. One-way ANOVA and two-way ANOVA were used to evaluate the results statistically. The treated mice showed significant improvement in motor and sensory functions. In treatment group, both the increased hemoglobin level and the restoration of muscle mass were statistically significant. The findings demonstrated that extract from *Cannabis sativa* greatly enhanced the recovery of motor and sensory functions. Further research is needed to discover and characterize the molecular mechanisms of active components of *C. Sativa*.

Key words: Peripheral Nerve Injury, Phytochemicals, Network Pharmacology, Sciatic Nerve

O-116

Green Synthesis, Characterization, and Antidiabetic Effects of Zinc Oxide Nanoparticles Synthesized Using Aqueous Extract of *Cydonia graveolens*

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Abstract:

Nanotechnology is a rapidly evolving scientific discipline that employs various techniques and technologies to design, study, and apply nanoparticles. Nanoparticles are widely used in diagnostics, drug delivery, food processing, cosmetics, and other industries. Researchers are increasingly focused on synthesizing nanoparticles using plant extracts, which are believed to create synergistic effects that enhance biological activities. Combining plant extracts and metallic nanoparticles can produce nanomaterials with improved therapeutic properties. This approach avoids using hazardous chemicals and high-cost equipment, making it a promising method for producing biocompatible, non-toxic

nanoparticles. Various plants, including those from the Lamiaceae and Meliaceae families, have been used to synthesize metal oxide nanoparticles like ZnO, demonstrating the potential of plant-based synthesis for producing nanoparticles with enhanced biological properties. The formation of ZnO-NPs by green synthesis method using aqueous extracts of *Cydonia graveolens*, the nanoparticles were characterized using FTIR, XRD, SEM, and Zetasizer to determine their optical, structural, and morphological features. The antidiabetic activity of the ZnO-NPs was assessed *in vitro* using alpha-glucosidase and alpha-amylase inhibition assays. Characterization confirmed the successful formation of spherical, crystalline ZnO-NPs with sizes ranging from 20–50 nm. FTIR analysis revealed the involvement of hydroxyl and carbonyl groups in nanoparticle stabilization. The ZnO-NPs exhibited significant inhibitory activity against both alpha-glucosidase and alpha-amylase enzymes, demonstrating stronger inhibition compared to the crude plant extract. In case of alpha-glucosidase the inhibition was seen to be increasing with the increase in concentration of the extract; the inhibition rates attained 67.8% by 50 µg/mL and rose to the maximum of 86.9% by 100 µg/mL. While in against alpha amylase the highest inhibition was observed for the concentration of 100 µg/mL of ZnO-NPs, amounting to 81.7%, with a slightly lower 58.4% observed for 50 µg/mL of particles. This indicates enhanced therapeutic efficacy likely due to the synergistic interaction between zinc ions and plant-derived phytochemicals. Green-synthesized ZnO-NPs using *C. graveolens* exhibit potent *in vitro* antidiabetic activity through dual inhibition of carbohydrate-hydrolyzing enzymes. These findings highlight the potential of plant-based nanoparticles as a natural, cost-effective strategy for managing type 2 diabetes. Further *in vivo* studies and clinical evaluations are recommended to confirm their therapeutic efficacy and safety.

Keywords: Nanoparticles, Nanotechnology, Zinc Oxide Nanoparticles, Antidiabetic, Glucosidase, Amylase, Inhibitory Activity

O-117

Impact of Obesity on Breast Cancer Prevalence Among Women of Punjab, Pakistan

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Abstract:

The increasing trends of obesity and breast cancer in the Punjab province of Pakistan are therefore portended for the future health, health care reform and socioeconomic advancement of the province. This socioecological form of inflammation and adipokine imbalances as mediating factors of primary and metastatic growth is highly relevant for primary prevention, early diagnosis, and intervention approaches in the province. This perspective from Punjab can prove useful for understanding the lessons from precision cancer control efforts in other LMICs struggling to contain increasing breast

cancer rates. Knowledge of these mechanistic connections then their environmental modifiers is therefore important in the development of rational interventions, especially in the province of Punjab, in Pakistan, where both breast cancer and obesity are raging epidemics. First of all, minimizing the hormonal and metabolic risk factors in the development of BC, as well as optimizing the use of hormone-related biomarkers in medical practice, can significantly reduce the incidence of this cancer crisis between Punjabi women. In conclusion, the risk factors associated with obesity, such as hormonal imbalances, chronic inflammation, and insulin resistance, may contribute to the development and progression of breast cancer between females in Punjab.

Keywords: Obesity, Breast Cancer, Adipokines, Inflammation, Hormonal Imbalance, Punjab, Pakistan

O-118

Unraveling the Pathogenic Mechanisms of SET Oncogene Variants in Leukemia Development and Progression

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Abstract:

SET protein family, linked to cell cycle, DNA damage, and gene transcription, is overexpressed in leukemia (CML, CLL) and inhibits PP2A. The objective of this study was to identify non-synonymous SNPs of SET and their role in causing leukemia utilizing computational analysis. For this purpose, different online tools like MAPP, SNAP, SNAP2 (to identify pathogenic SNPs), SIFT, Polyphen, Polyphen-2, fuNTRp, PhD-SNP, PredictSNP, PANTHER (disease associated SNPs), MetaSNP, SNP&GO, CONSURF (to check protein stability) I-Mutant, and Mu-Pro were used. Protein to protein interaction was detected by STRING, Post-translational modifications (PTMs) by Musitedeep, and protein secondary structure was detected by SOPMA. All SNPs in the SIFT and Polyphen-2 predicted as deleterious. In Polyphen, there were 113 SNPs predicted as possibly damaging, 21 showed probably damaging and 15 SNPs were predicted as benign. In SNAP2, 111 SNPs were predicted as diseased or effected SNPs, respectively. The PTMs found were phosphorylation at amino acid number 2 and 128; palmitoylation at number 13; pyrrolidone carboxylic acid at number 33 and glycosylation at number 41 and 46. The secondary structure of SET consists of Alpha helix (Hh) 121 is (43.68%), extended standard (Ee) 28 is (10.11%), beta turn (Tt) 3 is (1.08%) and random coil (Cc) 125 is (45.13%). SET has been shown strong protein to protein interaction with its own family as well as Granzyme A, Nucleoside diphosphate kinase A. It is concluded that these SNPs found in SET are involved in leukemia.

Keywords: SET Gene, SNPs, Leukemia, PP2A, In Silico Analysis, Protein Stability, PTMs

O-119

Enhanced Cytotoxicity of 5-Fluorouracil Against Skin Cancer Cell Lines and 3D Spheroid Tumor Model Using Solid Lipid Nanoparticles

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Abstract:

This study aimed to develop solid lipid nanoparticles containing 5-fluorouracil (5-FU loaded PGSLNs) to achieve desired physicochemical properties and to enhance in vitro cytotoxicity against monolayered and 3D spheroid skin tumor models. 5-FU loaded PGSLNs were prepared via cold homogenization using Glyceryl Palmitostearate (GP) and Geleol® as solid lipids and Poloxamer 188 and Tween 80 as surfactant and co-surfactant, respectively. The developed nanoparticles were then physicochemically characterized, and cytotoxicity was evaluated against monolayered and 3D spheroid skin tumor models using the Cell TiterBlue® Assay and Cell-Titre Glo assays, respectively. The cellular uptake behavior of nanoparticles against monolayered and 3D spheroid tumor models was studied through flow cytometric analysis and fluorescence microscopic analysis. Nanoparticle sizes ranged from 116.3 ± 1.19 to 235.13 ± 1.15 nm, with a PDI < 0.45, and zeta potential was found to be between -33.67 ± 0.40 and -19.37 ± 0.25 . FTIR analysis revealed no chemical interactions among components, and Differential Scanning Calorimetry showed the thermal stability of the drug in nanoparticles. The in vitro drug release profile depicted biphasic release behavior, with 30–35% burst release within 3 h and sustained release for 48 h. Enhanced cytotoxicity was observed against monolayered skin tumor models (B16F10, A375, and A431) and a 3D spheroid skin tumor model (A431). Rhodamine-labeled PGSLNs showed increased uptake in monolayered models via fluorescence microscopy and flow cytometry, with enhanced uptake in 3D spheroid models confirmed by fluorescence microscopy. The hemocompatibility assay indicated the safety of nanoparticles at physiological levels. The designed solid lipid nanoparticles significantly enhanced the cytotoxic effect of 5-FU against monolayered and 3D spheroid skin tumor models and can be used as promising approach for skin cancer.

Keywords: 5-FU, Glyceryl Palmitostearate, Geleol®, Skin Tumor Model, Solid Lipid Nanoparticles

O-120

AI-DRIVEN Social Media Use, Identity Fragmentation, Social Disconnection and Psychological Distress in Emerging Adult

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Abstract:

There has been a significant revolution in learning and interaction among emerging adults with the wide use of Artificial Intelligence-driven social media platforms. One of the most common applications of AI in daily life is AI-driven social media use which provides personalized content, algorithmic feeds, and automated social interactions.. Some of the significant variables influencing the relationship between AI-driven social media use and psychological distress include identity fragmentation and social disconnection. The study conducted a two-phase cross-sectional design. In Phase 1, 500 emerging adults aged 18–29 years were recruited and screened for adequate exposure to and awareness of AI-driven social media use. A final sample of 267 eligible participants was retained for Phase 2 main analyses, which focused on hypothesis testing through correlation, regression, and serial mediation analysis. Data were collected using standardized scales like the Social Media Engagement Scale (SMES; Przybylski et al., 2013), Self-Concept Clarity Scale (SCCS; Campbell et al., 1996), UCLA Loneliness Scale (Russell, 1996), and Depression Anxiety Stress Scale-12 ((Monteiro et al.,2023). The findings reveal meaningful and statistically significant relationships among the scales employed in the study. The serial mediation were analyzed using Hayes' PROCESS Macro Model 6 (Hayes, 2018). Findings revealed that AI-driven social media use emerged as a significant positive predictor of psychological distress among emerging adults, with identity fragmentation and social disconnection playing significant serial mediating roles. These findings may reflect cultural, contextual, and developmental factors influencing the psychological well-being of emerging adults in collectivistic societies. Future research could examine additional mediators and employ longitudinal designs to better understand the pathways.

Keywords: AI-driven social media use, identity fragmentation, social disconnection, psychological distress, emerging adults.

O-121

Facile Synthesis of Novel Thiophen-2-ylmethyl 5-Phenylfuran-2-Carboxylates via Suzuki–Miyaura Coupling: A Promising Strategy for Anti-Seizure Drug Development in Brain Disorders Supported by Molecular Docking

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Abstract:

Epilepsy is a chronic neurological disorder characterized by abnormal neuronal excitability, leading to synchronous and excessive firing of neural populations within the central nervous system. It is often associated with psychological comorbidities, recurrent unpredictable seizures, and transient behavioral changes, affecting approximately 65 million individuals worldwide. Molecular docking studies revealed strong binding affinities of the synthesized compounds toward key epileptic targets, including GABA_a receptors and SV2A protein, indicating potential multi-target mechanisms. Lipophilicity analysis suggested favorable blood–brain barrier penetration for all derivatives. Among the series,

compounds **3** and **5g** demonstrated the most potent anticonvulsant effects without observable neurotoxicity compared to standard drugs such as levetiracetam and diazepam. These findings highlight thiophenyl-furan hybrids as promising lead scaffolds for the development of effective and safe anti-seizure therapeutics.

Keywords: Acute PTZ and 6 Hz psychomotor seizure model, Anticonvulsant potential, Molecular docking studies, Suzuki Miyaura reactions, Thiophen-2-ylmethyl 5-phenylfuran-2-carboxylate derivative

O-122

Interactive Effects of Nitric Oxide and Thiourea on Growth and Physio-Biochemical Attributes of Oat (*Avena Sativa* L.) Under Drought Stress

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Abstract:

Drought is one of the major constraints limiting crop production worldwide. Drought impairs normal growth by disturbing water relations and reducing water use efficiency in plants. Nitric oxide, a simple free radical gas, elicits a surprisingly wide range of physiological and pathophysiological effects. Thiourea is the class of organic compounds having sulphur. Thiourea mitigates the effects of abiotic stresses by enhancing antioxidant enzyme activity and reducing oxidative stress. Oat (*Avena sativa* L.) belongs to the family Poaceae (Gramineae). It is an important winter cereal crop grown throughout the country as Rabi crop. A pot experiment was conducted at the Botanic Garden, Government College University, Faisalabad, to assess the efficacy of exogenous nitric oxide and thiourea in mitigating drought stress in oat (*Avena sativa* L.). Two oat cultivars (Faisalabad Oat-21 and Oat-22) were grown under 100% and 60% field capacity conditions. Following 30 days of drought stress, plants were subjected to foliar application of nitric oxide (0.05 and 0.1 mM) and thiourea (150 and 300 mg/L), while non-treated plants were maintained as controls. Imposition of drought stress resulted in a significant decline in growth, relative water content, chlorophyll content and yield-related traits. Conversely, drought stress led to a marked increase in oxidative stress indicators, antioxidant metabolites and the activities of superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD) in both oat cultivars. Foliar-applied nitric oxide and thiourea enhanced growth, photosynthetic pigments, osmolytes, antioxidants and SOD, POD, CAT activities involved in ROS detoxification. Faisalabad Oat-21 showed greater drought tolerance than Faisalabad Oat-22, with better growth, physio-biochemical traits and yield.

Key words: Drought Tolerance, Oxidative Stress, Antioxidant Defense System, Nitric Oxide, Oat

O-123

Design and Evaluation of ATN-161 Analogues as Fusion Inhibitors Targeting Integrins in SARS-CoV-2

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Abstract:

The COVID-19 pandemic renewed global focus on the development of novel antiviral agents. Peptides, owing to their high specificity and tunability, represent a promising therapeutic class. The integrin-binding peptide ATN-161 (Ac-PHSCN-NH₂) has shown potential as a SARS-CoV-2 fusion inhibitor by disrupting $\alpha 5 \beta 1$ integrin-mediated entry. Purpose This study aimed to develop and evaluate novel ATN-161 analogues with improved biochemical stability and antiviral activity by introducing proline substitutions into its core sequence. Methods Three analogues, Ac-PPSCN-NH₂ (Analogue-I), Ac-PHPCN-NH₂ (Analogue-II), and Ac-PHSPN-NH₂ (Analogue-III), were synthesized using SPPS, characterized by HPLC, mass spectrometry and NMR spectroscopy. Antiviral activity was assessed in SARS-CoV-2-infected Vero (E6) cells using cytopathic effect monitoring and RT-qPCR. In silico molecular docking and dynamics simulations were performed against $\alpha 5 \beta 1$ integrin and ACE2 to evaluate binding affinity and stability. Results Analogue-III demonstrated superior antiviral activity, reducing viral RNA load by ~100-fold with an IC₅₀=0.6 μ M, outperforming ATN-161 (IC₅₀=3.16 μ M), while maintaining a favorable cytotoxicity profile. Docking studies revealed the strongest binding affinities (up to -17.05 kcal/mol) and lowest RMSD values (as low as 1.113 Å), while dynamics simulations supported stable and favorable interactions. Conclusion Proline-based structural modifications of ATN-161 yielded a promising antiviral candidate with improved activity. Analogue-III (Ac-PHSPN-NH₂) merits further preclinical evaluation as a potential fusion inhibitor targeting integrin-mediated viral entry.

Keywords: SARS-CoV-2 Entry Inhibition, ATN-161 analogues, Spike-integrin interaction, Proline modified peptides, Antiviral peptides, Integrin-targeted therapeutics.

O-124

Cognitive Enhancement and Neuroprotection of Lepidium Sativum Seed Extract Against Diabetes Associated Dementia In Albino Rats

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Abstract:

Diabetes mellitus, a severe metabolic disorder, is characterized by hyperglycemia and inadequate insulin production. In diabetes mellitus, the prolonged hyperglycemic condition, which ultimately may be responsible for the numerous other diabetic associated complications like nephropathy, retinopathy, hepatotoxicity, and neuropathy such as dementia, etc. The most frequent problem is dementia which encompasses impaired cognitive function, and behavioral abnormalities. The nutritional and therapeutic value of *Lepidium sativum* (garden cress) seeds is well recognized by a number of researchers. It contains the memory enhancers, linoleic acid, arachidonic acid, and choline esters. *Lepidium sativum* seeds have a wide range of health benefits, i.e., anti-inflammatory, anti-diabetic, anti-hypertensive, and antioxidant. Considering all the properties of *Lepidium sativum* seeds, current study organized to investigate the neuroprotective tendency of seed extract in neurological deficits

albino rat models in comparison to commercially available anti-dementia drugs. Diabetes-associated dementia in albino male rats was induced by administration of Streptozotocin drug (60mg/kg) intraperitoneally with 5% sucrose solution for 15 days. The development of diabetes was confirmed by evaluation of their blood glucose level and memory deficits were confirmed by behavioral assessment. The rats were treated with methanol extract of *Lepidium sativum* seed (100mg/ml and 200mg/ml). The neuro behavioral assessment was conducted (NORT, MWMT & PAT); brain samples were collected to evaluate Ach content and AchE activity. The findings suggest that the methanolic seed extract significantly lowered the blood glucose levels to 116.4 mg/dL with an improved locomotory, cognitive, recognition and spatial memory, additionally it was observed that Ach content was increased to 5.12 μ mol/g, and normal AchE activity which indicates overall cognition improvement in the rats treated with 100mg/ml and 200mg/ml seed extract in comparison with those treated with donepezil drug. The strong antioxidant and anti-inflammatory properties of the extract suggests it as a potential natural therapeutic drug for managing diabetes and its associated other neurodegenerative disorders.

Keywords: *Lepidium Sativum*, Acetylcholine, Diabetes-Associated Dementia, MWMT, Garden Cress

O-125

A Systematic Review on Relationship Between Knowledge Sharing and Employee Performance

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Abstract:

This study aims to better understand how employee performance is impacted by knowledge sharing. The methods utilised to measure the effect of information sharing on employee performance, the research designs and sampling data employed, and the main conclusions that can be derived from these studies were all evaluated in this review. Another objective of this study was to systematically gather and review English language papers that offer empirical evidence for the existence of a relationship between knowledge sharing (KS) and employee performance (EP) as well as their influence on one another. PubMed, Google Scholar, LISTA, ISI Web of Knowledge, Gernal, and Theses were searched in order to conduct a comprehensive examination of the literature. By January 2026, the searches had been completed. Review papers and some research were searched using Google Scholar's backward and forward citations, and there was no language limitation. This review did not include books, but it did include studies that demonstrated the relationship between KS and EP. Data extraction and critical examination were done to determine the risk of bias in each study. The results unequivocally show that these two factors were influenced by and had a substantial relationship with one another. It is determined that JS benefited from KS and, in a similar vein. Among those employed by various organisations, JS had a significant impact on KS. This review first examines the relationship between KS and EP and how they influence one another by carefully compiling and assessing the English language research. This study has theoretical and practical implications for organisational departments and managers.

Keywords: Relationship, Knowledge sharing, Employee performance, Literature review, knowledge management, Knowledge transfer, employee engagement, productivity, organizational support, systematic review

O-126

Childhood Trauma and Obsessive-Compulsive Symptoms: The role of Attachment Styles in Young Adults

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Abstract:

Childhood trauma has been widely recognized as a significant predictor of long-term emotional and interpersonal difficulties, often affecting attachment patterns and psychological functioning in adulthood. The present study examined the mediating role of adult attachment styles in the relationship between childhood trauma and obsessive-compulsive symptoms among young adults. Guided by attachment theory, the study proposed that insecure attachment styles, particularly attachment anxiety and attachment avoidance, would mediate the association between early traumatic experiences and obsessive-compulsive symptomatology. A correlational research design was employed, and data were collected from a non-clinical sample of 250 young adults aged 18 to 29 years through convenience sampling. The Childhood Trauma Questionnaire (CTQ), Experiences in Close Relationships–Revised (ECR-R), and Obsessive Compulsive Inventory–Revised (OCI-R) were used to assess childhood trauma, adult attachment styles, and obsessive-compulsive symptoms, respectively. Descriptive statistics, Pearson product moment correlations, and reliability analyses were computed for all study variables. Mediation analysis was conducted using Hayes’ PROCESS Macro (Model 4) in IBM SPSS Statistics with 5,000 bootstrap resamples to examine the direct and indirect effects. The findings indicated that childhood trauma was significantly positively associated with both insecure attachment styles and obsessive-compulsive symptoms. Furthermore, adult attachment styles significantly mediated the relationship between childhood trauma and obsessive-compulsive symptoms, suggesting that individuals with higher levels of childhood trauma were more likely to develop insecure attachment patterns, which in turn contributed to greater obsessive-compulsive symptoms. These findings highlight the psychological mechanisms linking early adverse experiences to later psychopathology. The study contributes to the existing literature by providing empirical evidence for the mediating role of adult attachment styles in relationship between the childhood trauma and obsessive compulsive symptoms. The findings also underscore the importance of trauma-informed and attachment-based therapeutic interventions in addressing obsessive-compulsive symptoms among young adults.

Keywords: Childhood trauma, adult attachment styles, obsessive-compulsive symptoms, mediation, young adults

O-127

Machine Learning Approaches in Neurodegenerative Drug Discovery: Bridging Molecular Mechanisms and Cognitive Outcomes

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Abstract:

Neurodegenerative disorders such as Alzheimer's and Parkinson's disease involve progressive molecular damage, including amyloid aggregation, tau pathology, and neurotransmitter dysregulation,

that progressively impair memory, learning, and executive function. Traditional CNS drug discovery faces critical limitations, including poor blood-brain barrier penetration and the lack of correlation between molecular target engagement and cognitive recovery in multifactorial diseases. Machine learning algorithms address this translational gap by synthesizing genomic, proteomic, and neuroimaging datasets to connect molecular pharmacology with functional neuroscience outcomes. This narrative review examines how AI-driven algorithms bridge molecular drug discovery and cognitive outcomes in neurodegenerative disorders. A literature review of computational and clinical studies from PubMed and Google Scholar (2020 to 2025) was conducted using search terms including machine learning, drug discovery, CNS disorders, precision therapeutics, and neuroimaging analysis. The review identified three key domains where AI accelerates precision neuropharmacology. First, deep learning models achieve 34.7% improvement in receptor-ligand binding prediction compared to traditional simulations, enabling identification of novel therapeutic targets in complex neurodegenerative pathways. Second, AI simulations predict blood-brain barrier penetration, facilitating computational design of selective neurotransmitter modulators for epilepsy and mood disorders. Third, AI-powered neuroimaging analysis identifies individual level drug-response patterns, correlating molecular mechanisms with cognitive outcomes and improving research reproducibility. Significant obstacles remain, including model interpretability challenges, data heterogeneity, algorithmic bias, and insufficient clinical validation protocols. Machine learning algorithms are creating a productive convergence between molecular pharmacology and cognitive neuroscience. Advancing precision neuropharmacology requires interdisciplinary collaboration, standardized data frameworks, and rigorous ethical validation to equip practitioners with competency in interpreting AI-generated predictive models for safe clinical translation.

Keywords: Neurodegenerative disorders, central nervous system (CNS) disorders, precision neuropharmacology, receptor-ligand binding, blood-brain barrier (BBB) penetration, deep learning

O-128

Targeted Breast Cancer Treatment Using Polymeric Nanoparticles and Photodynamic Therapy

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Abstract:

This study introduces polymeric nanoparticles for the targeted co-delivery of a novel chemotherapeutic agent and curcumin to treat breast cancer. Formulated using the double-emulsion solvent evaporation method with Eudragit S-100 and polyvinyl alcohol (PVA), the nanoparticles were optimized via factorial design to achieve high drug encapsulation and a pH-responsive release profile suited for the acidic tumor microenvironment. The resulting nanoparticles were spherical with sizes between 195.7 nm and 468.9 nm and demonstrated acceptable uniformity and colloidal stability. Comprehensive characterization using FTIR, DSC, TGA, and XRD confirmed successful encapsulation of the amorphous drugs within the polymer matrix. The optimized formulation exhibited controlled, pH-dependent drug release, enhancing targeted delivery. The formulation proved biocompatible in red blood cell assays, indicating safety for intravenous use. In vivo studies using the CAM model and animal trials confirmed its safety and therapeutic efficacy. Crucially, in vitro assays on MCF-7 breast cancer cells demonstrated potent anticancer activity, which was further amplified by curcumin's

photodynamic properties. Subsequent therapeutic studies showed significant tumor regression with no observable toxicity to vital organs or hematological parameters. The study concludes that this Eudragit S-100-based nanoparticle system, enabling the co-delivery and photodynamic action of curcumin alongside a chemotherapeutic, represents a highly promising and clinically translatable platform for targeted breast cancer therapy.

Keywords: Breast Cancer, Polymeric Nanoparticles, Curcumin, Photodynamic Therapy, Targeted Drug Delivery, Eudragit S100, Zeta Potential, Particle Size, PDI, Cytotoxicity, CAM Model, Sustained Release

O-129

Explainable Brain Tumor Classification from MRI Using Attention-Enhanced CNNs and Stacking-Based Ensemble Learning

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Abstract:

The rapid development of artificial intelligence in biomedical research has significantly improved the early detection of brain tumors. Accurate classification of brain tumors from MRI images, however, remains a challenging task due to the complexity and variability of brain structures. In this study, a multiclass classification framework is developed using MRI data by combining pre-trained convolutional neural networks with a stacking-based ensemble approach. Several well-known architectures, including VGG16, InceptionV3, Xception, MobileNetV2, and EfficientNetB7, are adapted by incorporating attention mechanisms and improved classification layers. These modifications help the models focus more effectively on tumor-relevant regions and capture more meaningful features. The extracted features from different models are then combined using a stacking strategy, leading to the development of three ensemble models (EM-I, EM-II, EM-III) that take advantage of complementary strengths across networks. This approach allows for more effective learning of discriminative tumor characteristics compared to conventional methods. The results demonstrate strong classification performance, with the ensemble models achieving 97.87% testing accuracy. Among individual models, VGG16 shows the highest accuracy of 98.48%, while MobileNetV2 stands out for its efficiency, requiring only 6.8 minutes of training time, making it a practical option for real-time clinical use. To improve transparency, Grad-CAM is applied as an explainability technique to generate heatmaps that highlight the regions influencing model predictions. The visual results indicate that the model consistently focuses on clinically meaningful areas, which supports its reliability. Overall, the proposed framework achieves a good balance between accuracy, computational efficiency, and interpretability, making it a promising tool for assisting in brain tumor diagnosis using artificial intelligence.

Keywords: Attention-Enhanced Cnns, Brain Tumor Classification, Computational Efficiency, Ensemble Learning, Grad-CAM, MRI, Pre-Trained CNN Models

O-130

Development and evaluation of Biocompatible, pH-Sensitive Pectin-g-poly(AA)/PVP Semi inter penetrating Hydrogels for Controlled Release of Dexamethasone Sodium Phosphate

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Hydrogels were fabricated to address specific limitations such as mechanical weakness and targeted delivery to gastrointestinal tract. These limitations were addressed by combining natural (pectin) and synthetic (PVP) polymers and using pH-sensitive carboxylic groups of acrylic acid and pectin. We developed and characterized pH-responsive semi-interpenetrating network (semi-IPN) hydrogels composed of Pectin-g-poly(AA)/PVP using free radical polymerization. Structural and morphological characteristics were confirmed using FTIR, DSC, TGA, SEM, and XRD. Chemical evaluation focused on swelling behavior and release kinetics, demonstrating that the semi-IPN hydrogels limited dexamethasone sodium phosphate (DSP) release at pH 1.2, but provided controlled release at pH 7.4 via non-Fickian diffusion. Biologically, acute toxicity studies confirmed the safety and biocompatibility of the hydrogels for oral administration. The developed pectin-based semi-IPN hydrogels exhibit excellent mechanical strength, stimuli-responsive swelling, and biocompatibility. They offer a pH-dependent, controlled release system for DSP, making them a promising candidate for the treatment of inflammatory bowel diseases (IBD).

Keywords: Hydrogels, interpenetrating network, controlled delivery, dexamethasone, swelling

O-131

Anti-Inflammatory And Gastroprotective Effects Of Fagonia Bruguieri Var. Laxa (Zygophyllaceae) Via Attenuating Biochemical Alterations And Cellular Damage In Experimental Animals

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The current study aims to authenticate the traditional usage of Fagonia bruguieri var. laxa in eczema, ulcers, and gastrointestinal diseases. Fagonia bruguieri var. laxa. was collected, washed, dried, and ground, and its 70% aqueous methanolic solution was subjected to a rotary evaporator to produce the crude extract of the plant. Preliminary phytochemical screening was performed to validate the presence of secondary metabolites. The anti-inflammatory potential was assessed using the Carrageenan-induced paw edema test, and the anti-peptic ulcer activity was assessed using the Aspirin-induced gastric lesion/ulcer and Cysteamine-induced duodenal lesion/ulcer models in Wistar albino rats. At the end of the experiment, total acidity, ulcer index, biochemical markers, and histological changes were assessed. The crude extract of Fagonia bruguieri var. laxa. (Fb.Cr) reduced rat paw edema significantly ($P < 0.001$) by the fifth hour, with a maximum percent inhibition of 30.6%. In an aspirin-induced gastric lesion model, Fb.Cr was observed to improve pH, decrease overall acidity of stomach contents, and

reduce ulcer index at dosages ranging from 100 to 500 mg/ kg. In the Cysteamine-induced duodenal lesion model, Fb.Cr was found to reduce the severity score and ulcer index in a dose-dependent manner. The acute toxicity investigation determined that crude extract was safe up to the dose of 5 g/kg. The current study's findings show that the crude extract of *Fagonia bruguieri* (Fb.Cr) has anti-inflammatory, gastric, and duodenal protective actions, which support its folkloric use in the management and treatment of inflammation and gastric disorders.

Keywords: Aspirin, Cysteamine, *Fagonia bruguieri*, Inflammation, Gastric mucosal injury, Gastroprotection

O-132

Low-Level Laser Enhanced PNIPAM Nanocarriers For Targeted Cancer Therapy

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Abstract:

Poly(N-isopropylacrylamide) (PNIPAM)-based nanocarriers have garnered attention for cancer treatment due to their thermo-responsive and tunable physicochemical properties. This research aims to synthesize and evaluate PNIPAM-based nanocarriers crosslinked with Divinyl Azonaphthol, encapsulating a novel anticancer drug, for light-triggered and temperature-responsive drug delivery. These nanocarriers will be subjected to non-invasive therapeutic modalities low-level laser therapy (LLLT) for effectiveness in controlled drug release and cancer cell cytotoxicity. The unique integration of photoresponsiveness and thermal sensitivity is hypothesized to enhance selective accumulation at the tumor site and minimize off-target effects. Comprehensive physicochemical characterization will be conducted using techniques such as dynamic light scattering (DLS), scanning electron microscopy (SEM), and fourier transform infrared spectroscopy (FTIR). Cellular-level evaluations using MTT assay on breast cancer cell line will be performed to assess cytotoxicity, uptake efficiency, and therapeutic response under laser and LED light exposure. This study is expected to offer valuable insights into the comparative efficacy of laser-based therapies in combination with smart nanocarriers for targeted cancer therapy. The outcomes may pave the way for the development of advanced, minimally invasive, and patient-compliant cancer treatment modalities with high specificity and reduced systemic toxicity.

Keywords: Poly(N-isopropylacrylamide) (PNIPAM), Nanocarriers, Targeted Drug Delivery, Low-Level Laser Therapy (LLLT), Cancer Therapy, Stimuli-Responsive Nanoparticles, Controlled Drug Release, Breast Cancer

O-133

Phytochemical Profiling and Multimodal Pharmacological Evaluation of *Bauhinia Variegata* Extracts

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Abstract:

Bauhinia variegata plant is a very popular and traditionally potent ethno-medicine. Therefore, the ameliorative characteristics of *Bauhinia variegata* have been studied. Determination of the free radical scavenging potential using the DPPH assay, total phenolic and flavonoid contents has been evaluated by colorimetric method. Brine shrimp lethality assay was performed for determining preliminary cytotoxicity and antiproliferative activity of plant against human breast cancer MCF7 cell lines using MTT protocols. Antibacterial and antifungal activities were detected by using disc diffusion procedure. Alpha amylase assay was performed to monitor anti-diabetic potential of the plant. Among twenty different samples, methanolic extract (ME) of bark has shown highest total phenolic contents ($60.62 \pm 0.29 \mu\text{g GAE/mg DW}$). ME of leaves showed excellent flavonoid contents ($55.47 \pm 0.19 \mu\text{g QE/mg DW}$), with significant free radical scavenging activity of $93.43 \pm 0.19\%$ $\mu\text{g/ml}$ was exhibited by hexane extract of stem. Even though significant reducing power and antioxidant capacity were exhibited by ME of stem with values of 274.87 ± 2.30 and $99.97 \pm 3.97 \mu\text{g AAE/mg DW}$ respectively. Stem extract of hexane exhibits 77.40% as cytotoxic at LD₅₀ 10.50 $\mu\text{g/ml}$ when evaluated through brine shrimp lethality assay. Hexane and ethyl acetate extracts of root and stem showed antiproliferative activity against human breast cancer MCF7 cell line (IC₅₀ 12.10-14.20 $\mu\text{g/ml}$). For momentous antimicrobial potential, various extracts displayed excellent antibacterial and antifungal activities while hexane extract of root showed antidiabetic activity ($60.80 \pm 0.20\%$ at 200 $\mu\text{g/ml}$ concentration). In sum, these preliminary results will be useful for further compound isolation from selected plant parts for discovery of antibacterial, antidiabetic and anticancer lead candidate.

Keywords: *Bauhinia variegata*; Antiproliferative activity; MCF7; Ascorbic acid

O-134

Bench-Side To Bed-Side Approach: A Novel, Natural Remedy To Treat Cardiometabolic Syndrome

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Abstract:

Berberis brandisiana Ahrendt (Ishkeen, Shugloo) belongs to Berberidaceae family is dicotyledonous shrub traditionally used in various disorders like diabetes, arthritis, kidney stones, liver problems, wounds, infections, tumors, leucorrhoea, swellings. It is enriched with alkaloids, phenolics and flavonoids like berbamine, berberine, chlorogenic acid, gallic acid, quercetin, p- coumaric acid, ferulic acid, benzoic acid, m- coumaric acid. Its efficacy in preventing high fructose diet-induced diabetes has not yet been assessed. This study aims to investigate potential efficacy of HMEBB by using high fructose diet (HFR-Diet) fed diabetic rats. Male Wister rats were given high fructose diet (60%) for 8 weeks and oral doses of HMEBB (150 and 300 mg/kg) were administered for 6 weeks. After 14th weeks of study, HMEBB (150 and 300 mg/kg) treated groups exhibited significant decrease in FBG level, modified serum albumin, lipid profile and uric acid levels and significantly ($p < 0.001$) modulated HbA_{1c}, serum insulin, uric acid, eNOS, bilirubin level, lipid profile, electrolytes level as compared to only HFR-Diet exposed diabetic rats. Moreover, HMEBB (150 and 300 mg/kg) treated animals demonstrated cellular architecture preservation by modulation of TNF- α , IL-6, adiponectin, leptin and

levels of SOD, CAT and MDA significantly improved. Tissue architecture of pancreas, liver, kidney, heart and aorta was restored in histopathological study. Whereas, HMEBB (150 and 300 mg/kg) revealed up regulation of candidate genes thus exhibited notable results in treatment of diabetes, dyslipidemia and declined inflammation in HFR-Diet fed diabetic rats.

Keywords: Berberis Brandisiana, Adipokines, Glucose Transporter- 5, Ketohexokinase, Molecular Docking

O-135

Evaluating an AI-Powered Mobile Wellbeing App for Students: A Pilot Study of SehatMind in Pakistan

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Abstract:

University students in Pakistan face rising mental health and wellbeing challenges, including stress, anxiety, depression, loneliness, and reduced flourishing; however, access to culturally relevant and stigma-free support remains limited. Most digital mental health tools are developed in Western contexts and fail to reflect the cultural, linguistic, and social realities of South Asian students, while existing solutions in Pakistan largely focus on clinical referrals or reactive support with limited emphasis on continuous, self-guided care. This highlights a critical need for scalable, culturally adapted digital interventions that support both the reduction of psychological distress and the promotion of overall wellbeing. To address this gap, this study introduces SehatMind, a culturally adapted, AI-powered mobile mental health application designed as a “pocket wellbeing partner” for Pakistani university students. The app integrates mood logging, AI-assisted conversational support, and personalized “Today’s Tips” featuring psychoeducational content and guided activities, alongside an AI-powered chatbot companion, SehatBuddy, which provides emotionally responsive interactions, active listening, and personalized guidance. A 21-day pilot study using a pre–post design was conducted among university students in Pakistan (current $n = 20$; target $n \approx 40$). Mental health outcomes were assessed at baseline and post-intervention using validated measures, including the Depression Anxiety Stress Scales (DASS-21), Rosenberg Self-Esteem Scale (RSES), Harvard Flourishing Index, and UCLA Loneliness Scale, with demographic characteristics collected separately. Post-intervention usability was evaluated using the System Usability Scale (SUS), yielding a mean score of 70, indicating above-average usability. Preliminary findings suggest improvements across all measured outcomes, including reductions in depression, anxiety, stress, and loneliness, alongside increases in self-esteem and flourishing. Users reported that culturally relevant content, daily engagement features, and AI-supported interactions contributed to perceived usefulness and accessibility, highlighting the potential of culturally adapted, AI-powered mobile interventions as scalable, stigma-free solutions for supporting student mental health and overall wellbeing in low-resource settings.

Keywords: Digital Mental Health; AI in Mental Health; AI-Powered Personalization; Student Mental Health; Wellbeing; Flourishing; Pilot Study

O-136

Contribution of Academic Stress and Sports Training Load on Cognitive Function and Performance of University Athletes

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Abstract:

In sports and academic settings, academic stress referred to the pressures related to educational demands while sports training load represented the physical and mental demands of athletic training. One of the most important aspects of athlete performance is cognitive function. The objective of this research was to examine the contribution and effects of academic stress and sports training load on the cognitive function and performance of university athletes. A quantitative approach served as the foundation for the research methodology. The survey research design was used in the present study. The population of the study consisted of university athletes with a sample size of 104 participants. Data were collected using a self-developed questionnaire based on a five-point Likert scale, specifically, designed to measure academic stress, sports training load, cognitive function, and performance. Pearson's correlation analysis was conducted using SPSS software (version 26) to examine the relationships among the study variables. The findings revealed that academic stress, sports training load, cognitive function, and performance of university athletes were significantly correlated ($p < 0.01$) among each other. Academic stress and sports training load revealed strong positive relationships with cognitive function and overall sports performance. These results highlighted the important role of psychological and physical demands in shaping the outcomes of university athletes. This study concluded that academic stress and sports training load are significant factors influencing cognitive function and performance of university athletes. Proper management of academic stress alongside optimal sports training can enhance cognitive abilities and overall athletic performance. Institutions and coaches are encouraged to implement strategies balancing academic and athletic demands for university athletes' outcomes through managing academic stress as well as maintaining appropriate training loads.

Keywords: Academic Stress, Sports Training Load, Cognitive Function, Performance, University Athletes

O-137

Relationship between Goal Setting, Coach Feedback Style and Self-Efficacy of University Athletes

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Abstract:

In contemporary sports environments, psychological factors play a vital role in shaping athletes' performance and confidence. Goal setting is considered an essential strategy that helps athletes focus on improvement, while coach feedback style significantly influences athletes' motivation and learning process. Self-efficacy, which reflects an athlete's belief in their own abilities, is a key factor in

achieving success in sports. Therefore, the objective of this study was to examine the relationship between goal setting, coach feedback style, and self-efficacy among university athletes. A cross-sectional quantitative research design was employed, targeting male and female university athletes. A sample of 274 university athletes was selected from a population of 950 using a simple random sampling technique. Data were collected through a structured questionnaire based on a five-point Likert scale. The data were analyzed using SPSS (version 26) applying Pearson's correlation analysis to determine relationships among goal setting, coach feedback style, and self-efficacy among university athletes. The findings revealed that goal setting, coach feedback style, and self-efficacy were significantly correlated ($p \leq 0.01$) with each other. The results showed a very strong positive relationship between goal setting and self-efficacy ($r = .98$). Similarly, coach feedback style also demonstrated a strong positive relationship with self-efficacy ($r = .96$). In addition, a strong positive correlation was found between goal setting and coach feedback style ($r = .958$) among university athletes. It was concluded that goal setting and coach feedback styles significantly enhance university athletes' self-efficacy across task, coping, and learning dimensions. It is recommended that coaches implement structured goal-setting strategies and provide constructive feedback to strengthen athletes' confidence, adaptability, and skill development.

Keywords: Goal Setting, Coach Feedback Style, Self-Efficacy, University Athletes

O-138

Effects of Technology Integration and Teacher Competence on Learning Outcomes of Physical Education Students at University Level

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Abstract:

In modern higher education settings, the use of technology has become an important element in improving teaching and learning processes, especially in physical education where both practical and theoretical aspects are involved. At the same time, the competence of teachers is a key factor that influences students' academic achievement and skill development. The effective use of technological resources, combined with strong teaching abilities can enhance students' participation, understanding and overall performance. The present study aimed to investigate the effect of technology integration and teacher competence on the learning outcomes of physical education students at the university level. This study examined the relationship between technology integration, teacher competence, and students' learning outcomes among university physical education students. A cross-sectional quantitative design was used, with 300 respondents selected from a population of 1100 through stratified random sampling. Data were collected via a structured questionnaire and reliability was confirmed using Cronbach's alpha prior to actual data collection. The data were edited using SPSS 26 and further analyzed through descriptive statistics and Pearson's correlation analysis. The findings revealed significant positive correlations among technology integration, teacher competence, and students' learning outcomes ($p = 0.01$) along with teacher competence having a stronger effect ($r = 0.845$) than technology integration ($r = 0.562$) highlighting their important role in enhancing learning outcomes in university physical education programs. The existing research concluded that technology

integration and teacher competence played a significant role in enhancing students' learning outcomes in physical education at the university level. Effective use of technological tools combined with competent teaching strategies led to better academic understanding, improved physical skills, and higher overall performance among students. Universities should integrate modern technology in physical education classes while teachers can enhance their pedagogical and technological skills through professional development. Academic departments should provide adequate digital resources to explore factors like student motivation or institutional support to further improve learning outcomes.

Keywords: Technology Integration, Teacher Competence, Learning Outcomes, Students

O-139

Measurement of Leadership Styles, Team Cohesion and Performance of University Cricket Players

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Abstract:

The present study aims to examine the relationship between leadership styles, team cohesion, and the performance of university cricket players. The study adapted cross-sectional research design with quantitative approach to investigate the combined effect of leadership behaviors and team cohesion on players' performance. Leadership styles were based on transformational, transactional, autocratic, democratic, and laissez-faire approaches while team cohesion will examine through task, social, communication, and emotional dimensions. Performance of players treated as a multidimensional construct comprising technical, tactical, physical, and psychological components. The population consisted of cricket players aged 18-30 years comprising 5000 individuals actively participating from different teams and captains at university-level cricket competitions of different universities of Punjab. Stratified random sampling for quantitative approach employed to ensure description from different cricket teams, leadership styles, and formats of the game. The sample size was numbered as 370 cricketers actively participating from different teams at university level cricket players. Leadership styles and team cohesion was measured through structured questionnaire while performance assessed through a combination of field-based tests (technical skills and fitness capabilities) and self-reported measures (tactical and psychological performance). The collected data was analyzed using descriptive statistics and Pearson's correlation analysis. The findings of the study revealed that leadership styles and team cohesion had significant relationships with the performance of university cricket players. Furthermore, results of multiple regression analysis indicated that leadership styles and team cohesion significantly predicted the performance outcomes highlighting the significant variance in the outcome variable. The present research concluded that effective leadership behaviors and strong team cohesion played a vital role in enhancing the overall performance of cricket players at the university level. It is recommended that coaches and team leaders should adopt appropriate leadership styles and foster team cohesion to improve players' performance.

Keywords: Leadership Styles, Team Cohesion, Performance, Cricket Players, University Level

O-140

Involvement of Digital Media Distractions on Cognitive, Academic, and Physical Performance of Undergraduate Physical Education Students

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Abstract:

The purpose of the research was to examine the involvement of digital media distraction effects on the cognitive focus, academic achievement, and physical performance of undergraduate PE students. The study utilized a quantitative research approach. Punjab public universities undergraduates' physical education students were the population of the study. A sample of 550 students was selected through a simple random sampling technique. A self-administered questionnaire was used to collect data using a five-point Likert scale. The reliability and validity of questionnaire was tested through pilot testing engaging 40 students. Descriptive statistics, Pearson's correlation analysis, and multiple regression analysis were used to determine the results of the research. SPSS v-26 was used to edit the survey collected data. The results of the present research indicated that the statistical analysis of the data was found significant at p-value of 0.05. Pearson correlation revealed statistically significant but negative results of digital media distractions with cognitive, academic, and physical performance. Finding of multiple regression analysis demonstrated that digital media distractions significantly predicted cognitive performance, academic performance and physical performance of undergraduates' physical education students. It was concluded that digital media distractions remained a significant predictor of overall student performance indicating its substantial effect on cognitive, academic, and physical outcomes among undergraduate students. It was suggested that higher involvement in digital media distractions was associated with lower levels of performance across all domains.

Keywords: Cognitive Performance, Academic Performance, Physical Performance, Digital Media Distractions, Undergraduate Students

O-141

Relationship between Stress Management, Mental Toughness and Performance Consistency of Mature Athletes

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Abstract:

In competitive sports, maintaining consistent performance is challenging, and psychological factors such as stress management and mental toughness are considered critical in determining athletes' success. This study was to explore the relationship between stress management, mental toughness, and performance consistency among mature athletes. Specifically, the study aimed to investigate how stress management and mental toughness contribute to performance consistency. A quantitative survey research design was employed and data were collected through self-administered questionnaire using a five-point Likert scale. A simple random sampling technique was applied to select 120 mature athletes. The collected data was edited through SPSS (Version 26) and further analyzed using descriptive statistics and Pearson's correlation analysis. The results indicated a significant positive relationship between stress management and performance consistency ($r = .707$, $p < .01$) as well as between mental toughness and performance consistency ($r = .564$, $p < .01$). Findings showed strong and positive correlation between stress management and mental toughness ($r = .843$, $p < .01$). These

findings revealed that both stress management and mental toughness played a vital role in enhancing performance consistency among mature athletes. Athletes who effectively managed stress and possess higher levels of mental toughness demonstrated more stable and consistent performance. It is recommended that coaches and sports professionals should implement psychological skills training programs focusing on stress management and mental toughness development to improve athletes' performance consistency. Based on the results, coaches, and sports professionals should incorporate psychological skills concentrating on stress management techniques and mental toughness development to improve athletes' consistent performance. Furthermore, future research should consider larger sample size, different sports categories, and experimental designs to explore further improvements in sports performance effectively.

Keywords: Stress Management, Mental Toughness, Performance Consistency, Mature Athletes, Sports Performance

O-142

Uses and Effects of Norethisterone on Menstrual Cycle of Professional Women Athletes in Pakistan

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Abstract:

Professional female athletes frequently struggle to control their menstrual cycles because of the physiological demands of competition and training. Unplanned menstruation can have an effect on general health, recuperation, and sports performance of female athletes. The present study examined how norethisterone affects professional female athletes' menstrual cycles assessing its effectiveness in delaying periods, sports performance, and possible physiological adverse effects. The study lasted six months and involved (n=100) female athletes belonging to endurance, strength-based, and mixed-sport disciplines. Two groups of participants were formed: one that used norethisterone to treat menstrual delay and the other that followed their normal cycle as a control. Hormonal profiling, performance evaluations, and self-reported surveys on symptoms, well-being, and adverse effects were used to gather data. To assess the effectiveness of menstruation suppression, changes in sports performance indicators and side effects, descriptive statistics was done using SPSS v-26. The study indicated that 80% of athletes utilizing norethisterone effectively postponed menstruation during important competitive times. In addition to modest side effects including bloating and mood swings, 20% of users reported no discernible reduction in performance indicators like strength, endurance, and response speed. Follow-up evaluations revealed no visible long-term hormonal abnormalities. Professional sportsmen found that norethisterone is a safe and efficient way to suppress their periods. Individual differences in reaction, however, emphasized the necessity of tailored medical advice. Although, there was no apparent significant influence on sports performance, minor side effects highlighted the significance of keeping an eye on athlete health. Considering little side effects, norethisterone helped professional female athletes to control their menstrual cycles. For individuals who wanted to avoid menstruation during competition without suffering major performance consequences, it provided a

good alternative. Future studies should examine its long-term consequences and compare it with various menstrual dominance strategies.

Keywords: Norethisterone, Menstrual Cycle Regulation, Professional Women Athletes

O-143

Trends of Drug Practices in Pakistani National Athletes for Amplification of Sport Performance

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Abstract:

The primary objective of the present research was to provide awareness about the latest trends of drug practices of national athletes of Pakistan for the improvement of their sport performance. The samples were national athletes belonging to various sports departments of national level. The athletes were selected using snowball and convenient sampling approaches. The survey questionnaire employed for the data collection was self-administered. With the optimistic consent of the athletes, 80 questionnaires were distributed among the athletes. Therefore, 62 athletes (77.5%) returned the filled questionnaires. The requisite information of all filled questionnaires was coded in SPSS software v-26 to get the desired results. Moreover, descriptive statistics through frequencies and percentages was executed to draw the findings and further discussions of the present study. The mean age of the national athletes was noted 34.17 years with 2.8 std. deviation and the age range was found between 30 to 38 years. The descriptive statistics of drug practices by national athletes calculated through occasionally, sometimes and frequently. Majority of the national athletes followed and practiced the trends of drugs while participating in their national games and championships to enhance their sport performance to approach the winning position and get the medals. It was concluded that athletes were not fully aware of the side effects and hazards of these drug practices using anabolic steroids, charas, marijuana, aspirin, cocaine, and heroin. National associations and federations should conduct seminars and awareness workshops for the athletes prior to their participation in sport competitions so that national athletes may save themselves from the side effects and afterwards physical damages.

Keywords: Drugs Practices, Amplification, Pakistani Athletes, Sports Performance

O-144

A Study of Difficulties and Hurdles Faced by Female Athletes Towards Their Athletic Career

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Abstract:

The present study aims to the participation of women in athletics has increased significantly over the past few decades, yet female athletes continued to encounter a wide range of difficulties and hurdles that hindered their performance and long-term career development. The study employed a descriptive

survey design to examine the social, cultural, financial, psychological, and health-related challenges faced by female athletes at the university level in Faisalabad. A stratified random sampling technique was used to select a representative sample of 200 female athletes and data were collected through a structured questionnaire with prior consent. The collected data were analysed using descriptive statistics in SPSS (Version 26) to identify major hurdles and their effect on athletes' performance and career development while ensuring ethical considerations such as confidentiality and voluntary participation. Data were collected through a self-administered questionnaire measuring difficulties and hurdles faced by female athletes and pilot testing confirmed the reliability and clarity of the instrument. Furthermore, the validity and suitability of the data were established through the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity while Principal Component Analysis (PCA) was applied to ensure construct validity. The collected data were analyzed using descriptive statistics, Pearson's correlation analysis, and multiple regression analysis to examine relationships and predictive effects among variables. The findings indicated that social, cultural, and institutional barriers are significantly associated with reduced performance, participation, and career progression of female athletes. Key challenges including lack of family support, inadequate facilities, financial constraints, limited coaching, and safety concerns negatively influenced athletes' motivation, confidence, and overall outcomes. It was concluded that these barriers substantially hindered the development and success of female athletes in Pakistan. Therefore, sports institutions and policymakers should implement supportive strategies, improve infrastructure, ensure safety, and promote equal opportunities to enhance female athletes' participation and performance.

Keywords: Difficulties, Hurdles, Athletic Career, Female Athletes

O-145

Improvement in Athletes' Satisfaction and Performance through Sports Organizational Strategies and Management Practices

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Abstract:

The objective of the present study was to examine athletes' satisfaction and competitive performance within Pakistani sports institutions focusing on the role of sports organizational strategies and management practices. Specifically, this research intended to investigate the effect of these strategies and practices on enhancing athlete satisfaction and performance. A cross-sectional research design was employed targeting male and female athletes from universities and sports clubs. A sample of 306 respondents was selected using simple random sampling from a population of 1500 athletes. Data were collected through a self-administered survey questionnaire to measure organizational strategies, management practices, athlete satisfaction, and performance. Prior to the actual data collection, pilot testing indicated satisfactory reliability and clarity of the instrument. The validity and suitability of the data were confirmed using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity while Principal Component Analysis (PCA) was applied to establish construct validity. The data were analyzed using descriptive statistics, Pearson's correlation analysis to examine relationships among the variables. The findings indicated that organizational strategies and management practices were

significantly associated with athletes' satisfaction and competitive performance demonstrating a positive contribution toward enhancing athlete outcomes. It was concluded that effective organizational strategies and sound management practices effectively contributed to improving athletes' satisfaction and competitive performance within Pakistani sports institutions. Sports institutions, administrators, and policymakers should encourage implementing structured organizational strategies and effective management practices to enhance athlete satisfaction and performance outcomes.

Keywords: Athlete Satisfaction, Competitive Performance, Organizational Strategies, Sports Management Practices, Physical Education Students

O-146

Contribution of Monetary Factors Towards Sports Opportunity and Facility Approaches Available to Female Players

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Abstract:

The purpose of the present study was to examine how monetary factors contribute to sports opportunities and the availability of facility approaches for female players in Pakistan with a specific focus on the role of financial resources in enhancing women's participation and athletic development. A cross-sectional quantitative research design was employed, targeting female athletes from colleges, universities in Lahore and Faisalabad. A sample of 289 participants was selected from the population of 1000 female players using purposive sampling technique. Data were collected through a self-administered questionnaire measuring funding allocation, sponsorship opportunities, scholarships, institutional financial support, facility access, and overall sports engagement. The research instrument was pilot-tested to ensure reliability, clarity, and internal consistency. Furthermore, the validity and suitability of the dataset were confirmed through the Kaiser Meyer Olkin (KMO) measure and Bartlett's Test of Sphericity, while Principal Component Analysis (PCA) was applied to establish construct validity. Descriptive statistics, Pearson's correlation analysis, and multiple regression analysis were used to examine relationships and predictive effect among monetary factors, facility access, and female athletes' sports opportunities. The results revealed that monetary factors had a significant and positive impact on sports opportunities and facility approaches available to female players. Adequate funding, scholarships, and sponsorships were found to play a vital role in improving training conditions, facility access, professional coaching opportunities, and participation in competitive events. It was concluded that financial support is a critical determinant of sports development among female players in Pakistan. Therefore, sports administrators, educational institutions, and policymakers are strongly encouraged to promote equitable funding structures, increase financial incentives, and enhance resource allocation to advance sports opportunities for female athletes.

Keywords: Monetary Factors, Sports Opportunities, Facility Approaches, Female Athletes, Funding Allocation, Sponsorship

O-147

Development of Lower Extremity Fitness through Gym Exercises and Its Effects on Overall Health and Performance of Student Players

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Abstract:

The study aimed to compare the lower extremity fitness level, health status, and performance between experimental and control groups at both pre-test and post-test stages. The study was conducted to investigate the effect of gym-based training on lower extremity fitness, health promotion, and performance among student players. An experimental research design with pre-test and post-test of experimental and control group method was adopted for the study. A sample of 3 student players was selected. The data were collected through standardized strength and endurance tests, including one-repetition maximum (1RM) squat, calf raises, lunges, jump squat test (30 seconds), step test (1 minute), and sit-hold test (maximum duration). The statistical techniques used for data analysis were mean and standard deviation. The pre-test findings revealed that the participants had moderate levels of lower extremity fitness, with mean values of (10.67) repetitions in squat, (14.33) in calf raises, and (5.00) in lunges. Similarly, endurance performance was recorded with mean scores of (16.67) repetitions in jump squat, (65.67) in step test, and (52.33) seconds in sit-hold. After the application of the gym exercise training program, the post-test results showed significant improvement, with mean values increasing to (12.33) in squat, (17.00) in calf raises, and (8.33) in lunges. Endurance variables also improved, with jump squat increasing to (20.00) repetitions, step test to (79.00), and sit-hold duration to (68.67) seconds. The findings of the study indicate that gym exercises have a significant positive effect on the development of lower extremity fitness, which in turn enhances overall health and performance of student players. It is concluded that structured gym training programs are effective in improving strength, endurance, and athletic performance. It is recommended that sports training programs incorporate structured gym-based exercise routines into their regular curriculum for student athletes. Emphasis should be placed on progressive resistance training and endurance-building exercises, as these have proven effective in improving both muscular fitness and functional performance.

Keywords: Development of lower extremity fitness, overall health, performance of student players

O-148

Implications of Achievement Motivation and Emotional Intelligence on Burnout Among University Student Players

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Abstract:

In academic and sports settings, achievement motivation referred to the internal drive of student players to accomplish goals and excel in performance, while emotional intelligence represents their ability to perceive, understand, and regulate emotions effectively. On the other hand, burnout reflected a state of physical and emotional exhaustion resulting from prolonged stress. One of the major concerns

in university sports is the increasing level of burnout among student players. Therefore, the objective of this research was to examine the implications of achievement motivation and emotional intelligence on burnout among university student players. A quantitative approach served as the foundation for the research methodology and a survey research design was employed. The population of the study consisted of 1000 university student players out of which a sample size of 278 student players was selected. Data were collected from university players through self-administered survey questionnaire. Descriptive statistics and Pearson's correlation analysis were employed using SPSS software (version 26) to examine the relationships among the study variables. The findings revealed that achievement motivation, emotional intelligence, and burnout were significantly correlated ($p < 0.01$) among each other. Achievement motivation and emotional intelligence revealed strong and negative relationships with burnout indicating that higher levels of these constructs were associated with lower burnout of university student players. These results highlighted the significant role of psychological factors in managing stress and preventing burnout in athletes. This study concluded that achievement motivation and emotional intelligence considered vital factors influencing burnout among university student players. Enhancing these psychological attributes may effectively reduce burnout and improve athletes' mental well-being and performance. It was recommended that universities and sports organizations should develop and implement psychological training programs to enhance achievement motivation and emotional intelligence among student players.

Keywords: Achievement Motivation, Emotional Intelligence, Burnout, Student Players

O-149

A Study of Awareness, Attitude and Adaptation of AI Fitness on Exercise Adherence of Student Athletes of HEIs

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Abstract:

In sports and fitness settings, exercise adherence referred to the consistency in which individuals followed prescribed exercise routines while artificial intelligence fitness (AI) applications provided personalized training, performance tracking, and adaptive feedback to support exercise behavior. The objective of this research was to examine the role of awareness, attitude, and adaptation of AI fitness applications in influencing exercise adherence among student athletes in Higher Education Institutions (HEIs) in Punjab, Pakistan. A quantitative research approach was adopted using a survey research design. The population consisted of all student athletes from eleven universities with a sample size of 400 participants selected through purposive sampling. Data were collected using a self-administered survey questionnaire. The collected data was edited through SPSS (Version 26) and further analyzed using descriptive statistics and Pearson's product-moment correlation to examine the relationships among the variables. The findings revealed that all variables were significantly correlated ($p < 0.01$). A strong and positive relationship was found between awareness and exercise adherence ($r = 0.740$). Similarly, adaptation ($r = 0.644$) and attitude ($r = 0.609$) also showed significant and positive relationships with exercise adherence. Moreover, strong interrelationships were observed among independent variables particularly between AI awareness and attitude ($r = 0.846$) and AI awareness

and adaptation ($r = 0.803$). The study concluded that awareness, attitude, and adaptation of AI fitness applications are significant factors influencing exercise adherence among student athletes. Effective use of AI-based fitness technologies enhanced consistency in exercise behavior when users were well-informed, develop positive attitudes, and actively integrate these applications into their daily routines. It is recommended that Higher Education Institutions (HEIs), coaches, and policymakers should promote awareness programs and training sessions to improve the effective use of AI fitness applications. Institutional support and proper guidance may help student athletes better integrate these technologies ultimately improving their exercise adherence.

Keywords: Artificial Intelligence, Fitness Applications, Exercise Adherence, Awareness, Attitude, Adaptation, Student Athletes

O-150

Role of Digital Coaching Literacy and Online Coaching Effectiveness in Enhancing Athlete's Performance of Remote Territory

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Abstract:

In contemporary sports environments, digital coaching literacy had become essential for effective coaching, especially in remote territories where access to physical training resources was limited. Alongside this, online coaching effectiveness ensured efficient delivery of training, feedback, and performance monitoring through virtual platforms. The objective of this research was to examine the role of digital coaching literacy and online coaching effectiveness in enhancing athlete's performance in remote areas of Pakistan. A quantitative approach with a survey research design was adopted for the present research. A sample of 120 athletes was selected using snowball sampling technique and data were collected through a structured survey questionnaire based on a five-point Likert scale. The data were analyzed using SPSS (version 26) applying descriptive statistics and Pearson's correlation analysis to determine relationships among variables. The findings highlighted the importance of digital coaching in improving athlete's performance in geographically isolated contexts. The results revealed that digital coaching literacy, online coaching effectiveness, and athlete's performance were significantly correlated ($p = 0.01$) among each other. Results indicated positive and strong relationships of digital coaching literacy ($r = .571$) and online coaching effectiveness ($r = .877$) with athlete's performance. This study concluded that digital coaching literacy and online coaching effectiveness played an important role in enhancing athlete's performance in remote territories. It was recommended that coaches should improve their digital coaching literacy through continuous training to enhance online coaching quality in remote areas. Sports institutions should also strengthen digital platforms and infrastructure to support effective online coaching and improve athlete performance.

Keywords: Digital Coaching Literacy, Online Coaching Effectiveness, Athlete's Performance, Remote Territory

O-151

Influence of Procrastination on Decision-Making Effectiveness and Time Management of Sports Coaches

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Abstract:

The purpose of present study was to examine the relationships of procrastination with decision-making effectiveness and time management among sports coaches. This research employed a quantitative approach with survey research design to examine the influence of procrastination on decision-making effectiveness and time management among 200 sports coaches. Data was collected through structured survey questionnaires. Reliability and validity were confirmed via factor analysis, KMO, Bartlett's test, and communalities and factor loadings. Three constructs with sub-dimensions were analyzed. Descriptive statistics and Pearson's correlation analysis was used to explore relationships ensuring the data collection and robust analysis of coaching performance. Correlation analysis revealed that procrastination negatively and strongly correlated with decision-making effectiveness ($r = -0.612$) and time management ($r = -0.598$) among sports coaches. Sub-dimensions such as fear of evaluation, time aversion, and stress had moderate to strong negative influence. Results indicated that positive and significant relationships were observed between decision-making sub-dimensions (clarity, emotional control, confidence) and time management indicating that better decision-making supported efficient task planning and execution. The study concluded that sports coaching institutions implemented strategies to reduce procrastination including stress management, goal-setting exercises, and structured time management tools. Coaches were advised to enhance decision-making skills such as clarity of judgment, emotional control, and confidence while using reflective practices to evaluate outcomes. Supportive environments that reduced fear of evaluation and provided constructive feedback should encourage improving timely and effective decision-making.

Keywords: Procrastination, Decision-Making Effectiveness, Time Management, Sports Coaches

O-152

Influence of Gender Discrimination, Community Attitude and Media Coverage on Female Sports Participation

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Abstract:

This study investigated the role of gender discrimination, community attitude, and media coverage in the sport participation of female players. It also examined how these factors influenced personal interest, dress code, and health of female players and determined the relationships among these variables. The study used a descriptive survey design with quantitative approach to collect primary data from 400 intervarsity female players selected through simple random sampling from a population of approximately 1400. Data gathered through a structured closed-ended questionnaire (Likert scale and multiple-choice) focusing on gender discrimination, community attitude, media coverage, and female sport participation. The collected data was edited in SPSS (V-26) and further analyzed through descriptive statistics and Pearson's correlation analysis. The results showed that female sport participation is significantly related to gender discrimination, community attitude, and media coverage.

Factors such as personal interest, dress code, and health were found to be influenced by social, cultural, and media-related conditions. The findings further indicated that awareness, social support, equal opportunities, and media attention played an important role in encouraging female players' participation in sports. Overall, these results suggested that a supportive social media environment positively improved female involvement in sports. The study concluded that gender discrimination, community attitude, and media coverage significantly influenced the sport participation of female players. The findings showed that these factors are positively related to personal interest, dress code, and health among female athletes. Variables such as ineffective equity, awareness and education, social support, and media focus were found to have strong associations with sports participation. Overall, improving equal opportunities, community support, and positive media representation also helped to increase female participation in sports. It was recommended that universities and sports institutions should provide equal opportunities to support female players. Communities should promote positive attitudes and awareness about women's participation in sports. Media should increase the coverage and encouragement of female sports.

Keywords: Gender Discrimination, Community Attitude, Media Coverage, Female Players Sport Participation

O-153

Role of Speed and Accuracy of Ball on The Perfection of Penalty Shootouts of Male Football Players

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Abstract:

The present study aimed to examine the role of ball speed and accuracy on the perfection of penalty shootouts among male football players. An experimental research design was used consisting of pre-test and post-test measures with control and experimental conditions. A sample of male football players was assessed for ball speed and accuracy during penalty shootouts. A total sample of 20 male football players (10 experimental group and 10 control group) was selected using purposive sampling technique. Before the intervention, pre-tests were conducted to measure the initial ball speed and accuracy of both groups during penalty shootouts. Ball speed was measured using a speed formula while accuracy was assessed by dividing the goalpost into 9 zone. After the pre-test, the experimental group underwent a structured training program designed to improve penalty kick speed and accuracy while the control group continued with routine practice. Following the training period, post-tests were conducted to measure improvements in both variables. Ball speed was calculated using the formula $\text{speed} = \text{distance} / \text{time}$ while accuracy was measured using $\text{accuracy} = (\text{successful shots} / \text{total shots}) \times 100$. Pre-test results indicated moderate levels of speed and accuracy among players. Following the intervention, improvements were observed in both variables during the post-test. The mean ball speed increased from 19.37 ± 3.03 km/h in the pre-test to 20.87 ± 3.48 km/h in the post-test. Similarly, mean accuracy improved from $40.00 \pm 8.16\%$ to $60.00 \pm 8.16\%$. These findings demonstrated that enhanced ball speed and accuracy significantly contributed to better performance in penalty shootouts. Ball speed and accuracy are critical factors contributing to the perfection of penalty shootouts in football. The findings highlighted the importance of specialized training programs for enhancing these performance variables among male football players. It was recommended that football coaches and trainers should

place greater emphasis on structured training programs specifically designed to improve both ball speed and accuracy during penalty shootouts. Since the results indicated a clear improvement in performance after the intervention incorporating targeted drills such as repetitive shooting practice, goal zone targeting (9-zone method) and time-based kicking exercises can significantly enhance players' effectiveness.

Keywords: Ball Speed, Ball Accuracy, Performance, Football Players

O-154

Effects of Mindfulness and Cognitive Reappraisal on Emotional Stability among University Athletes

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Abstract:

This study examines the effects of mindfulness and cognitive reappraisal on emotional stability among university athletes in Punjab, Pakistan. A quantitative research approach and survey design was used for the present research. The data were collected from a sample of 300 university athletes drawn from a population of 1000 university athletes in Punjab, Pakistan. The study used a multistage sampling technique where universities were selected through convenience sampling and athletes were chosen via simple random sampling. The study focused on three primary variables: mindfulness, cognitive reappraisal, and emotional stability. Data were gathered through a self-administered survey questionnaire measuring key dimensions of emotional regulation and psychological stability. Statistical analysis was conducted using descriptive statistics to measure the demographic information of the respondents and Pearson's correlation analysis to examine the relationships among the study variables. The results revealed a strong, positive, and statistically significant relationships between emotional stability and mindfulness ($r = 0.846$, $p < 0.01$), emotional stability and cognitive reappraisal ($r = 0.776$, $p < 0.01$), and mindfulness and cognitive reappraisal ($r = 0.855$, $p < 0.01$). The findings indicated that all study variables are strongly interrelated suggesting that athletes with higher mindfulness and cognitive reappraisal skills tended to demonstrate greater emotional stability. The study concluded that mindfulness and cognitive reappraisal were important psychological factors contributing to emotional stability in athletes. It was recommended that sports administrators and university programs should integrate psychological skills training, particularly, mindfulness practices and cognitive restructuring techniques to enhance athletes' emotional regulation and performance under pressure.

Keywords: Mindfulness, Cognitive Reappraisal, Emotional Stability, University Athletes

O-155

Prevalence of Sacro-Iliac Joint Dysfunction and its Association with Low Back Pain and Related Functional Disabilities Among Dairy Farmers

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Abstract:

Sacroiliac joint dysfunction (SIJD) is a significant contributor to low back pain (LBP), often leading to functional disabilities that affect daily activities. Dairy farmers are particularly vulnerable due to the physical demands, repetitive tasks, and prolonged postural stresses inherent in their occupation. These factors contribute to a heightened risk of musculoskeletal disorders, with SIJD being a key factor influencing LBP and its associated functional impairments. To assess the prevalence of sacroiliac joint dysfunction and its association with low back pain and related functional disabilities among dairy farmers. This cross-sectional survey was conducted from April 28, 2024, to May 15, 2024, at dairy farms registered with the Pakistan Agriculture and Dairy Farmers Association (PADFA). The sample comprised 75 male participants aged 20–50 years, with at least one year of work experience and a minimum of six daily working hours. Purposive sampling was used to select 65 participants with LBP and 10 without. Data were collected using validated tools, including the Numeric Pain Rating Scale, the Urdu version of the Oswestry Disability Index, and the 5-Test Cluster of Laslett for SIJD diagnosis. Statistical analysis was performed using SPSS version 29 to determine associations between LBP, SIJD, and functional disabilities. Of the 75 participants, 65 (86.7%) reported LBP, and 19 of these (29.2%) were diagnosed with SIJD. Among all participants, SIJD prevalence was 25.3%. Functional disability scores among those with LBP revealed the highest impact in pain intensity (67.7%) and lifting tasks (32.3%), with minimal impact on personal care and employment. Statistically significant associations were found between LBP and SIJD ($p = 0.048$), LBP and functional disabilities ($p = 0.000$), and SIJD and functional disabilities ($p = 0.019$). Sacroiliac joint dysfunction was highly prevalent among dairy farmers with low back pain, significantly contributing to related functional disabilities. The findings emphasize the need for targeted ergonomic interventions and preventive measures to address occupational risk factors.

Keywords: Dairy farmers, Functional disabilities, Low back pain, Musculoskeletal disorders, Occupational health, Sacroiliac joint dysfunction, Work-related injuries

O-156

Streptomyces Albus: A Promising Strategy For Controlling Poultry Diseases

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Abstract:

Actinomycetes play a vital role in scientific society. They possess small hyphae, and pharmacologically, these bacteria are renowned because of their potential bioactive metabolites, which help inhibit pathogens and parasites. Various types of antibiotics used to treat infections have been derived from the Streptomyces genus. Poultry is the most important protein source for human beings. However, different types of diseases have increased in recent years. Coccidiosis, necrotic and enteritis, and other diseases greatly destroy the poultry birds' health. Streptomyces can be used as a probiotic to improve the prebiotic functions in birds. These bacteria are naturally present in the gastrointestinal tract of birds and support immune functions. Streptomyces albus is an Actinomycete bacterium and is used for the synthesis of different types of antimicrobial agents. This bacterium produces metabolites to

break the cell membrane of the pathogen, block RNA replication and also inhibit the transcription process. Avermectin is an antiparasitic antibiotic synthesized by *Streptomyces avermitilis*, but *S. albus* synthesizes butenolide metabolites to trigger avermectin synthesis in *S. avermitilis*. Thus, its application could contribute to improved birds' health, reduced drug residues in poultry products, and mitigation of antimicrobial resistance risks. Further studies are recommended to optimize dosage, delivery methods, and large-scale application in commercial poultry systems.

Keywords: Actinomycetes, *Streptomyces albus*, Bioactive compounds, poultry, Diseases

O-157

Effect of Electrospun Polymers on Biofilm Formation of Medical Devices

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Abstract:

New strategies are required to control biofilm formation because prevalence rate of biofilm associated infection is 65-80 %. Present study provides base line data to coat medical implants with suitable polymer nanofibers to reduce multi drug resistance due to biofilm formation and implant associated infections. Polymer solution which is blend of Chitosan/poly vinyl alcohol/ sodium alginate (0.9%/5%/0.1%) was prepared and subsequently electrospun on glass beads. Characterization studies of nanofibers via SEM and FTIR was also carried out in this study. Results of Scanning electron microscopy concluded that nanofibers formed of diameter 120nm to 250nm, while Fourier transform infrared microscopy explained successful interaction between chitosan and sodium alginate. Effect of different concentrations of CSP solution and nanofibers were observed on antibacterial activity and biofilm formation against multi drug resistant and biofilm forming strains of *E. coli*, *V. cholerae* and *S. aureus*. Results showed that polymer solution had strong antibacterial activity against all bacteria. *S. aureus* was most susceptible showed 2 log reduction. Biofilm formation was also reduced by the polymer solution as well as nano fibers coated over glass beads. *E. coli* was most affected by coated nanofibers as reduction in biofilm formation with polymer solution was 23%, which was increased to 98.12% after nanofibers formation. Results concluded that this polymer solution nanofiber can be successfully coated over medical implants to avoid biofilm formation. In future the nanofibers of combination of different drugs and blend of polymer solution can be coated over medical devices to prevent infections due to formation of biofilm on these devices, moreover results can be compared of the nanofibers of these drugs combination with blend of polymers to avoid biofilm formation on medical devices.

Keywords: Biofilm, Implant, Electrospinning, Nanofibers, Biofilm Formation, Multi Drug Resistance, Antibacterial

O-158

Aptamer Decorated Diblock Nanoscaffolds For Targeted Cancer Therapy

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Abstract:

Aptamer-decorated diblock nanoscaffolds represent a promising strategy for targeted cancer therapy, combining the advantages of nanotechnology and molecular recognition. These systems are typically formed from amphiphilic diblock copolymers that self-assemble into nanoscale structures such as micelles or vesicles, featuring a hydrophobic core for drug encapsulation and a hydrophilic shell for enhanced stability and circulation. Functionalization with aptamers—short, single-stranded DNA or RNA molecules—enables specific binding to overexpressed receptors on cancer cells, facilitating active targeting. Upon systemic administration, these nanoscaffolds accumulate in tumor tissues via the enhanced permeability and retention effect and further improve selectivity through aptamer-mediated recognition. Following receptor binding, the nanocarrier is internalized into cancer cells, where environmental triggers such as acidic pH or enzymatic activity promote controlled drug release. This targeted delivery approach enhances therapeutic efficacy while minimizing off-target toxicity and side effects commonly associated with conventional chemotherapy. Despite challenges including aptamer stability, large-scale production, and tumor heterogeneity, ongoing advancements in polymer design and bioconjugation techniques continue to improve their clinical potential as a next-generation platform for precision oncology.

Keywords: Diblock Copolymer, Targeted Cancer Therapy, Targeted Drug Delivery, Nanomedicine Polymeric Nanoparticles, Receptor-Mediated Targeting, Cancer Nanotechnology

O-159

Nanocomposite of AS1411 and Noval Drug For Targeted Cancer Therapy

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Abstract:

Breast cancer remains a prevalent health challenge, underscoring the need for advanced therapeutic strategies that maximize efficacy while minimizing side effects. This study aimed to develop and characterize gelatin-based nanoparticles as carriers to improve efficacy and reduce side effects by using targeted delivery (Due to aptamer-AS1411) of anticancer potential of novel drug (SA24-3) in conjunction with Chlorine E6 (Photosensitizer), specifically for breast cancer therapy with photodynamic therapy (PDT). A factorial design was employed to optimize nanoparticle formulation. Comprehensive characterization of the nanoparticles included particle size, zeta potential, and morphological assessments using scanning electron microscopy (SEM), confirming smooth, spherical particles. Fourier-transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) were conducted to validate drug incorporation and assess molecular interactions, confirming the amorphous state of the encapsulated drugs. Cytotoxicity was evaluated against the MCF-7 breast cancer cell line using the MTT assay, confirming significant anticancer activity. The chick chorioallantoic membrane (CAM) assay and RBC aggregation studies under PDT conditions revealed effective anti-angiogenic properties and enhanced oxygen delivery, crucial for photodynamic efficacy. Additionally, in vivo toxicity assessment demonstrated no adverse effects on blood parameters or major organs, reinforcing the formulation's safety profile. This research work demonstrates the potential of aptamer (AS1411) guided Novel anti-cancer drug (SA24-3) and Chlorine E6 loaded polymeric nanoparticles as a multifaceted and targeted approach for breast cancer treatment, leveraging biocompatibility, photodynamic synergy to improve therapeutic outcomes. These findings provide a foundation for further clinical investigations, with the potential to impact future breast cancer therapy.

Keywords: Aptamer (AS1411), Novel drug (SA24-3), Chlorine E6, photodynamic therapy, polymeric nanoparticles, breast cancer

O-160

Elucidating Silicon-Mediated Distinct Morpho-Physio-Biochemical Attributes and Organic Acid Exudation Patterns of Cadmium Stressed Ajwain (*Trachyspermum Ammi* L.)

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Abstract:

Soil contamination with toxic heavy metals such as cadmium (Cd) is becoming a serious global problem due to rapid development of social economy. Silicon (Si), being an important fertilizer element, has been found effective in enhancing plant tolerance against biotic and abiotic stresses. The present study investigated the extent to which different levels of Si modulated the Cd tolerance of Ajwain (*Trachyspermum ammi* L.) seedlings when maintained in artificially Cd spiked regimes. A pot experiment was conducted under controlled conditions for four weeks, by using sand, mixed with different levels of Cd i.e., 0, 1.5 and 3 mM together with the application of Si at 0, 1.5 and 3 mM levels to monitor different growth, gaseous exchange, oxidative stress, antioxidative responses, minerals accumulation, organic acid exudation patterns of T. ammi seedlings. Our results depicted that Cd addition to growth medium significantly decreased plant growth and biomass, gaseous exchange attributes and minerals uptake by T. ammi seedlings as compared to the plants grown without addition of Cd. However, Cd toxicity boosted the production of reactive oxygen species (ROS) by increasing the contents of malondialdehyde (MDA), which is the indication of oxidative stress in T. ammi seedlings and was also manifested by hydrogen peroxide (H₂O₂) contents and electrolyte leakage to the membrane bounded organelles. Although, activities of various antioxidative enzymes like superoxidase dismutase (SOD), peroxidase (POD), catalase (CAT) and ascorbate peroxidase (APX) initially increased up to a Cd level of 1.5 mM but were significantly diminished at the highest Cd level of 3 mM. Results revealed that the anthocyanin and soluble proteins contents were decreased in seedlings grown under elevating Cd levels but increased the Cd accumulation of T. ammi roots and shoots. The negative impacts of Cd injury were reduced by the application of Si which increased plant growth and biomass, improved photosynthetic apparatus, antioxidant enzymes, minerals uptake together with diminished exudation of organic acids as well as oxidative stress indicators in roots and shoots of T. ammi by decreasing Cd retention in different plant parts. Our research suggested that Si application can ameliorate Cd toxicity in T. ammi seedlings and resulted in improved plant growth and composition under metal stress as depicted by balanced exudation of organic acids.

Keywords: Metal Stress, Silicon, Oxidative Damage, Antioxidative Machinery, Essential Nutrients, Oil Seed Crop, Root Exudations

O-161

The Neuroprotective Potential Of Gerbera Jamesonii in A Neuronal Demyelination Rat Model Through The Modulation Of Interleukins, Cyclooxygenase and Tumor Necrosis Factor-A

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Abstract:

Multiple sclerosis is characterized by the demyelination of neurons, which is a chronic inflammatory disease of the central nervous system. This autoimmune disorder occurs due to an imbalance in the body's immune system as a result of uncontrolled oxidative stress. The B and T lymphocytes cross the blood–brain barrier and destroy the myelin sheath. Multiple sclerosis is one of the most common causes of disability in young adults affecting approximately 3 million individuals worldwide. Among them, females are considered at higher risk than males. It disrupts the normal functioning of life badly and major symptoms include loss of sensation, poor vision, impaired hearing, and cognitive abnormalities. Several treatments and drugs have been used to treat this medical condition, but they pose serious side effects also. So, the need of the hour is to explore such natural bioactive compounds that have neuroprotective properties, thus leading to the treatment of neurodegenerative disorders. Among various plants with medicinal properties, *Gerbera jamesonii* is a plant that exhibits antioxidant, anti-inflammatory, and neuroprotective properties. To enhance its therapeutic potential, this study aimed to load its ethanolic extract into solid-lipid nanoparticle formulations (SLNs), which is an innovative approach for treatment because nanoparticles provide effective targeted drug delivery due to their extremely small size. Solid-lipid nanoparticles were prepared using the emulsification–solvent evaporation method. For experimental design, 30 Wistar rats were randomly divided into seven groups (n=10): normal, demyelination disease model, standard drugs, dimethyl fumarate and fingolimod (FTY 720) 15 mg/kg, and three treatment groups: GJ-NPs 250 mg/kg, 500 mg/kg, and 750 mg/kg. Prior to treatment, 0.2% cuprizone solution was prepared for the induction of multiple sclerosis in all groups except the normal group for 42 days. Biochemical analyses such as determination of inflammatory biomarkers and antioxidant enzymes were performed. The plant extract was subjected to HPLC to examine its phenolic compounds which are active in healing neurodegeneration. Physiological changes in rats were observed such as motor dysfunction and anxiety-like behavior caused by cuprizone. Behavioral tests showed significant improvement of motor function, muscular coordination, and enhanced cognitive abilities in the treatment groups as compared to the demyelination disease model. Histopathology of the rat brain regions showed significant differences in the normal and demyelinated areas. The results showed that GJ-NPs treated demyelination, modulating oxidative stress manifested by pro-inflammatory cytokines TNF- α , IL-6, A β PP, α -synuclein, NF-KB, etc., thus restoring the levels of antioxidant enzymes to normal range.

Keywords: Multiple sclerosis, Demyelination, *Gerbera jamesonii*, Solid lipid nanoparticles, Ethanolic extract, Oxidative stress, Neuroinflammation

O-162

**Review Of Antioxidants Capabilities Of Leaf Extracts And Synthesized Silver Nano Particles
Of Tradescantia Pallida**

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Abstract:

In recent years, oxidative stress has garnered significant research interest. This phenomenon, caused by an imbalance between the generation and removal of reactive oxygen species (ROS) within cells, is a primary contributor to various human pathologies, including Alzheimer's and Parkinson's diseases. Consequently, identifying effective antioxidants to combat ROS has become a critical research priority. Plant extracts are extensively studied for this purpose, as they contain high concentrations of natural antioxidants such as anthocyanins, carotenoids, flavonoids, and vitamins C and E. Concurrently, advancements in nanotechnology have enabled the manipulation of materials at the nanoscale, facilitating the eco-friendly green synthesis of nanoparticles using these plant extracts. *Tradescantia pallida*, an ornamental plant belonging to the Commelinaceae family, possesses leaf extracts with notably high antioxidant capacity. Utilizing the principles of green chemistry, these extracts have been successfully employed to mediate the synthesis of silver nanoparticles. The aim of this review is to comparatively evaluate the antioxidant capabilities of raw *T. pallida* leaf extracts versus green-synthesized *T. pallida*-mediated silver nanoparticles, synthesizing data from various literature sources. Ultimately, the literature suggests that the synthesized nanoparticles exhibit superior ROS-scavenging abilities compared to the crude leaf extract.

Keywords: *Tradescantia pallida*, Silver Nanoparticles (AgNPs), Green synthesis, Oxidative stress, Antioxidants, Reactive Oxygen Species (ROS)

O-163

Oleanic Acid Attenuate Complete Freund Adjuvant-Induced Arthritis In Rats Via Targeting The RANKL/OPG Signaling Pathway

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Abstract:

Rheumatoid arthritis (RA) is an inflammatory arthropathy involving the structural destruction of articular bone and cartilage due to inflammation in synovium resulting in joint pain. Metacarpophalangeal and proximal interphalangeal joints are most commonly involved. RA is treated with biological and synthetic Disease-modifying Antirheumatic Drugs (DMARDs) along with steroids. Nanomedicine has played a crucial role in improving the efficacy of treatment by controlling the release of pharmacologically active ingredients to increase bioavailability and targeted delivery of drugs. Oleanic acid were given orally in rats for 21 days to treat CFA (Complete Freund Adjuvant) induced RA. Rats were divided into four groups. On the 21st day, blood samples were collected for evaluation of COX-2, RA factor, IL-6, and TNF- α . Gene expression analysis was performed to evaluate the IL-4, IL-17a, IL-6, INF- γ , TNF- α , IL-1b, OPG, and RANKL. The data was subjected to statistical analysis by applying one-way ANOVA and Tukey test. Gene expression studies revealed that mRNA levels of IL 1 β , IL-6, IL 4, IL-17a, RANKL, INF γ , and TNF- α showed a significant difference in the CFA group compared to the control group. It was concluded that oleanic acid exhibited the increased therapeutic efficacy in CFA induced arthritis in rats.

Keywords: Rheumatoid arthritis, inflammatory markers, Oleanic acid

O-164

Formulation And Optimization Of Fast Dissolving Microneedle Patch For Transdermal Delivery Of Granisetron HCl

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Abstract:

Management of chemotherapy-induced nausea and vomiting remains challenging due to limitations of conventional drug delivery, including poor oral tolerance and the invasiveness of intravenous administration. To address these issues, a polymeric fast-dissolving microneedle patch (G-FDM) was developed for transdermal delivery of Granisetron HCl. The formulation was optimized using a 3-level factorial design and extensively characterized. The optimized formulation (G-FDMo) exhibited strong mechanical properties and excellent structural integrity, confirmed by SEM, FTIR, DSC, and XRD analyses. It demonstrated high drug loading efficiency ($97.2\% \pm 1.53\%$) and uniform drug distribution ($RSD = 1.73\%$). In vitro release studies showed an initial burst followed by sustained release, achieving 91.73% drug release over 24 hours. Ex vivo permeation studies using rat skin indicated enhanced drug flux ($11.76 \mu\text{g}/\text{cm}^2/\text{h}$), confirming effective penetration of the stratum corneum. Additionally, insertion studies in a skin-simulant model demonstrated adequate penetration depth ($\sim 500 \mu\text{m}$), while biocompatibility assessment showed only mild, transient irritation. Overall, the developed fast-dissolving microneedle patch represents a promising, non-invasive, and patient-friendly alternative for delivering Granisetron HCl, with potential to improve the effectiveness of antiemetic therapy.

Keywords: Granisetron Hcl, Granisetron Hcl, Fast-Dissolving Microneedles, Transdermal Drug Delivery, Chemotherapy-Induced Nausea, Polymeric Microneedle Patch

O-165

Curcumin Loaded Microemulsion as a Nanodelivery System to Enhance Solubility And Biological Performance

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Abstract:

Water solubility, which limits its absorption and bioavailability in the body. This study aimed to develop and characterize stable microemulsions (MEs) to enhance the solubility of curcumin in oil in water (o/w) microemulsion and facilitate its absorption in the body. Curcumin-loaded MEs were developed with the aim of improving topical delivery and its pharmacological activity (anti-inflammatory). The pseudoternary phase diagram was constructed to determine the desired microemulsion region. The prepared MEs (ME1-ME5) were evaluated for pH, viscosity, particle size, electrical conductivity, zeta potential, and ex vivo drug permeation. The optimized ME formulation was selected based on particle size and further evaluated for its biological activity (in vitro/vivo). Geranium oil, Tween 80 (as surfactant) and propylene glycol (as cosurfactant) were selected based on their solubility to formulate MEs. The optimized ME formulation (ME5), with a composition of 20:50:30 (Geranium oil : Tween 80 : Propylene glycol), exhibited a pH of 4.36 ± 0.057 , a conductivity of $40.06 \pm 0.05 \mu\text{S}/\text{cm}$, a viscosity of $165 \pm 0.37 \text{ mPas}$ and a droplet diameter of $199.39 \pm 0.017 \text{ nm}$. Ex vivo permeation study demonstrated a significant cumulative amount of curcumin permeated within 24 h and a flux of $130.91 \pm 0.02 \mu\text{g}/\text{cm}^2/\text{h}$. Antioxidant activity demonstrated that curcumin loaded microemulsion (ME5) exhibited higher scavenging activity (99.27

± 0.021 %) than blank microemulsion (94.67 ± 0.001 %). Optimized curcumin loaded microemulsion (ME5) exhibited a zone of inhibition of 25.18 mm and 28.37 mm against *E. coli* and *S. aureus*, respectively. Among the cell lines tested, higher concentration of ME5 showed the greatest cytotoxicity with % viability of 8.22 ± 1.09 %. The optimized ME5 exhibited significant in vivo anti-inflammatory activity, with $93.29 \pm 0.030\%$ inhibition in the carrageenan-induced paw edema model (6-hour study) and $88.39 \pm 0.002\%$ inhibition in the formalin-induced paw edema model (14-day study). In conclusion, the developed microemulsion system successfully addressed the solubility challenge of curcumin and enabled the effective topical delivery, unlocking its potential for anti-inflammatory application.

Keywords: Curcumin, Microemulsion, Topical Drug Delivery, Anti-Inflammatory Activity, Ex Vivo Permeation

O-166

Design, Optimization, and In-Vitro Evaluation of Floating Micro-Carriers for Antihypertensive Drug Delivery of Furosemide

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Abstract:

Hypertension requires sustained and effective drug delivery to maintain optimal blood pressure control. However, drugs like furosemide exhibit a narrow absorption window in the upper gastrointestinal tract, leading to reduced bioavailability and therapeutic variability. This study aims to develop a gastro-retentive floating microparticle system to enhance the oral delivery and antihypertensive efficacy of furosemide. Floating microparticles were prepared using the solvent diffusion-evaporation method with ethyl cellulose, stearyl alcohol, Gelucire 43/01, and Eudragit E100, while Tween 80 served as a surfactant. The formulations were designed to prolong gastric residence time and provide sustained drug release for improved hypertension management. The prepared microparticles remained buoyant for up to 24 hours in simulated gastric fluid. Characterization studies including drug loading, encapsulation efficiency, particle size analysis, SEM, DSC, XRD, FTIR, and in-vitro release were performed. Encapsulation efficiency ranged from 14–88%, with particle sizes between 216–400 μm . SEM confirmed pore formation due to Eudragit E100, facilitating controlled release. Thermal and structural analyses indicated no drug-polymer interaction and conversion to an amorphous form. In-vitro release studies demonstrated sustained drug release, following the Korsmeyer–Peppas model at pH 1.2. The developed system shows potential to improve bioavailability, reduce dosing frequency, and enhance therapeutic outcomes in hypertension management.

Hypertension requires sustained and effective drug delivery to maintain optimal blood pressure control. However, drugs like furosemide exhibit a narrow absorption window in the upper gastrointestinal tract, leading to reduced bioavailability and therapeutic variability. This study aims to develop a gastro-retentive floating microparticle system to enhance the oral delivery and antihypertensive efficacy of furosemide. Floating microparticles were prepared using the solvent diffusion-evaporation method with ethyl cellulose, stearyl alcohol, Gelucire 43/01, and Eudragit E100, while Tween 80 served as a surfactant. The formulations were designed to prolong gastric residence time and provide sustained drug release for improved hypertension management. The prepared microparticles remained buoyant for up to 24 hours

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Keywords: Furosemide, Floating Microparticles, Gastro-Retentive Drug Delivery, Sustained Drug Release, Bioavailability Enhancement, Controlled Release, Hypertension

O-167

Passive Media Use And Suicidal Ideation Among Older Adults: The Mediating Role Of Loneliness And Social Isolation

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Abstract:

Social media use is rapidly increasing; concerns have emerged regarding its psychological impact on mental health that may leads to suicidal ideation particularly in older adults who may be vulnerable to social isolation and loneliness. Passive social media use, characterized by no interactive browsing (Frison & Eggermont, 2020) has been linked to negative psychological outcomes such as loneliness: A discrepancy between a person's desired and actual social relationships (Shvedko et al, 2018), social isolation: The objective absence of contacts and interactions between a person and a social network (Shvedko et al, 2018) and suicidal ideation: Thoughts, considerations, or planning of suicide ranging from a passive wish to be dead (StatPearls, 2025). The role of passive media use on suicidal ideation in older adults with mediating effect of loneliness and suicidal ideation is examined in this study. A cross-sectional study (N= 200) was conducted on older adults of urban and rural areas belongs to different occupational status of Faisalabad, which focused on hypothesis testing through correlation, regression, and mediation analysis. To identify mode of social media use, social isolation, loneliness and suicide risk by using validating measures including Friendship Scale (Hawthorne 2006), Social Media Activity Questionnaire (SMAQ; Ozimek et al., 2023), UCLA Loneliness Scale (Russell, 1996) and Suicide probability scale (Cull and Gill 1982). The findings reveal meaningful and statistically significant relationships among the scales employed in the study. Analysis shows significant positive correlation between passive media use and suicidal ideation. The mediation was analyzed using Hayes' PROCESS Macro Model 6 (Hayes, 2018). The loneliness partially mediates the passive media use and suicidal ideation while social isolation shows no mediation. Finding, May highlights the impact of passive media use in increasing loneliness within Pakistani cultural context including different demographic variables as living arrangement, employment status and age group. Limitation includes self-report bias and regional specificity. Further studies should include longitudinal studies, additional mediator and objective screen time matrix.

Keywords: Passive Scrolling, Social Isolation, Loneliness, Suicidal Ideation, Older Adults

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Phytochemicals as Anti-Arthritic Agents: Mechanistic Pathways and Therapeutic Potential

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Abstract:

Rheumatoid arthritis (RA) is a chronic autoimmune disorder characterized by persistent synovial inflammation, cartilage destruction and joint deformity. Conventional treatment, including non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids and antirheumatic drugs of modifying diseases (DMARD), often lead to adverse effects and limited long-term efficacy. The phytochemicals proved to be promising anti-arthritic agents due to their versatile mechanisms of action and lower toxicity. This abstract examines the mechanistic pathway and the therapeutic potential of different phytochemicals in the treatment of RA. Important bioactive compounds, including flavonoids (quercetin, hesperetin), polyphenols (curcumin, resveratrol), alkaloids (berberin), terpenoids (boswellinic acids) and saponins, show potential anti-inflammatory, immunomodulatory and chondroprotective effects. These compounds modulate critical signaling pathways such as nuclear factor-kappa B (NF- κ B), mitogen activated protein kinase (MAPK), Janus kinase/signal transducer and transcription activator (both/JAK and STAT) and phosphoinositide 3-kinase/protein kinase B (PI3K/AKT), thereby inhibiting pro-inflammatory cytokines (TNF- α , IL-6, IL-1) and oxidative stress and at the same time promotes the repair of cartilage. Their ability to regulate the intestinal microbiota and the epigenetic modification further increases their therapeutic efficiency. Despite promising preclinical and clinical evidence, they reduce challenges such as biological availability, pharmacokinetics and standardization, their clinical translation. Advances in nanotechnological and drug systems, including nanoparticles and liposomes of pickled phytochemicals, offer these challenges a potential solution. This abstract emphasizes recent findings, discusses current restrictions and proposes future directions for the integration of phytochemicals into the treatment of traditional arthritis. The use of these natural compounds through innovative formulations can provide safer and more efficient RA management alternatives.

Keywords: Rheumatoid Arthritis, Phytochemicals, Inflammation, Signaling Pathways, Nanotechnology, Drug Delivery

O-169

Functional Characterization of Spray Dried Walnut Oil

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Abstract:

Walnuts are vital components of a healthy diet that aid in the prevention of major diseases because they are good sources of dietary fiber and micronutrients. They provide biological system with vital nutrients, vitamins, and minerals that support overall health and wealth being. In human diet, it can boost the immune system reduce the risk of chronic diseases, and improve digestion. Spray dried walnut oil can be a valuable functional ingredient may be due to its enhanced stability and versatility in various food applications. The spray drying process encapsulates the walnut oil within a protective matrix

typically composed of carbohydrates and proteins, which shields the sensitive fatty acids from oxidation. This encapsulation not only extends the shelf life of the walnut oil but also improves its handling properties, making it easier to incorporate into powdered or dry formulation. Additionally, spray dried walnut oil retains the rich nutrient profile of raw walnut oil including its high levels of omega 3 fatty acids, antioxidants, and vitamins, which contribute to its health benefits. Its application in food products, such as nutritional content providing a convenient way to integrate the health benefits of walnut oil into a variety of diets. This project was designed to investigate the functional characterization of spray dried walnut oil. Extraction of walnut oil was analyzed in terms of different parameters peroxide value and free fatty acids. Using the RSM design, a total of 11 observations were made. The functionality and quality of the spray product were impacted by minute changes in parameters such as temperature and wall material concentration. Following ingredient analysis, spray-dried walnut oil powder was used to create the functionally augmented product. The amount of spray-dried walnut oil powder in the cookies varies, ranging from 0.025% to 0.5% to 0.1%. 1.25, 1.25, and 1.75 percent. Physical characteristics were also examined after production, and the results showed that, compared to other ratios of supplementations, the cookie with an SDWOP of roughly 0.75% to 1.0% had more stable and long-term acceptable qualities.

Key words: Walnut oil, Omega 3, Characterization, Spray-dried, SDWOP

O-170

Phytochemical Characterization and Antioxidant Potential of Canola Meal Polyphenols via LC-ESI-QTOF-MS/MS Analysis

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Abstract:

As a protein-rich byproduct obtained from the processing of edible oils canola meal is becoming increasingly recognized for its ability to provide an abundant source of phenolic compounds with promising pharmaceutical and nutritional applications. In this study, we aimed at performing an extensive examination of canola meal phenolics by means of antioxidant determination and bioactive profile characterization using LC-ESI-QTOF-MS/MS. The total phenolic contents were determined via the Folin Ciocalteu assay, while the antioxidants were measured through DPPH, ABTS, FRAP, and ORAC assays. Through high-resolution LC-ESI-QTOF-MS/MS analysis we were able to identify and characterize different bioactive compounds such as phenolic acids, flavonoids, hydroxycinnamic acid derivatives, and sinapic acid derivatives. Among the major compounds isolated were sinapic acid and its analogs, caffeic acid esters, p-coumaric acid, quercetin glycosides and other phenolic secondary metabolites which possess antioxidant, anti-inflammatory and cardio protective effects. The results clearly suggest that canola meal is a potential candidate for the extraction of natural antioxidants and bioactive secondary metabolites for various applications in functional foods and drug development. The utilization of canola meal for polyphenols extraction is beneficial not only from an economic

perspective but also from the concept of sustainable development and circular bioeconomy perspectives. In addition, the application of LC-ESI-QTOF-MS/MS technique plays a crucial role in compound identification, and this study will help in future drug discovery and functional food development.

Keywords: Agro-Industrial By Products, Bioactive Compounds, Antioxidant Activity, LC-ESI-QTOF-MS/MS, Phytochemical Profiling, Circular Economy

O-171

Dysbiosis in Inflammatory Bowel Diseases and its Nutritional Management

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Abstract:

Inflammatory bowel disease is chronic inflammation which is continuously relapsing. It has two major forms, Crohn's disease and ulcerative colitis. Different factors including epigenetics contribute towards it. Dysbiosis is also a great factor in IBDs. Disturbance in diversity of gut microbiota is referred as dysbiosis. Healthy gut has 99% firmicutes, Bacteroidetes, proteobacteria and actinobacteria. Decreased concentration of *B. fragilis* and *B. vulgatus* leads towards inflammation. A lot of factors lead towards dysbiosis. These factors include diet, dietary fibers, antibiotics, probiotics, oxidative stress and sulfate concentration. Dysbiosis can be managed by nutritional component management. By changing dietary patterns from animal-based diet to plant-based diet helps much. Probiotics produce short chain fatty acids to maintain gut microbial stability. Fermented food has a positive impact on gut health as it forms bioactive metabolites in gut microbes that modulates immune system of gut. Dietary fish oils that are enriched in poly-unsaturated-fatty acids are found very beneficial for dysbiosis in IBDs. Non-absorptive and non-digestible fibers that are being fermented into short chain fatty acids in colon by gut microbiota are energy substrate of colon cells. Vitamin D is also very important to improve dysbiosis due to its anti-inflammatory properties. Micronutrients are required by gut microbiota for their proper functioning. It may also elevate inflammation or modulate structure and function of gut microbiota. Figs improve composition of gut microbiota and increases the production of short chain fatty acids. Kiwis also have a positive impact on clonal gut microbiota. Dried plums and prunes are enriched in dietary fibers pectins, cellulose, hemicellulose and lignins. They regulate short chain fatty acids. Dried apricots are also enriched in fibers. They also contribute in anti-inflammation. Flaxseeds are enriched in fibers and omega-3 fatty acids that improves dysbiosis in IBDs patients. Breastfeeding is critical for development of healthy gut microbiota. Glucose, fructose, sucrose, lactose, polyos, sorbitols, mannitol, xylitol and maltitol all are fermentable sugars and increases intestinal absorption, dysbiosis, gut permeability and inflammation. By avoiding red meat dysbiosis can also be cured.

Key Words: Dysbiosis, Short Chain Fatty Acids, Anti-Inflammatory, Gut Microbiota

O-172

Sports Diplomacy in a Divided World, Opportunities and Challenges for Indo-Pak Relations

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Abstract:

Sports diplomacy is a soft tactic in promoting harmony in diplomatic relations among states. The study aims to explore the role of sports in shaping Pakistan and India relations and also discusses the efforts made by both nuclear powers in order to restore peace and confidence. Various approaches are used to understand how sports diplomacy can work in improving Indo-Pak relations. The Objectives of this research is to assess the historical role of sports diplomacy in Indo-Pak relations and analyze the social, political, and security challenges hindering sports diplomacy, to explore potential opportunities in strengthening bilateral relations and evaluate whether sports diplomacy has a lasting impact on Indo-Pak relations. Due to the anarchic nature of the world where states are busy safeguarding their own interest and neglecting the needs and requirements of other nations, sports diplomacy faces several complicated challenges. The role and contribution of sports are highly influenced by some political, social, or economic factors. The ideological, social, and political differences between Pakistan and India made their bilateral relationship complex and volatile since their partition in 1947. Against such a historical backdrop, sports diplomacy emerged as a prominent tactic of soft power, providing them with other channels to communicate and reconcile. This research work is focused on exploring the potential of sports diplomacy in reforming and manipulating bilateral relations between Pakistan and India. The research work has revealed that sports especially cricket have long served as a catalyst to initiate reconciliatory measures but outcomes are highly dependent on the political environment. From 2004 India's tour of Pakistan and high profile semifinal contest at Mohali in 2011, sports diplomacy has achieved significant success in reducing tensions and encouraging people to people contact. Sports created informal diplomatic channels for political leaders to negotiate under less pressured circumstances to showcase peaceful gestures for local and international spectators

Keywords: Peace, Indo-Pak, Communication, Disputes

O-173

Investigating The Role of Proinflammatory Cytokines in the Pathogenesis of Rheumatoid Arthritis

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Abstract

Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by persistent synovial inflammation, leading to progressive joint destruction and disability. Proinflammatory cytokines play a pivotal role in the pathogenesis of RA by driving immune cell activation, synovial hyperplasia, and cartilage degradation. Among these, tumor necrosis factor-alpha (TNF- α), interleukin-6 (IL-6), and interleukin-1 β (IL-1 β) are key mediators that orchestrate the inflammatory cascade, leading to increased expression of matrix metalloproteinases and enhanced osteoclastogenesis. This study explores the intricate interplay of these cytokines within the inflammatory milieu of RA on disease

progression and current emerging therapeutic interventions. The dysregulation of cytokine signaling contributes to chronic inflammation and autoimmunity, with emerging evidence highlighting the role of Th17-driven interleukin-17 in exacerbating joint destruction. The therapeutic landscape of RA has been revolutionized by biologic agents targeting specific cytokines, including TNF inhibitors, IL-6 receptor blockers, and Janus kinase (JAK) inhibitors, underscoring the critical role of these molecules in disease modulation. Despite significant advancements, resistance to chemically synthesized therapies remain a clinical challenge, necessitating further research into novel plant-based strategies with minimum or no side effects.

Keywords: Proinflammatory cytokines, Rheumatoid arthritis, TNF- α , IL-6, Autoimmune inflammation, Biologic therapy

O-174

Preception and Awareness of Nano-Antibiotics Among Medical Students

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Abstract:

Nanotechnology enables targeted drug delivery, fewer side effects, and improved outcomes. Nano-antibiotics delivered via nanoparticles can enhance stability, bioavailability, and help fight antimicrobial resistance (AMR). Awareness among future healthcare providers is key for successful adoption. Descriptive cross-sectional study among 200 MBBS, Pharm-D, Nursing/DPT students using a 19-item questionnaire. Data analyzed in SPSS and expressed as percentages. 73.3% were aware of nano-antibiotics; internet (33.9%) and articles (24%) were main sources. 73.3% agreed they improve drug effectiveness, 70.8% said they reduce dosing frequency, and 50.7% believed they have fewer side effects. 95% saw them as a solution to AMR, 67.9% would recommend them, and 74.5% supported curriculum inclusion. Cost (57%) was the major barrier. Findings show promising awareness and positive attitudes toward nano-antibiotics but highlight moderate self-rated knowledge. Students recognize their role in combating AMR but cost concerns may limit adoption. Incorporating nanotechnology topics into curricula could bridge knowledge gaps and prepare students for future clinical use. Students had good awareness and perception but need more education and exposure to nanoformulations to ensure wider clinical acceptance.

Keywords: Nanotechnology, Nano-antibiotics, Awareness, Healthcare students

O-175

Combating Paediatric Pneumonia: The Dynamic Duo of Cinnamon-Clove Steam and Physiotherapy

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Abstract:

Paediatric community-acquired pneumonia (CAP) is a prevailing respiratory infection that impacts children in non-medical settings, giving rise to substantial morbidity and mortality, especially in less developed areas. The current study was aimed at finding a holistic approach for improving the

management and treatment of paediatric CAP. For that purpose, a comparative interventional study was conducted to investigate the effectiveness of chest physiotherapy (CPT) combining with *Cinnamomum varum* and *Syzygium aromaticum* steam therapy in paediatric CAP. A total of 60 paediatric patient hospitalised with CAP were assessed. The study included both male and female participants aged between three and 14 years. The study was conducted at Children Hospital and Institute of Child Health in Faisalabad, Pakistan. The subjects were divided into three equal groups: group 1 received CPT, group 2 underwent CPT accompanied with nebulization, and group 3 received CPT along with steam therapy using *C. varum* and *S. aromaticum*. Each participant received the assigned therapy twice a day for seven consecutive days. The study was approved and registered by Ethics Review Committee, Government College University, Faisalabad, Pakistan (Reference number GCUF/ERC/214). Among the three groups studied, those who received the combined therapy exhibited improved outcome by improving the complete blood count (CBC), spirometer index, arterial blood gases (ABGs) and Systolic blood pressure, Multi lobar infiltrates, Albumin, Respiratory rate, Tachycardia, Confusion, Oxygen and pH severity score for pneumonia. The antimicrobial, anti-inflammatory and mucolytic properties of cinnamon and clove, along with the positive effects of CPT, resulted in reduced lung inflammation, enhanced respiratory performance, and improved vital signs.

Keywords: Cinnamomum varum, Syzygium aromaticum, Chest physiotherapy, Community-acquired pneumonia, Inhalation therapy

O-176

Solvent-Driven Modulation of Physicochemical Properties and Dissolution Enhancement of Soluplus Based Solid Dispersions of Rosuvastatin Calcium

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Abstract:

Solid dispersions (SD) is a promising technology for improving dissolution and thereby bio availability of poorly soluble drugs. This study aimed to prepare SD of rosuvastatin calcium, a BCS class II drug, through solvent evaporation method using variable ratios of soluplus to achieve the objective of boosted solubility. Moreover, impact of polar protic solvents (acetone, MeOH and AC:MeOH) was also investigated to foresee the transformation of physicochemical properties. The prepared formulations were assessed for saturation solubility, in-vitro drug release, FTIR, XRD, DSC and SEM analysis. The results revealed that all SDs profoundly increased solubility as well as drug release. Among the optimized SD formulations, RSEB-10 with a remarkable increase of 34.95 fold in solubility presented 81.67% of drug release within 5 min in contrast to only 25% release of pure RoCa. Importantly, the role of solvent, though present in minute amounts after evaporation, could not be underrated and the combination of polar solvents noticeably influenced in potentiating the solubility of RoCa.

Keywords: Solubility Enhancement, Polar Protic Solvent, Solid Dispersion, Rosuvastatin Calcium

O-177

Role Of Gut Microbiota in the Pathogenesis and Management of Rheumatoid Arthritis

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Abstract:

The gut microbiota, a complex community of microorganisms residing in the gastrointestinal tract, has emerged as a critical player in the pathogenesis and management of rheumatoid arthritis (RA). RA is a chronic autoimmune disorder characterized by systemic inflammation, joint destruction, and immune dysregulation. Recent research highlights the bidirectional communication between the gut microbiota and the immune system, suggesting that microbial dysbiosis may contribute to the development and progression of RA. Specific microbial taxa, such as *Prevotella copri* and *Lactobacillus* species, have been implicated in promoting inflammation by altering gut permeability, activating immune responses, and generating pro-inflammatory metabolites. These mechanisms may trigger autoimmunity through molecular mimicry, epitope spreading, or bystander activation, leading to the production of autoantibodies like rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPAs). The gut microbiota also influences the efficacy of RA treatments. For instance, certain microbial profiles are associated with improved responses to disease-modifying antirheumatic drugs (DMARDs) and biologics. Additionally, interventions targeting the gut microbiota, such as probiotics, prebiotics, and dietary modifications, have shown promise in modulating immune responses and reducing disease activity. Fecal microbiota transplantation (FMT) is another emerging therapeutic strategy aimed at restoring microbial balance and ameliorating RA symptoms. Understanding the role of gut microbiota in RA opens new avenues for personalized medicine, enabling the development of microbiome-based diagnostics and therapies. However, challenges remain, including the need for large-scale longitudinal studies to establish causal relationships and the standardization of microbiome targeted interventions. Overall, the gut microbiota represents a pivotal factor in the pathogenesis of RA and offers potential for innovative management strategies, underscoring the importance of integrating microbiome science into rheumatology practice.

Keywords: Gut Microbiota, Rheumatoid Arthritis, Dysbiosis, Immune Dysregulation, Microbiome-Based Therapies, Autoimmunity

O-178

Medication Adherence, Clinical Outcomes, and Health-Related Quality of Life Among Pediatric Patients with β -Thalassemia Major Receiving Iron Chelation Therapy: A Multicenter Study from Punjab, Pakistan

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Abstract:

Thalassemia is a genetic disease affecting the blood cells, a severe health condition where the haemoglobin level is deficient compared to normal. To determine medication adherence, clinical outcomes, and health-related quality of life (HRQoL) in pediatric patients with β -thalassemia major receiving iron chelation therapy and to assess the relationships among these variables in thalassemic centers in Punjab. A prospective cross-sectional study was conducted among 622 pediatric patients at the thalassemia centers in Punjab, Pakistan. For data collection, the Treatment Adherence Scale (TAS) and PedsQL 4.0 Generic Core Scales were used. Clinical outcomes were assessed via hematological and iron overload parameters. Statistical analyses, including non-parametric tests, Friedman test to assess differences in clinical outcomes, multiple regression analysis to identify predictors, and Spearman's rank correlation to determine the relationship between adherence, clinical outcomes, and HRQoL. The total adherence score was 6 IQR (3-8). About 46 % of patients demonstrated low adherence to ICT. Clinical outcomes showed significant increases in hemoglobin and red blood cell levels, while serum ferritin remained elevated ($p < 0.001$). Younger age, urban residency, and deferasirox monotherapy were significantly associated with higher adherence and HRQoL ($p < 0.001$). The total QoL score was 67.3 IQR (50-84.4). Family history, deferoxamine use, and serum ferritin were identified as negative predictors of adherence and HRQoL, whereas urban residency, splenectomy, and higher adherence to ICT were positive predictors of HRQoL ($p < 0.05$). A significant positive correlation was found between adherence and HRQoL ($\rho = 0.420$, $p < 0.01$), while serum ferritin was negatively correlated with adherence ($\rho = -0.476$, $p < 0.01$) and HRQoL ($\rho = -0.329$, $p < 0.01$). Pediatric β -thalassemia patients reported moderate overall adherence to ICT. Clinical outcomes showed improvement in anemia and increased iron overload. HRQoL was moderately affected, especially in school functioning. Patients with low adherence had lower HRQoL and increased serum ferritin levels, reflecting suboptimal clinical outcomes.

Keywords: β -thalassemia major, iron chelation therapy, hemoglobin, serum ferritin, PedsQL, health-related quality of life

O-179

Genetic Insights into Primary Microcephaly in Consanguineous Pakistani Families: Discovery of Novel Variants and Shared Pathways with Neurodevelopmental Disorder

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Abstract:

Primary microcephaly (MCPH) is a rare neurodevelopmental disorder characterized by a smaller head size, structural brain abnormalities, and non-progressive intellectual disability. More than 30 genes have been linked to its cause. We examined the genetic basis of MCPH in consanguineous Pakistani families and its connection to other neurodevelopmental disorders (NDDs) such as autism spectrum disorder, intellectual disability, and developmental delay. Whole-exome sequencing with Sanger validation identified two new variants in *ERCC2* (c.2255G>A) and *ERCC6* (c.1178C>T), along with

known variants in *MCPHI* (c.1254delT) and *CENPJ* (c.18delC). Network-based clustering showed that MCPH-associated genes are functionally connected to broader NDD pathways. These results expand the known mutational spectrum of MCPH and highlight its shared genetic foundation with other NDDs, offering new insights into disease mechanisms and potential treatment options.

Keywords: Primary microcephaly, Neurodevelopmental disorders, Whole-exome sequencing, Consanguinity, Genetic variants

O-180

Statin-Loaded Hydrogel as a Novel Off-Label Therapeutic Strategy to Diabetic Wound Healing

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Abstract:

Chronic diabetic wounds are a significant clinical issue because of the impaired angiogenesis, long-term inflammation, and slow tissue repair. The recent developments in biomaterials have identified hydrogel-based drug delivery systems as promising therapeutic systems due to their high water content, biocompatibility, and capacity to deliver sustained drug release. Statins, which are mostly lipid-lowering agents, have shown considerable pleiotropic action, such as pro-angiogenic, anti-inflammatory, and antioxidant effects, thus, they are good candidates to be used in the off-label therapy of wound healing. Addition of statins like simvastatin to polymeric hydrogel has demonstrated increased wound contraction, collagen deposition and neovascularization in diabetic animal models. This study discusses the possibility of using statin-impregnated hydrogels as a novel topical dressing of diabetic wounds, including a discussion of its translational application to human wounds. The hydrogel network is also able to preserve a moist wound environment but also allows local, controlled statin release, reducing systemic exposure and side effects. There is emergent evidence that these systems have the ability to and do adjust the microenvironment of wounds, enhance cellular growth, and speed tissue remodeling. To sum up, statin-loaded hydrogels are an innovative and promising off-label therapeutic modality to treat diabetic wounds with potential to enhance the healing process and decrease the number of complications in clinical practice. Additional clinical trials should be conducted to confirm their safety and effectiveness in humans.

Keywords: Diabetic wound healing, Statins, Hydrogel, Off-label therapy, Angiogenesis, Tissue regeneration, Controlled drug release

O-181

Elucidating The Role of Nitrogen Regulator Area in Green Synthesis of Silver Nanoparticles by *Aspergillus Niger*: A Comparative Study

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Abstract:

Mycosynthesis of nanoparticles (NPs) has emerged as a sustainable and eco-friendly strategy, offering a simple, biocompatible, and cost-effective alternative to conventional chemical and physical methods.

Among filamentous fungi, *Aspergillus niger* is “Generally Regarded as Safe” and versatile cellular factory for industrial metabolites. In nanoparticle biosynthesis, NADH-dependent nitrate reductase (NR) is often considered a key reducing agent, though recent studies suggest that formation of NPs may also occur independent of NR activity. In this study, the role of NR in silver nanoparticle (AgNP) biosynthesis was evaluated by targeting the *A. niger* *areA* transcription factor using a CRISPR-Cas9 expression system. Both parent (*areA*⁺) and mutant (*areA*⁻) strains were used for the biosynthesis of AgNPs and were comparatively analyzed. A distinct surface plasmon resonance peak at 415 nm confirmed the formation of AgNPs. X-ray diffraction (XRD) revealed typical face-centered cubic (fcc) crystalline AgNPs. Moreover, Atomic Force Microscopy (AFM) revealed that AgNPs synthesized by the parent strain (15.26 nm) were smaller in size and uniformly distributed than mutant strain AgNPs (57.33 nm). Zeta potential analysis showed colloidal stability with the value of -11 mV for both strains. The average hydrodynamic diameter (51.02 d.nm) further reflected better stability and dispersity in the parent strain AgNPs compared to the mutant (182.16 d.nm), respectively. While, the Fourier Transform Infrared Spectroscopy (FTIR) spectra confirmed capping of NPs by fungal proteins and polysaccharides, indicating stabilization mediated by fungal biomolecules. These findings highlight the potential of *A. niger* as a reliable cellular factory for the green synthesis of AgNPs and provide new insights into the role of nitrate reductase-related pathways. In future these mycosynthesized AgNPs can be further evaluated for their antimicrobial potential and biomedical applications.

Keywords: Green Synthesis, CRISPR-Cas9, Area Transcription Factor, *Aspergillus Niger*, Silver Nanoparticles, Nitrate Reductase

O-182

Bridging Philosophy and Neuroscience: A Reassessment of the Mind–Brain Problem

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Abstract:

This paper examines the mind and brain problem by considering old philosophical ideas and advancements which are happening in neuroscience. The mind and brain problem is about how our thoughts and emotions are connected to what is happening in our brain. A time ago philosophers like René Descartes thought that the mind and body were separate entities. Now scientists who study the brain are claiming that our thoughts and feelings can be explained with reference to our brain. There is no denying the fact that science has made great advancements, but there are certain areas in which science alone cannot answer all the questions about the mind and brain problem. The paper analyzes the ideas from philosophers who think about the mind like David Chalmers, who talks about the "problem" of being aware of things. The argument goes beyond whether scientists who study the brain can explain why we have thoughts and feelings and why we are aware of things. The question also sparks at what happens when we say that our thoughts and feelings are things that happen in our brain. Does that mean that we do not really have control over what we think and do? The paper tries to find a way to bring together what we learn from science and what we learn from thinking about the mind. It claims that one should not just throw away what science tells us. In the end, the paper argues for an interdisciplinary approach in which philosophy and neuroscience are not competing but complementing each other in order to understand the relationship of mind and brain. This reassessment

aims to reopen the debate and questions in a way that is scientifically informed and philosophically rigorous.

Keywords: Mind–Brain Problem, Consciousness, Reductionism, Free Will, Philosophy–Neuroscience Integration

O-183

A Cross-Sectional Assessment of Mental Health, Cognitive Abilities, and Spiritual Well-Being During Ramadan Among Adults in Larkana City, Pakistan

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Abstract:

Ramadan fasting is linked to lifestyle, sleeping, and everyday routine alterations that can affect psychological well-being and cognitive abilities. Simultaneously, Ramadan-related heightened religious activity might positively influence spiritual well-being, which might have a protective effect on mental health. Nevertheless, a small body of community-based research has studied the interaction between the mental health, cognitive functioning, and spirituality in Ramadan in Pakistan. Objective: The purpose of the study was to evaluate the degree of psychological distress, cognitive functioning, and spiritual well-being of adults during Ramadan and to evaluate the relationships between these variables. Methods: A cross-sectional study was done on 402 adults in Larkana City in Pakistan based on community. The online survey was used to gather data in the form of a standardized instrument to measure depression, anxiety and stress, subjective cognitive difficulties and spiritual well-being. To analyze associations and predictors of psychological distress, descriptive statistics, Pearson correlation, independent sample t-tests, one-way ANOVA, and multiple linear regression analyses were done. Results: The mean age of the participants was 27.84 ± 7.92 years. In general, the psychological distress was mild to moderate and the mean scores were 10.87 ± 6.21 of depression, 9.74 ± 5.83 of anxiety, and 12.96 ± 6.48 of stress. Cognitive challenges were also indicated to be moderate, especially with regard to concentration, mental speed, and tasks that involve memory. Conversely, majority of the participants had high spiritual well-being. Correlation analysis revealed that there was a significant positive correlation between depression, anxiety and stress with cognitive difficulties ($p < 0.001$). There was a negative correlation between spiritual well-being and psychological distress and cognitive difficulties ($p < 0.001$). The depression, stress and anxiety scores were significantly lower and the spiritual well-being of participants who fasted during the Ramadan was higher than that of the non-fasting participants. Regression analysis revealed that the strongest predictor of psychological distress was cognitive difficulties with portentous significance of spiritual well-being. Conclusion: The results indicate that psychological distress is closely associated with cognitive problems, whereas spiritual well-being can play a significant protective role during Ramadan. These findings indicate the possible importance of spiritual practice in promoting mental health and cognitive functioning in adults throughout the fasting season.

Keywords: Ramadan Fasting, Mental Health, Cognitive Functioning, Spiritual Well-Being, Psychological Distress, Pakistan

O-184

Chrononutrition and Circadian Desynchrony during Ramadan: Assessing Meal-Timing Shifts, Social Jetlag, and Cognitive Burnout among Students at Medical Universities of Sindh: A Cross-Sectional Study

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Abstract:

The academic load on medical students in Sindh is already stressful, and Ramadan makes it even worse when sleep and eating schedules are reorganized completely. This paper examines how the changes in chrononutrition (i.e., Suhoor and Iftar times) induce circadian desynchrony and social jetlag, which result in cognitive burnout and headache. Although Ramadan has a spiritual advantage, the imbalance of biological processes and the demands of academics leads to serious physiological stress. To study these particular variables is essential to map and assist universities to create data-driven wellness policies regarding fasting students. Methodology: A descriptive cross-sectional study was conducted among 401 students at medical universities of Sindh, Pakistan, from January to March 2026. The survey was done through an online google form using validated tools for data collection: rMEQ to measure chronotype, MCTQ to measure social jetlag, CP-Q to measure meal times, and MBI-SS to measure cognitive burnout. The statistical analysis was done using the SPSS v27, and Chi-square tests were used to test the associations, Pearson correlations, independent t-tests, and multiple linear regression to determine the independent predictors of fasting-related symptoms and fatigue strictly. Results: Out of 401 students, 80.5% complained of sleep disruption. Wake-up shifts were highly influenced by Suhoor timing ($\chi^2=6543.6$, $p=.001$, $V=.577$), and meal timing affected biological rhythms. Headaches were highly predicted by sleep disturbance ($\chi^2=23.2$, $p=.001$; prevalence: 55.1%). Sleep disruption ($\beta=.36$, $p<.001$) and delay in falling asleep ($\beta=.24$, $p=.002$) were the best burnout drivers confirmed by regression. There were more fatigue levels among disrupted sleepers ($3.2\pm.8$ vs $2.5\pm.7$, $p<.001$). Conclusion: The delayed sleep stage of Ramadan is the biological reaction to the changed time of meals, leading to sleepiness in the morning (54.7%) and brain burnout. Morbidity due to fasting is highly motivated by circadian misalignment and sleep disturbance. These observations imply that wellness policies should be data-driven such as modified morning hours in medical universities in Sindh to support the special physiological and chrononutritional requirements of fasting students.

Keywords: Chrononutrition, Social Jetlag, Circadian Desynchrony, Cognitive Burnout, Ramadan

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Knowledge, Attitudes, and Practices Regarding Cervical Cancer Among Female Students in Larkana

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Abstract:

Cervical cancer is a major cause of morbidity and mortality due to oncology in developing countries, which is mainly caused by late diagnosis and insufficient preventive education. It is critical to assess the knowledge, attitudes, and practices (KAP) to influence future strategies in public health. The objective of the study was to evaluate the KAP of cervical cancer and preventive screening among the

females in Larkana. A descriptive cross-sectional study was carried out on 500 female students. The sample size was estimated using the Raosoft calculator, and a 95% confidence level with a 5% margin of error was set. The age range of the participants was 15 to more than 40 years, but the majority of the participants had an age below 40. The data collection was done through online google form through a structured questionnaire. All statistical tests such as the cross-tabulations, Pearson Chi-Square tests to test associations between socio-demographic variables and KAP parameters were done using SPSS version 23. Statistical results demonstrated that the most powerful predictors of basic awareness of cervical cancer ($X^2=30.280$, $p=0.001$) and the notion that the disease can be treated in case of early detection ($X^2=36.335$, $p=0.003$) are higher educational level. Education was the greatest influence on theoretical knowledge, but marital status was the greatest influence on actual preventative practice, with married participants being much more likely to have gone through clinical screening of some kind, including a Pap smear or VIA, than their unmarried counterparts (22.7% vs. 9.2%; $X^2=4.351$, $p=0.037$). Moreover, age was also a key factor in early detection awareness. The youngest group (15-20 years) showed the biggest discrepancy in their knowledge about routine screening procedures in comparison to older groups ($X^2=21.928$, $p=0.005$), which reveals a severe weakness in the youngest population. Conclusion: Although female students in Larkana have increasing knowledge of cervical cancer and its prevalence in the population, there are significant gaps related to particular screening guidelines and practical application of preventive interventions such as HPV vaccine. Educational interventions in the form of institution-based interventions are urgently needed to bridge basic awareness to actionable, proactive clinical practice amongst the younger unmarried groups.

Keywords: Cervical Cancer, KAP, Human Papillomavirus, Pap Smear, Larkana, Preventive Health

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Sustainable Biofortification Using Zn–GSH Improves Yield, and Nutritional Quality of Water-Stressed Maize: A Better Solution of Malnutrition Problem

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Abstract:

Water deficit stress is one of the major abiotic constraints limiting maize productivity and deteriorating nutritional quality, particularly in arid and semi-arid regions, causing malnutrition problem in consumers residing in these areas. Developing sustainable biofortification strategies to enhance crop resilience with improved grain nutritional value is therefore critically needed. In this context, a field experiment was conducted under water-deficit conditions using a split-plot arrangement to evaluate the effectiveness of foliar biofortification treatments including ZnSO₄, reduced glutathione (GSH), and Zn-GSH applied at the vegetative stage. The experiment was performed with four replications in duplicate to ensure statistical reliability. The results revealed that biofortification treatments significantly ameliorated the adverse effects of water stress by improving key yield attributes and mitigating the negative impacts of deficit irrigation on seed nutritional composition. Moreover, these treatments enhanced seed oil yield and improved oil quality parameters, including total phenolic content (TPC), total flavonoid content (TFC), tocopherols (Toc), and fatty acid composition. Biofortification also improved the seed oil physicochemical properties, indicating enhanced oil stability and nutritional

value. In addition, mineral profiling demonstrated substantial improvements in seed nutrient composition, including K, Ca, Mg, N, P, Mo, Mn, Fe, Zn, Cu, Cr, Cd, and Na. Notably, Zn accumulation was markedly increased, which is particularly beneficial for addressing zinc deficiency in human populations, a widespread global nutritional concern. Overall, the application of ZnSO₄, GSH, and Zn-GSH proved effective in enhancing water stress tolerance, improving yield performance, and enriching the nutritional quality of maize under deficit irrigation conditions. These findings highlight Zn-GSH-based biofortification as a promising and sustainable strategy to improve crop productivity, enhance nutritional quality, and contribute to combating global malnutrition especially Zn deficiency problems in consumers residing in arid semi-arid zones under present changing climatic conditions.

Keywords: Maize, yield, Nutritional quality, Seed Zn, Water stress, Oil quality

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Rewiring Parkinson's Therapy: Multi - Target Bioactive Compounds as Disease-Modifying Agent

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Abstract:

Parkinson's disease (PD) is the second most prevalent neurodegenerative disorder worldwide, characterized by progressive degeneration of dopaminergic neurons in the substantia nigra and the accumulation of α -synuclein aggregates. Although levodopa remains the gold standard for symptomatic management, long-term use is associated with motor complications and does not halt disease progression. Growing evidence suggests that natural products may modulate key pathological pathways involved in PD, including oxidative stress, neuroinflammation, mitochondrial dysfunction, and α -synuclein aggregation. This mini-review critically summarizes recent preclinical and emerging clinical evidence on bioactive compounds derived from traditional medicinal systems, including curcumin, baicalein, Withania somnifera, and Uncaria rhynchophylla. Mechanistic insights indicate their potential roles in regulating Nrf2 signaling, reducing neuroinflammation, and inhibiting protein aggregation. However, most evidence remains preclinical, and standardized clinical validation is limited. Future research should emphasize targeted modulation of α -synuclein pathology and Leucine-Rich Repeat kinase 2 activity, alongside well-designed clinical trials to establish translational relevance, particularly targeting early-stage neuroprotection before irreversible neuronal damage.

Keywords: Parkinson's disease, bioactive compounds, alpha-synuclein aggregation, neuroprotection, multi-target therapy, Nrf2 signaling, Leucine-Rich Repeat kinase 2

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Anti-Ulcerogenic and Anti-Inflammatory Potential of Ethyl Ascorbic Acid Protected Quercetin-Pantoprazole Pellets and its Polyphenolic Binding with Bovine Serum Albumin; *In-Vitro*, *In Vivo*, And In-Silico Analysis

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Abstract:

The objective of the recent study was to improve the potency of proton pump inhibitors (PPI) by antagonistic binding of quercetin (Quer) with bovine serum albumin (BSA) previously protected by newly synthesized ethyl ascorbic acid (EAA). Dually coated pellets (CPQ-P4a-d) of Pantoprazole (Pantop) and Quer were prepared by using EAA and Eudragit RL-100 (ERL-100) as inner and outer coats, respectively. Alkaline sensitivity, permeation properties, and DPPH scavenging activity of Quer and EAA were observed. Changes from the negative charge on the surface of uncoated pellets (UPQ-P4) to the positive charge in CPQ-P4a-d were observed and may be due to the presence of quaternary ammonium in ERL-100, which ultimately favored mucoadhesive behavior. Content uniformity and confirmation of the binding interaction in the form of hydrogen bonding of Pantop and Quer at site I and site III of BSA were observed by the newly developed High-performance Liquid Chromatography (HPLC) method and computational studies. Binding plots Stern-Volmer, Direct, Scatchard, Klotz, and Hitchcock provide complimentary information about the ligand-BSA interaction's nature, stoichiometry, and binding strength. Maximum absorbable dose (MAD) was 42±0.01%, paw edema inhibition was 83.1±1.12%, ulcer index rate was 82.12±1.42% and ulcer score turned to 0 and 1±0.04% with CPQ-P4d proved its anti-ulcerant effect which were calculated by the histopathological scoring model. Reduction in severity of ulcers and restoration of stomach pH, proved CPQ-P4d as an alternative of conventional treatment of gastric ulcers (GU) and atrophic gastritis (AG).

Keywords: Alkaline sensitivity, Binding interaction, Dual-coated pellets, Atrophic gastritis, Radiographic scans, Anti-inflammatory

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Preparation And Characterization of Colon Targeted Carboxymethyl Inulin Sulfadiazine Conjugated Pellets, Coated with Eudragit to Alleviate the Severity of Ulcerative Colitis in Albino Rats

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Abstract:

Among major complications of ulcerative colitis (UC), gut microbiota dysbiosis and chronic inflammation remain challenging, which can be addressed by prebiotic-assisted antimicrobial system. An attempt has been made to synthesize novel complex of Carboxymethyl Inulin- Sulfadiazine (CMI-SDZ) loaded sustained release (SR) pellets for targeted therapy of UC. Formation of CMI-SDZ was confirmed by FTIR and crystallinity revealed by XRD. DPPH antioxidant assay proved 70% scavenging activity further confirmed by reducing power assay. Prebiotic nature of CMI-SDZ confirmed for *L. rhamnosus* with enhanced antimicrobial activity against *E. coli*, *S. aureus* and *C. albicans* than SDZ alone. SR pellets of CMI, SDZ and CMI-SDZ were prepared using Eudragit-L100 and coated with Inulin-Eudragit RS-100 for targeted delivery in colon. In-vitro % drug release optimized formulations C-P1-CMI, C-P1-SDZ and C-P1-CMISDZ in a simulated colon fluid were 75, 84 and 79%, respectively. Acetic acid (AA) induced UC rat model tested UC treatment efficacy by assessing colitis activity index (CAI), histopathology, oxidative stress and inflammatory markers. Treatment with C-P1-CMI-SDZ increased levels of anti-inflammatory cytokine (IL-10) and antioxidant enzyme (GSH-Px), while reducing levels of inflammatory biomarkers (IL-6, IL-1 β , TNF- α , MPO, MDA and iNOS). Conclusively, C-P1-CMISDZ can be considered promising candidate to prevent dysbiosis and colon inflammation associated with UC.

Keywords: Ulcerative Colitis, Carboxymethyl Insulin, Sulfadiazine, Antioxidant Activity

O-190**Hepatoprotective And Anti-Fibrotic Effects of Euphorbia Hirta and Lepidium Sativum and Their Phytochemicals: An Integrated in Silico and in Vivo Investigation**

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Abstract:

This study aimed to assess the hepatoprotective and anti-fibrotic effects of extracts derived from *Euphorbia hirta* and *Lepidium sativum*, along with their bioactive phytochemicals, Kaempferol and Coumestrol, in a CCl₄-induced hepatic fibrosis rat model. An integrated in silico and in vivo method was used. Kaempferol and Coumestrol were identified as lead compounds in the molecular docking of 69 phytochemicals against IL-6, AKT1, EGFR, and Caspase-3. Sixty-four male albino rats were stratified into different groups, administered with plant extracts and phytochemicals (50 and 100 mg/kg), and liver function tests, hematological parameters, and histopathology were evaluated. Histopathological findings showed that high-dose Kaempferol and Coumestrol restored hepatic architecture with no necrosis, hemorrhage, or fatty changes. Biochemical analysis showed improved liver function across all treatment groups, with decreased levels of ALT, AST, ALP, and bilirubin compared to the intoxicated group. Hematologic outcomes revealed dose-related normalization of RBCs, hemoglobin, platelets, and WBCs with *L. sativum* extract. Overall, Coumestrol showed the strongest hepatoprotective effect, followed by Kaempferol, which had a higher hepatoprotective effect than that of the plant extracts. Kaempferol and Coumestrol demonstrated marked hepatoprotective and anti-fibrotic potential, suggesting their value as effective and economical natural therapeutic agents for the management of liver fibrosis.

Keywords: Anti-Fibrotic Agents, Coumestrol, Euphorbia Hirta, Hepatoprotection, Kaempferol, Lepidium Sativum

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Treatment of Inflammatory Bowel Disease using Curcumin-Loaded Self-Emulsifying Delivery System; Macroscopic and Microscopic Evaluation

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Abstract:

Poor local availability of drugs in the colon limits the therapeutic efficacy of Curcumin (Cur) in treating Inflammatory Bowel Disease (IBD). The present study aimed to develop Self-Emulsifying Drug Delivery System (SEDDS) to enhance stability, solubility and colon-targeted delivery of Cur. Based on preformulation studies, Lauroglycol FCC, Tween 80, Transcutol HP and Avicel were selected to prepare liquid and solid Cur-loaded SEDDS. The optimized formulation (S-Cur SEDDS) was evaluated by Z-average size (12.36 ± 1.04), zeta potential (-14.7 ± 1.08) and polydispersity index (0.155 ± 0.36) indicating uniform nano-sized dispersion. Physicochemical characterization of S-Cur-SEDDS using FTIR, DSC, TGA and XRD confirmed the stability of Cur within SEDDS. Morphological analysis via SEM and AFM demonstrated successful incorporation of Cur into SEDDS with increased surface roughness ($RMS\ 11.433 \pm 0.91\ nm$) compared to blank SEDDS. Acute toxicity studies, including organ weight ratio and hemolysis assay ($15.65 \pm 1.32\ %$ at high concentration of 600Mm) indicated that optimized formulation is safe at doses of 0.2-0.8 g/kg/day. The S-Cur-SEDDS showed significant in-vitro antioxidant ($68.54 \pm 1.42\ %$) and anti-inflammatory ($56.47 \pm 1.17\ %$) activities proving its therapeutic efficacy for IBD. In vivo evaluation of S-Cur-SEDDS in acetic acid-induced IBD albino rat models revealed marked reduction in disease activity index (DAI) and macroscopic ulcer score (MUS) from 4.15 ± 0.21 to 1.62 ± 0.12 at a dose of 15mg/kg/day, further supported by histopathological assay. In conclusion, S-Cur-SEDDS is a stable, safe and effective alternative for Cur delivery which significantly enhances its therapeutic potential for treatment of IBD.

Keywords: Curcumin, self-emulsifying drug delivery system, colon, acute toxicity, inflammatory bowel disease

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From Pain to Performance: Unlocking Frozen Shoulder, Comparative Efficacy of Neil-Asher and Spencer Muscle Energy Techniques

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Abstract:

Adhesive capsulitis, commonly known as frozen shoulder, is a painful condition marked by stiffness and limited shoulder range of motion (ROM), significantly affecting daily activities and quality of life. Although various studies highlight the benefits of electrotherapy and manual mobilization for adhesive capsulitis, limited research has directly compared the effectiveness of the Niel-Asher Technique and muscle energy technique. Aims/objective: To compare the effect of the Niel-Asher technique and muscle energy technique on pain, active range of motion, and functional disability in patients with adhesive capsulitis. Materials and Method: A total of 30 patients aged between 40 and 65 years were selected using purposive sampling and then randomly assigned into two groups. Group A received treatment using the Niel-Asher Technique (NAT), while Group B underwent the Spencer Muscle Energy Technique (SMET). Both groups received their respective treatments twice weekly for a duration of six weeks. Pain intensity, shoulder ROM, and functional ability were measured before and after the intervention using standard scales and goniometric assessment. Results: Both techniques showed significant improvement in pain reduction, ROM, and shoulder function. However, NAT demonstrated greater improvements in pain relief and in internal and external rotation ROM compared to SMET. Conclusion: The study concluded that NAT is a more effective approach than SMET for improving shoulder pain and ROM in adhesive capsulitis and can be recommended as a primary treatment method.

Keywords: Frozen Shoulder, Adhesive capsulitis, Niel-Asher Technique, Spencer Muscle Energy Technique, Range of Motion

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Role Of Circadian Rhythms in Brain and Metabolic Regulation

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Abstract:

Circadian rhythms are endogenous 24 hour biological cycles that regulate physiological and behavioral processes through a coordinated interaction between the brain and peripheral organs. The suprachiasmatic nucleus (SCN) of the hypothalamus serves as the central pacemaker, aligning internal functions with external light dark cues by integrating retinal signals and directing neural and hormonal outputs. This central clock governs essential metabolic activities such as glucose homeostasis, energy balance, feeding patterns, and hormone secretion, including melatonin and cortisol. In addition to central regulation, peripheral tissues possess their own molecular clocks that function in synchrony with the SCN, forming an integrated system that optimizes energy utilization and anticipates metabolic demands. Disruption of circadian timing caused by irregular sleep cycles, shift work, or altered light exposure leads to misalignment between central and peripheral clocks, impairing metabolic efficiency. Such disturbances are strongly linked to metabolic disorders, including obesity, insulin resistance, and type 2 diabetes. Overall, circadian rhythms play a crucial role in maintaining metabolic homeostasis by ensuring temporal coordination between brain function and physiological processes. Understanding these mechanisms is essential for developing strategies to prevent and manage metabolic disease.

Keywords: Circadian rhythms, Peripheral clocks, Metabolic homeostasis, Hormonal regulation, Circadian disruption, Insulin resistance, Type 2 Diabetes

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Dual-Targeting E-Stilbene Hybrids as Promising Anticancer Agents: Synthesis, Biological Evaluation, and Computational Insights

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Abstract:

The design of dual-targeting anticancer agents offers an effective strategy to inhibit multiple tumor-promoting pathways simultaneously. In this study, a series of novel E-stilbene-based hybrid molecules were synthesized via a multistep approach, utilizing the Mizoroki–Heck reaction to construct the stilbene framework (Scheme 1). Structural characterization was performed using FT-IR, ¹H NMR, ¹³C NMR, and mass spectrometry. The synthesized compounds were evaluated for their inhibitory activity against Carbonic Anhydrase I and Thymidine Phosphorylase, enzymes associated with tumor growth, pH regulation, and nucleotide metabolism. Compounds 3b and 3c exhibited potent inhibition of CA-I, while compounds 4a and 5a demonstrated significant activity against TPase, outperforming standard inhibitors such as Acetazolamide and 7-Deazaxanthine. Notably, selected compounds displayed dual inhibitory potential against both enzymes. Molecular docking and dynamic simulations revealed stable binding interactions with key catalytic residues, supporting the observed biological activity. These findings suggest that E-stilbene hybrids represent promising scaffolds for the development of multifunctional anticancer agents with enhanced therapeutic potential.

Keywords: E-Stilbene Hybrids, Mizoroki–Heck Reaction, Dual Inhibition, Carbonic Anhydrase I, Thymidine Phosphorylase, Anticancer Activity, Molecular Docking, Molecular Dynamics Simulation, Structure–Activity Relationship (SAR), Drug Design

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Network Pharmacology–Based in Silico Analysis to Identify the Therapeutic Targets of *Ocimum basilicum* in Asthma

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Abstract:

Asthma is the most common chronic respiratory disease affecting over 20 million people in Pakistan. Inhaled corticosteroids (ICS) are mainly used in their treatment, but they are associated with adverse effects on the hypothalamo-pituitary-adrenal axis, bone metabolism, and growth. Long-term use of ICS can also cause cataracts, glaucoma, and bruising. There has been increasing interest in Aromatherapy, which utilizes essential oils. Traditionally, *Ocimum basilicum* essential oil is known for its anti-inflammatory properties. This study was done to show its anti-asthmatic properties through In-silico analysis. Network pharmacology and molecular docking techniques were applied to study its molecular

mechanism in treating asthma. 12 Active compounds of *O. basilicum* were selected from the literature. Their molecular targets were predicted using ChEMBL, Swiss target prediction, and BATMAN-TCM. Molecular targets of Asthma were retrieved using GeneCards. Common targets were obtained using GeneVenn. Protein-protein interaction (PPI) was built using String, and Hub genes were identified using the CytoHubba plugin (Cytoscape). Pathway analysis were performed using Shiny GO and the KEGG database. Findings: Common 370 targets were found from 607 predicted targets of *O. basilicum* compounds and 5990 asthma-related targets. 10 Hub genes were identified, which were related to inflammation. KEGG analysis showed a total of 175 pathways, out of which 9 pathways that were related to inflammation, i.e., NF-kappa and MAPK pathways, were selected. TNF- α (tumour necrosis factor- α) and IL-1 β (interleukin-1 β) genes induce these inflammatory pathways. *O. basilicum* compounds (1,8-cineole, Rutin) inhibit TNF- α and IL-1 β , which results in inhibition of these inflammatory pathways. Furthermore, Molecular docking showed similar binding of 1,8-cineole and Rutin with TNF- α and IL-1 β , when compared to standard Fluticasone propionate binding with these genes. *O. basilicum* exerts a therapeutic effect on asthma by inhibiting NF-kappa and MAPK pathways. **Keywords:** Asthma, *Ocimum basilicum*, Network pharmacology, Molecular docking, Inflammation inhibition

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In Silico Network Pharmacology Analysis Reveals the Role of Neurotransmitter-Linked Molecular Targets in Stress- Induced Irritable Bowel Syndrome and their Modulation by Antidepressants

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Abstract:

Stress, anxiety and depression are common psychological issues increasing worldwide. These conditions affect the overall functioning of body with the help of brain chemicals. Increasing evidence suggests a strong gut–brain axis connection, where stress and anxiety act as triggers for gut dysfunction via neurotransmitter imbalance. This leads to Irritable bowel syndrome (IBS), a persistent gut disorder, affecting approximately 10–15% of the global population. This study aimed to elucidate the molecular mechanism between neurotransmitters and IBS to explore the potential pathways by which antidepressants may alleviate stress-induced IBS using a network pharmacology-based in silico approach. Methodology: IBS-associated molecular targets were retrieved from the Gene Cards database. Eight key neurotransmitters implicated in stress and anxiety were identified through a comprehensive literature review. The putative molecular targets of these neurotransmitters were predicted using the Swiss Target Prediction tool. Gene overlap analysis was performed using Venn diagrams to identify common targets between IBS and neurotransmitters. Similarly, molecular targets of selected antidepressants were retrieved from Swiss Target Prediction and analyzed for their intersection with IBS and neurotransmitter associated targets. Findings: Among 1307 IBS associated targets, 68 genes were found to overlap with targets of the eight neurotransmitters, highlighting a potential mechanistic link between stress-related neurotransmitter and IBS underlying process. Antidepressants showed substantial overlap with both IBS and neurotransmitter targets, suggesting that they may act by modulating these shared molecular pathways, and in addition, the unintended

interactions of antidepressants with healthy genes were also identified. Our findings provide a network pharmacology-based insight into the molecular mechanisms linking stress-related neurotransmitters and IBS. The identified overlapping targets may represent key nodes in the gut–brain axis and explain the therapeutic action of antidepressants in stress-induced IBS. However, their off-targets showed that these drugs can also have detrimental effects on normal genes.

Keywords: Depression, IBS, Neurotransmitters, Antidepressants, Network Pharmacology

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The Interplay of Carveol and All-Trans Retinoic Acid (ATRA) in Experimental Parkinson's Disease: Role of Inflammasome-Mediated Pyroptosis and Nrf2

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Abstract:

Parkinson's disease (PD) is a debilitating and the second most common neurodegenerative disorder with a high prevalence. PD has a multifaceted etiology characterized by an altered redox state and an excessive inflammatory response. Extensive research has consistently demonstrated the role of the nuclear factor E2-related factor (Nrf2) and inflammasomes, notably NLRP3 in neurodegenerative diseases. In this study, our focus was on exploring the potential neuroprotective properties of carveol in Parkinson's disease. Our findings suggest that carveol may exhibit these effects through Nrf2 and by suppressing pyroptosis. Male albino mice were treated with carveol, and the animal PD model was induced through a single intranigral dose of 2 µg/2µl lipopolysaccharide (LPS). To further demonstrate the essential role of the Nrf2 pathway, we utilized all-trans retinoic acid (ATRA) to inhibit the Nrf2. Our finding showed the induction of pyroptosis as evidenced by increased levels of NLRP3 and other inflammatory mediators, including IL-1β, iNOS, p-NFκB, and apoptotic cell death indicated by positive fluoro Jade B (FJB) staining. Moreover, increased levels of lipid peroxides and reactive oxygen species indicated a significant rise in oxidative stress due to LPS. The administration of carveol mitigates oxidative stress and suppresses inflammatory pathways through the augmentation of intrinsic antioxidant defenses, primarily via the activation of the Nrf2. Conversely, ATRA reversed carveol protective effects by increasing FJB-positive cells, inflammatory and oxidative biomarkers. Taken together, our findings suggest that carveol mitigated LPS-induced Parkinson-like symptoms, partially through the activation of the Nrf2 and downregulation of pyroptosis notably NLRP3.

Keywords: Parkinson's disease, Nrf2, NLRP3, Pyroptosis, ATRA

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Protective Effects of Pinocembrin Against Bisphenol A Induced Neural Damage in Rats Via Targeting Oxido-Inflammatory Pathways

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Abstract:

Bisphenol A (BPA) is a widespread endocrine-disrupting chemical, used in plastics and epoxy resins that mimics estrogen, leading to multi-organ toxicity including brain damage. Pinocembrin is a natural

flavonoid widely found in bee propolis with potent medicinal effects. The present study was designed to evaluate the alleviative effects of pinocembrin against BPA-prompted damage in the brain of rats. 24 albino rats were distributed into four groups such as control group, BPA-treated group (10 mg/kg), BPA (10 mg/kg) + pinocembrin (5 mg/kg) exposed group and pinocembrin (5 mg/kg) only supplemented group. The experiment was conducted for thirty days. The exposure to BPA reduced the activities of anti-oxidants such as, CAT, GSR, SOD, GSH and GPx, besides malondialdehyde (MDA) and reactive oxygen species (ROS) contents were increased significantly following the BPA exposure. BPA significantly elevated inflammatory biomarkers levels such as tumor necrosis- α (TNF- α), nuclear factor- κ B (NF- κ B), interleukin-6 (IL-6), interleukin-1beta (IL- 1 β) and cyclo-oxygenase-2 (COX-2). BPA exposure also induced significant histopathological damages in the neural tissues. Nevertheless, pinocembrin supplementation significantly abrogated all the damages induced by BPA. The findings of our study demonstrated that pinocembrin could significantly attenuate BPA-instigated OS and neurotoxicity, due to its anti-oxidant and anti-inflammatory potential.

Keywords: Bisphenol A, Pinocembrin, Neurotoxicity, Oxidative stress, Inflammation, Antioxidant activity

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Evaluation of Mitigative Effects of Taxifolin Against Cadmium Provoked Neural Injury in Rats

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Abstract:

Cadmium (Cd) is a highly toxic heavy metal with a biological half-life of up to 30 years that damages different organs of the body. Taxifolin, a natural bioflavonoid, possesses significant therapeutic effects. The present research was planned to determine the protective effect of taxifolin against Cd induced neural damage. Twenty-four albino rats were distributed randomly into 4 equal groups, control, Cd (10 mg/kg), Cd + taxifolin group (10 mg/kg + 50 mg/kg) and taxifolin group (50 mg/kg). The experiment was conducted for 30 days. Our results concluded that Cd intoxication substantially reduced the activities of glutathione peroxidase (GPx), glutathione reductase (GSR), superoxide dismutase (SOD) as well as catalase (CAT) while, escalated the level of malondialdehyde (MDA) along with reactive oxygen species (ROS). Moreover, Cd intoxication notably elevated the levels of inflammatory indices (interleukin-1 β [IL-1 β], nuclear factor kappa B [NF- κ B], interleukin-6 [IL-6], tumor necrosis factor- α [TNF- α] and cyclooxygenase-2 [COX-2]). In addition to this, the histopathological analysis also revealed significant damage in Cd-treated rats. However, taxifolin treatment considerably decreased oxidative stress by reducing ROS. In addition to this, taxifolin also reduced inflammation and alleviated all the histological damages induced by the Cd. Therefore, it is concluded that taxifolin may prove to be a potential therapeutic agent to restore the Cd-instigated brain damage.

Keywords: Cadmium, Taxifolin, Neurotoxicity, Oxidative stress, Neuroinflammation, Antioxidant defense

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Perceived Parental Aspirations, Academic Motivation and Study Habits in High and Low Academic Achievers

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Abstract:

The growing emphasis on academic achievement in competitive educational environments has amplified the need to understand the interplay between psychological, behavioral, and sociocultural factors influencing student success. This study explored the relationships among perceived parental aspirations, study habits, and academic motivation, while also examining variations across academic achievement levels. The sample comprised 198 undergraduate students ($M = 21.3$, $SD = 1.92$), categorized into high and low achievers based on cumulative grade point average and further divided by gender from a private university in Pakistan. Standardized instruments were used, including the Perceived Parental Aspirations Scale, Academic Motivation Scale, and Palsane and Sharma Study Habits Inventory, alongside a demographic form. Pearson's correlation analysis revealed that academic motivation was positively associated with academic achievement, while study habits demonstrated a significant negative relationship with both motivation and achievement. Regression analyses showed that academic motivation significantly predicted study habits, and vice versa, though in opposing directions. A serial mediation model tested using the PROCESS macro (Model 6) indicated that academic motivation significantly mediated the relationship between parental aspirations and academic achievement. The full serial pathway through both motivation and study habits showed marginal significance, providing partial support for the proposed mediation hypothesis. The findings offer valuable insights into gender-sensitive educational planning and call for family-inclusive academic interventions. Policy implications include the need for culturally adapted support systems that align parental involvement with student autonomy and academic persistence.

Keywords: Academic Motivation, Perceived Parental Aspirations, Study Habits, Academic Achievement

O-201

Cross-Border Predictive Model for Nipah Virus Spillover Across South Asia Utilizing: A One Health Framework Integrating Climate Variability, Mobile and Predictive Early Warning Systems

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Abstract:

The current study looks at the long-standing difference between the ecological risk to people of contracting Nipah virus from bats and its epidemiological detection between countries in South Asia which have experienced repeated outbreaks of the virus particularly, in India and Bangladesh, compared to Pakistan who has not experienced any confirmed cases, despite having a common environmental habitat for bats and shared migration corridors of both countries. The main aim of this study is to develop an integrated, cross-border surveillance system for early detection of possible zoonotic virus spillover from bats prior to the risk of amplified disease transmission in the region. To create this integrated system, we propose a "One Health Surveillance Convergence Model," combining three tiers of operations. First, at the highest risk areas along border districts (i.e., Bahawalpur, Rahim Yar Khan, Sukkur, and Tharparkar), there should be mandatory reporting of acute encephalitis

syndrome (AES) cases by health professionals using a set of standard definitions of AES that have been agreed upon by all three countries' healthcare systems. The second tier consists of environmental and wildlife-based surveillance that will monitor known bat roosting locations mainly for the Indian flying fox, utilizing periodic viral testing by way of non-invasive methods (i.e., urine, saliva, or left-over fruit) to identify possible circulating viruses in the roosts prior to being spit over. The third and final tier of the model will require combined real-time genome (sequencing) and digital (syndromic) surveillance, allowing for cross-border exchange of viral sequencing data and syndromic alerts through a standard shared regional platform in cooperation with national health organizations. Rather than providing each country with independent reporting of their data, the model prioritizes interoperability; therefore, early warning triggers rely on multiple concurrent indicators, or signals, of a potential outbreak across two levels of the ecosystem: a cluster of clinical cases, evidence of the pathogen in the environment, or an unusual death event that occurs at the same time as these other indicators. This triangulation of indicators enhances the specificity and reduces the number of false alerts, allowing for rapid containment of any outbreak that occurs. It will also help to build on the interconnectivity between surveillance systems, moving from reactive management of outbreaks to proactive prevention of them, within the shared ecological landscape of South Asia.

Keywords: Nipah Virus, One Health Surveillance, Bat Borne Spillover, Genomic Surveillance, Cross Border Preparedness

O-202

MyD88 Inhibitory Peptide 2 Attenuates Trigeminal Neuropathic Pain via Modulation of TLR4-Mediated Neuroimmune Signaling and Neuronal Excitability

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Abstract:

Trigeminal neuropathic pain (TNP) is a debilitating, treatment-resistant condition with limited effective therapies. Activation of Toll-like receptor 4 (TLR4) signaling and its downstream adaptor MyD88 in trigeminal ganglion neurons is a key mechanism driving TNP. In this study, we investigated the therapeutic potential of MyD88 Inhibitory Peptide 2 (MIP2) in a TNP chronic constriction injury (IoN-CCI) model of the infraorbital nerve. Systemic administration of MIP2 significantly alleviated mechanical allodynia and thermal hyperalgesia. Furthermore, MIP2 improved anxiety-like and depressive-like behaviors, as demonstrated by elevated plus maze, open field, and forced swim tests. Mechanistic analyses revealed that MIP2 suppressed TLR4/MyD88-mediated activation of NF- κ B and MAPK signaling pathways, resulting in reduced expression of pro-inflammatory cytokines (IL-1 β , TNF- α , IL-6) and decreased microglial activation in the trigeminal ganglion. These findings demonstrate that MIP2 effectively mitigates neuropathic pain and associated neurobehavioral deficits by targeting MyD88-dependent TLR4 signaling. Our results highlight the translational potential of MIP2 as a promising therapeutic strategy for chronic trigeminal neuropathic pain.

Keywords: Trigeminal neuropathic pain, MyD88 Inhibitory Peptide 2, TLR4, neuroinflammation, neuronal excitability, translational neuroscience

TA-65 Regulates the AMPK/SIRT1/PGC-1 α Pathway to Enhance Mitochondrial biocycle (biogenesis, Mitochondrial Respiratory Chain, dynamics, and quality) Expression in Alzheimer's Disease: Insights from Computational and In Vitro Studies

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Abstract:

Alzheimer's disease (AD) is a common neurodegenerative disorder characterized by the progressive accumulation of misfolded proteins, including amyloid- β (A β), tau, and α -synuclein, along with neuronal cell death. Mitochondrial dysfunction and oxidative stress are considered early pathological features of AD. However, the underlying mechanisms linking mitochondrial impairment, oxidative stress, and AD progression remain unclear, and effective therapeutic strategies are still limited. TA-65, a compound derived from traditional Chinese herbal medicine, has been reported to enhance telomerase reverse transcriptase (TERT) activity. TERT has been identified as an important modulator of mitochondrial function, and growing evidence suggests its potential role in inhibiting A β accumulation and reducing oxidative stress. Nevertheless, the molecular mechanisms by which TA-65 alleviates oxidative stress and mitochondrial dysfunction in AD remain to be fully elucidated. In the present study, TA-65 was administered by gavage to A β oligomer (A β O)-induced Alzheimer's disease (AD) model mice. Behavioral assessments, including the novel object recognition (NOR) test and Morris water maze (MWM), were performed to evaluate cognitive function and spatial memory. TA-65 treatment significantly improved early cognitive decline and spatial memory deficits in A β O-induced AD model mice. Molecular docking was performed to investigate the interaction of TA-65 with AMPK and SIRT1, followed by experimental validation of the AMPK/SIRT1/PGC-1 α regulatory pathway. RNA-seq analysis of the model groups was then performed using next-generation sequencing (NGS), followed by comparative bioinformatics database analysis to determine the effects of TA-65 on targeted genes and proteins. qPCR, western blotting, and immunofluorescence were used for further validation. qPCR was performed to detect the mRNA expression levels of mitochondrial biogenesis-related genes, including PGC-1 α , Nrf-1, Nrf-2, and TFAM; mitochondria-associated electron transport chain genes,

including NDUFA9, SDHA, UQCRC1, COX5B, and ATP5F1A; mitochondrial dynamics-related genes, including fusion genes Mfn-1, Mfn-2, and OPA-1 and fission genes Drp-1 and Fis-1; and the mitochondrial quality control gene PINK-1. Western blotting and immunofluorescence were further used to evaluate the protein expression levels of mitochondrial biogenesis markers PGC-1 α , Nrf-1, and TFAM; electron transport chain proteins NDUFA9 and COX5B; mitochondrial dynamics markers Mfn-1, Mfn-2, and Drp-1; and the mitochondrial quality control marker PINK-1. Immunofluorescence analysis was also performed to measure relative fluorescence intensity in different hippocampal regions, including the dentate gyrus (DG), CA1, and CA3. In addition, immunohistochemistry was conducted to assess the potential toxicity of TA-65. Our findings demonstrated that TA-65 significantly improved cognitive impairment and memory deficits in A β O model mice. TA-65 also reduced hippocampal neuronal loss and degeneration. Moreover, TA-65 alleviated mitochondrial dysfunction by improving mitochondrial energy metabolism, ATP production, mitochondrial integrity, mitochondrial dynamics, and the clearance of damaged mitochondria and defective proteins. Furthermore, TA-65 enhanced synaptic function by improving the expression of key synaptic proteins involved in neuronal communication and plasticity. In conclusion, TA-65 promotes AMPK and SIRT1 activation and reduces oxidative stress, possibly through regulation of the mitochondrial biocycle, including mitochondrial biogenesis, mitochondria-associated electron transport chain function, mitochondrial dynamics, and mitochondrial quality control. These effects may contribute to the improvement of memory deficits, neuronal survival, and mitochondrial function in AD. Therefore, TA-65 may represent a promising therapeutic candidate for targeting mitochondrial dysfunction and oxidative stress in Alzheimer's disease.

Keywords: TA-65, AMPK, SIRT1, PGC-1, AD

O-204

Suppression of the TLR4-MD-2 Signaling Pathway Attenuated Chronic Mechanical Pain and Anxiety-Depression-Like Behaviors in a Mouse Model of Infra-Orbital Nerve Injury

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Abstract:

Trigeminal neuropathic pain (TNP) is a debilitating and refractory disease state with limited therapeutic options. The pathogenesis of trigeminal neuroinflammation and pain sensitization involves the activation of Toll-like receptor 4 (TLR4) signaling pathways within the trigeminal ganglion (TG). Cyclic phage-display-derived inhibitory peptide (cPIP2) is a structurally constrained TLR4-targeting peptide. It alleviates inflammation by suppressing proinflammatory cytokines and oxidative stress markers. However, the precise molecular mechanisms by which cPIP2 modulates TLR4/MD2 interaction and downstream signaling remain to be fully elucidated. In this study, TNP was induced by ligating the left infraorbital nerve (IoN-CCI) in male C57BL/6 mice. cPIP2 was administered at 1 nmol/g from days 3 to 7 post-IoN-CCI for subsequent behavioural and molecular analyses. Orofacial mechanical hypersensitivity was evaluated using von Frey filaments to measure head withdrawal

threshold on days 1, 3, 7, 10, 14, 21, and 28 after TNP. Anxiety-like behaviour was measured by the open field test and elevated plus maze. Depressive-like behaviour was assessed by the forced swimming test. TLR4/NF- κ B/p38 signalling components, glial markers, and inflammatory cytokines were assessed to evaluate trigeminal neuroinflammation following cPIP2 treatment. Treatment with cPIP2 alleviated nociceptive hypersensitivity and associated anxiety-depression-like behaviors while suppressing TLR4-driven neuroinflammation through inhibition of NF- κ B and p38 phosphorylation, attenuation of NLRP3 inflammasome activation, and reduction of proinflammatory cytokines, e.g., TNF- α , IL-1 β , and IL-6. Our findings suggest that hyperactivated TLR4 signaling is a critical driver of TNP pathology, mediated by NF- κ B/p38/NLRP3-induced neuroinflammation in TG neurons and glia, and likely represents a novel therapeutic target for manipulating TNP.

Keywords: Trigeminal Neuropathic pain, Toll-like receptor 4 signalling, cyclic peptide inhibitory peptide (cPIP2), Antagonist, Neuroinflammation

O-205

Eye Infrared Thermography as a Proxy of Core Body Temperature in Healthy Adults

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Abstract:

The traditional thermometer has been used on a large scale in the medical world to measure the body temperature through rectal approach. Infrared thermography (IRT) is a non-invasive, reliable approach that records body surface temperatures, unlike traditional thermometers that require physical contact with the body. Current pilot study was conducted to determine the correlation and agreement between infrared thermography and rectal thermometry for body temperature measurement in healthy adults (n=20), of heterogeneous age groups were recruited from Bahawalpur. Rectal temperature was recorded using the traditional method and infrared eye temperature was determined through the infrared thermal imaging camera. The result of the current study depicts that there was a significant difference ($p < 0.05$) between the rectal temperature (37.18 ± 0.28) and the infrared eye temperature (44.14 ± 1.28). The relationship between rectal and the infrared temperature of the eye was approximately $7 \pm 1.3^\circ\text{C}$. The core body temperature of the individuals can be indirectly monitored by subtracting approximately 7°C from the recorded infrared eye temperature. Hence, the infrared eye temperature can be used as the proxy of core body temperature measurement in healthy adults

Keywords: Core Body Temperature, Infrared Thermography, Non-Invasive

O-206

Human Mind and Human Brain: A Literary Study of Biomedicine's Gaze

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Abstract:

The 21st-century biomedical model posits the human brain as a predictive engine, a network of electrochemical signals where consciousness is an emergent property, and the mind, a convenient ghost. This study argues that English fiction from the Gothic to the postmodern has long anticipated, resisted, and refined this biomaterialist turn. By conducting a close literary analysis of works ranging from Mary Shelley's *Frankenstein* (1818) to Ian McEwan's *Saturday* (2005) and Kazuo Ishiguro's *Never Let Me Go* (2005), this study examines how literature interrogates the reduction of the self to neural circuitry. The research posits three core arguments: first, that Romantic and Victorian fiction constructs the diseased brain as a site of moral and metaphysical conflict; second, that Modernist stream-of-consciousness techniques prefigure cognitive neuroscience's mapping of non-linear memory, yet preserve the ineffable qualia of subjective experience; third, that contemporary neuro-fiction reveals the biopolitical and ethical terror of biomedical solutions to mental distress. The conclusion asserts that literature does not reject biomedicine but serves as an essential hermeneutic of suspicion, reminding us that to know the brain's mechanics is not to exhaust the mind's meaning.

Keywords: Neuro-Literature, Biomedicine, Stream of Consciousness, Neuroethics, Biopolitics

O-207

Identification Of Bioactive Compounds of *Foeniculum Vulgare* and *Withania Somnifera* for Alzheimer's Disease by Integrative Network Pharmacology

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Abstract:

Alzheimer's disease is the most common cause of dementia, yet the drugs in routine use act on a narrow set of targets and offer only symptomatic relief. Medicinal plants, whose many compounds reach several proteins at once, are better matched to a disease driven by multiple processes at the same time. This study used network pharmacology and molecular docking to map, and then compare how two such plants, *Withania somnifera* and *Foeniculum vulgare*, are predicted to act against Alzheimer's disease, with the two plants analyzed separately so that their mechanisms could be set side by side. For each plant, the reported constituents were screened for drug-likeness and Lipinski compliance, their protein targets were predicted, and these were intersected with Alzheimer-associated genes from GeneCards. The shared targets were built into protein-protein interaction networks in STRING and Cytoscape, ranked by degree to identify hub genes, and annotated by Gene Ontology and KEGG enrichment in ShinyGO. Hub proteins with a defined binding pocket were then docked against the screened compounds using AutoDock Vina. Screening returned thirteen compounds for *W. somnifera*,

almost all withanolides, mapping to 79 Alzheimer-associated targets, and seven compounds for *F. vulgare*, led by the flavonoid's quercetin, kaempferol and luteolin, mapping to 115. Each plant produced ten hub genes, of which five were shared: ESR1, GSK3B, HSP90AA1, PPARG and PTGS2. Both plants' targets were enriched in the KEGG Alzheimer disease and neurodegeneration pathways. In docking, the withanolides bound GSK3B and HSP90AA1 strongly, reaching -10.6 and -10.2 kcal/mol, while the flavonoids bound cyclo-oxygenase-2 and the kinases well, with kaempferol at -9.9 kcal/mol against PTGS2. GSK3B, bound strongly by compounds from both plants, emerged as the single point at which the two species converge. This work provides the first side-by-side network and structural account of how *W. somnifera* and *F. vulgare* engage Alzheimer-relevant proteins, and it turns two traditionally used plants into a defined, ranked set of compounds and targets ready for testing. The convergence of both plants on GSK3B, supported at the network level and by strong predicted binding, marks this kinase as the priority target for follow-up. The clear next step is molecular dynamics simulation with binding-free-energy calculation on the withanolide-GSK3B, withanolide-HSP90 and flavonoid-cyclo-oxygenase-2 complexes to confirm that the predicted poses are stable, followed by enzyme-inhibition and cell-based assays on these lead pairs and then in vivo evaluation in established disease models. Confirming GSK3B inhibition experimentally would establish the first mechanistic link between these two plants and a defined Alzheimer target.

Keywords: Alzheimer's Disease, Network Pharmacology, Molecular Docking, *Withania Somnifera*, *Foeniculum Vulgare*, Hub Genes, GSK3B

O-208

Detection and Molecular Epidemiology of Coronaviruses, Paramyxoviruses and Astrovirus in Wastewater from Multan, Pakistan

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Abstract:

Wastewater-based epidemiology (WBE) has emerged as a sensitive and cost-effective tool for early detection of infectious diseases at the community level, particularly in resource-limited regions. In cities like Multan, Pakistan, where clinical diagnostics are often delayed or inaccessible, monitoring wastewater offers a non-invasive approach to track viral circulation before symptoms appear or outbreaks are officially reported. This study aimed to detect and characterize the presence of human infecting coronaviruses, paramyxoviruses, and astrovirus in wastewater samples from Multan and assess their epidemiological significance through molecular analysis. A total of 69 wastewater samples were collected from key drainage sites across the city between January and March 2025. Virus concentration was achieved using polyethylene glycol (PEG) precipitation, followed by RNA extraction, cDNA synthesis, and conventional RT-PCR with coronaviruses, paramyxoviruses and astrovirus specific primers. Positive amplicons were sequenced and phylogenetic analysis was performed using MEGA 12 software to determine genetic relationships with reference strains. No coronaviruses were detected in any of the wastewater samples throughout the study period, suggesting

no ongoing community transmission at that time. Paramyxoviruses were detected intermittently in 2 pooled samples from February and March, indicating low-level circulation. Phylogenetic analysis revealed that both positive paramyxoviruses sequences clustered within the Measles virus genotype B3 lineage, showing ~99% homology with MVs/California.USA/18.2 strain. Further, a sharp increase in astrovirus RNA was observed, with 11 positive detections in March compared to a single detection in February, suggesting a possible seasonal outbreak or increased transmission within the community. Astrovirus phylogenetic analysis revealed two novel genogroups: four sequences (M3, M7, M20, M23) clustered within the MLB1 clade (94.3–96.1% nt homology), while three others (M4, M16, M21) formed a divergent cluster within the HMO/VA-like genogroup (68.2–73.0% nt identity). The study highlights the effectiveness of WBE in capturing hidden viral activity, particularly for viruses like astrovirus that are often excluded from routine diagnostics. The identification of these viruses reinforces the need to expand wastewater surveillance to additional priority pathogens, as this approach can provide early warning signals before clinical cases are recognized. Although coronaviruses were not found, continued monitoring remains essential for early warning and preparedness in post pandemic settings. This was the first known study in Pakistan to integrate molecular surveillance of these three viral families through WBE, offering a practical and scalable framework for public health intervention in resource-limited urban areas.

Keywords: Wastewater, Coronaviruses, Paramyxoviruses, Astrovirus, Multan

O-209

Postnatal Depression and its Impact on Maternal and Child Health

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Abstract:

Transition to motherhood is a crucial period and leads to numerous psychological, problem related to child-birth is Postnatal Depression (PND). It affects 10-15% mothers around the world and is considered as major public health issue. Mostly cases (7% - 33%) of PND have been reported in low and middle-income countries (with grand national income per capita between \$1,146 and \$4,515). In Pakistan, its reported prevalence is ≈ 28%- 36%. PND is characterized by loss of interest, incessant sadness, insomnia, feeling of worthlessness, social isolation and suicidal thoughts. Genetic, hormonal and psychosocial factors are involved in its etiology. Hormonal factors include decline in levels of progesterone and estrogen after child- birth. Lack of family/ social support, life stressors (e.g. low socioeconomic status, serious life-events) and chronic psychiatric problems may be plausible psychosocial factors. It is cardinal to understand the ramifications of PND on mothers and child because it profoundly affects the bonding between infant/child and mother. Most often, postnatally depressed mothers undergo poor parenting behaviour, and exhibit negative

perceptions, reduced responsiveness, and less efficient communication with young children. It results in low quality of life. Therefore, such mothers are not capable to fulfill the maternal responsibilities. Ultimately, the infant or young child may suffer from serious emotional, behavioural, social and cognitive problems. Infants/ children excessively rely on the responsiveness and emotional attachment with their mothers to regulate their emotions. Intense emotional reactions are reflected in infant/child due to low responsiveness of PND mothers. Behavioural issues such as disturbance in sleep and feeding patterns are observed in infants. Poor feeding practices cause insufficient nutrition and growth retardation. Social problems, young children may face, impaired social interaction and reduced self-confidence. Cognitive dysfunction and language problems may arise due to poor interactions with their mothers. So, addressing postnatal depression in mothers is imperative in order to prevent from its negative repercussions both on mothers and infants/child. Thus, policymakers, healthcare provide must develop efficient screening systems and intervention programs for timely diagnose and treat PND mothers. Strong social support is also paramount in this regard.

Key Words: Postnatal Depression (Pnd), Infants, Children, Mothers, Emotions, Responsiveness

O-210

Enhancing Neurocognitive Engagement Through Physiology Skill Labs in Undergraduate Medical Education

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Abstract:

Active, experience-driven learning is fundamental to neurocognitive development, yet traditional didactic teaching in medical education often limits deep learning and retention. In the context of evolving student-centered curricula in Pakistan, physiology skill laboratories offer a potential platform to enhance brain-based learning by integrating sensory, motor, and cognitive pathways. To explore undergraduate medical students' learning experiences in physiology skill labs and analyze their impact on neurocognitive engagement, skill acquisition, and knowledge application. A qualitative study was conducted at a medical college in Pakistan following ethical approval (Ref: 113/23/10). A purposive sample of 10 first- and second-year MBBS students participated in semi-structured interviews. Data were audio-recorded, transcribed using Otter.ai, and analyzed through thematic analysis with AI-assisted support. Five major themes emerged: Cognitive Engagement & Teaching Styles: Passive learning approaches limited retention, whereas interactive strategies enhanced attention and deeper processing. Multimodal Learning Resources: Structured notes and visual aids (PowerPoints) supported cognitive scaffolding and exam preparation. Sensorimotor Integration through Hands-on Practice: Skill labs strengthened the connection between theoretical knowledge and procedural memory. Group Dynamics & Social Learning: Smaller, well-structured groups improved peer interaction, collaborative learning, and cognitive engagement. Demonstration-Based Learning: Combining demonstrations with practical assignments enhanced understanding, communication skills, and experiential learning. Findings highlight that physiology skill labs promote active neural engagement by integrating cognitive, sensory, and motor domains, key principles in neuroscience-based education. However, gaps in organization, feedback, and structured interaction may limit their full potential. Physiology skill labs serve as powerful tools for brain-based learning, enhancing neurocognitive engagement and practical competence. Optimizing instructional design, group structure, and feedback mechanisms can further strengthen their role in modern medical education.

Keywords: Neuroscience Education, Skill labs, Neurocognitive learning, Medical Students, Active learning, Physiology

O-211

Targeting the Brain Gut Microbiome Axis: Opportunities for Novel Metabolic, Gastrointestinal, and Neuropsychiatric Therapies

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Abstract:

The brain gut microbiome (BGM) axis is a bidirectional network connecting the central nervous system, gastrointestinal tract, and trillions of microbes, redefining the gut microbiota as a functional organ influencing systemic health. Preclinical models of germ-free animals, antibiotic depletion, probiotic supplementation, and fecal transplants show that early microbial colonization shapes stress responses, neurogenesis, synaptic plasticity, and neurotransmitter synthesis, while antibiotic-induced dysbiosis reduces hippocampus neurogenesis and serotonin, impairing memory. Human studies report that Bifidobacterium probiotics attenuate negative emotional brain activity in IBS (irritable bowel syndrome) patients and fermented milk alters functional connectivity during emotion recognition, though many rodent findings lack consistent replication in humans. Bottom up signaling involves microbial metabolites such as short chain fatty acids, secondary bile acids, and tryptophan derived compounds that cross the bloodstream, modulate neuroinflammation, and serve as neurotransmitter precursors; the vagus nerve provides rapid gut to brain communication. Approximately 95 % of peripheral serotonin resides in the gut, where specific spore-forming bacteria regulate its synthesis, linking microbial activity to mood and gut motility. Top-down control via the autonomic nervous system modulates intestinal motility, secretion, and permeability, with chronic stress promoting leaky gut and bacterial translocation. Clinical associations connect BGM dysbiosis to IBS, obesity, depression, anxiety, Parkinson's disease, and autism spectrum disorder. This research analyzes the critical gaps, including the translational disconnect between animal and human data and the incomplete mechanistic understanding of blood-brain barrier modulation. Addressing these barriers is essential for developing novel therapeutics for targeting metabolic, gastrointestinal, and neuropsychiatric disorders.

Keywords: Brain gut microbiome, Germ free animals, neuro-inflammation, dysbiosis, blood-brain barrier

O-212

The Skull-Meningeal-Brain Axis: Mapping of Local Immune Surveillance Channels for Neuro-inflammation Control

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Abstract:

The central nervous system (CNS) has long been viewed as immunologically isolated, with systemic immune surveillance as the primary framework for understanding neuroinflammation. Recent discoveries challenge this paradigm by revealing specialized anatomical conduits that enable local immune communication between the skull, meninges, and brain parenchyma. This emerging skull-meninges-brain axis reframes CNS immunity as a frontier-based system, where border niches orchestrate rapid, localized immune responses independent of systemic circulation. Skull bone marrow channels serve as critical anatomical gateways, supplying immune cells directly to the meningeal compartments and acting as CSF-sensing niches that enable real-time surveillance of CNS homeostasis. These channels facilitate bidirectional trafficking between cranial marrow and meningeal spaces, creating a localized hematopoietic reservoir that can be rapidly mobilized during injury or disease. Complementing this architecture, meningeal lymphatic and perivascular spaces provide drainage pathways that connect the CNS-derived antigens to cervical lymph nodes, integrating local immune signals with peripheral adaptive responses. This anatomical framework has profound implications for the treatment of neurodegenerative diseases. By targeting skull marrow channels and meningeal immune niches, the therapeutic strategies can achieve precision immunomodulation without systemic immunosuppression. Approaches include localized delivery of glia-targeted biologics, antigen-specific tolerance induction via CNS regulatory peptides, and controlled modulation of the blood-brain barrier to enhance therapeutic access. Understanding the skull-meninges-brain axis offers a transformative opportunity to develop spatially and temporally precise neuro-immunological interventions for Alzheimer's disease, multiple sclerosis, and other CNS disorders.

Keywords: CNS, Skull-Meningeal-Brain Axis, Glia-Targeted Biologics, Neurodegenerative Diseases

Neuro-immunology and Biomedicine of the Central Nervous System: Immune Mechanisms, Neuro-inflammation, and Emerging Therapeutic Strategies

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Abstract:

The understanding of the nervous system, or CNS, has changed a lot over time. It was once thought to be an "immune organ. Now we know it is an environment where the immune system and nerves interact in complex ways. The CNS keeps itself balanced with the help of immune components. These include microglia, astrocytes, perivascular macrophages, and the blood–brain barrier or BBB. They work together to monitor activity. At the time, they restrict too many immune cells from entering the CNS. Microglia are like the immune cells of the CNS. They constantly survey the environment. They respond to damage, infection, or degeneration by releasing cytokines, eating up particles through phagocytosis, and presenting antigens. In disease states, microglia and astrocytes can become chronically activated, which enhances neuroinflammation and weakens the Blood Brain Barrier. As a result, immune cells like T cells, B cells, and monocytes can infiltrate CNS tissue. This disruption plays a role in conditions such as multiple sclerosis, Alzheimer's disease, Parkinson's disease, traumatic brain injury, and infection-associated neurological disorders. Recent advances in biomedical research aim to control neuroinflammation. They use targeted immunotherapies, modulation of cytokine signaling, and nanomedicine-based drug delivery across the BBB. Advanced brain models also help improve translation. Research shows that systemic immunity, gut-brain communication, and meningeal lymphatics play a role in CNS disease development. Understanding these mechanisms is crucial. It helps create precision medicine strategies that suppress inflammation while preserving beneficial CNS immune functions. As a result, neuroimmunology is

becoming central to developing therapies. These therapies target diseases, autoimmune diseases, and neuroinfectious diseases. So, neuroimmunology is an element in future CNS biomedical research and treatment.

Keywords: Neuroimmunology, central nervous system (CNS), neuroinflammation, microglia, astrocytes, blood-brain barrier, neurodegeneration, multiple sclerosis, Alzheimer's Disease

O-214

Long COVID and the Brain: Microglial Activation, Cytokine-Mediated Neuroinflammation, and Emerging Neuroimmunology

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Abstract:

Long COVID, also known as post-acute sequelae of SARS-CoV-2 infection (PASC), represents a significant global health challenge characterized by various neurological and neuropsychiatric symptoms such as cognitive impairment ("brain fog"), fatigue, headaches, sleep disorders, and mood abnormalities long after the resolution of an acute infection episode. Increasingly recognized as one of the main causes of the pathogenesis of such neuro-inflammatory sequelae, chronic immune activation and persisting neuro-inflammation have been identified as underlying mechanisms. This review aims to discuss the connection between sustained immune dysregulation and neurological manifestations in patients suffering from long COVID and will focus on the effects of microglial activation, neuro-inflammation induced by cytokines, the disruption of the integrity of the blood-brain barrier, and the ongoing immune signaling associated with post-infection sequelae. The patients show highly activated innate immune cells, lacking naive T and B cells, and show elevated expression of type I IFN (IFN- β) and type III IFN (IFN- λ 1) that remain persistently high at 8 months after infection. Specifically, this review will explore how increased production of pro-inflammatory

factors, including IL-6, TNF- α , and interferons, can be implicated in the development of neuroinflammatory response, synaptic and neuronal injuries, and impaired neuro-immune homeostasis as some of the main characteristics of long COVID. Moreover, the role of chronic viral infections, autoimmune processes, vascular injury, and the peripheral-central immune axis in the development of post-COVID neuro-inflammation will be reviewed. Furthermore, it discusses the existing parallels between neuro-inflammatory and neurodegenerative diseases and highlights potential therapeutic approaches and their applications to the problem of neuro-involvement in the long COVID.

Keywords: Post-acute sequelae of SARS-CoV-2 (PASC), chronic immune activation, microglia, blood-brain barrier dysfunction, neurodegeneration, immune-mediated neuropathology

O-215

Quantitative Analysis of Florfenicol Resistance in Carbapenem-Resistant Isolates of *Acinetobacter baumannii*

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Abstract:

Acinetobacter baumannii is a gram-negative coccobacillus that is isolated from the hospital environment. This pathogen has been isolated from sputum, tissue fluids, CSF, non-broncho lavage, pus, blood, urine, and endobronchial washing. Treatment of infection with each passing year has become more challenging. This is particularly true for diseases triggered by resourceful pathogens such as *Acinetobacter baumannii*, which is multidrug-resistant and has become an immediate cause of healthcare-associated infections. Due to resistance to multiple drugs, this pathogen has complicated the treatment options, which has led to a mortality rate of 35%. Florfenicol is a member of the amphenicols class. It is a fluorinated derivative of thiamphenicol. It is the only antibiotic from its class that is exclusively used in veterinary

therapy. It was first used for the cure of infections of cattle and pigs against *E. coli*. For this study, 200 samples were collected from the Armed Forces Institute of Pathology (AFIP) in Rawalpindi. The majority of samples were taken from tissues. Out of them, MIC was performed on 50 isolates. Out of 50, 48 were meropenem-resistant, and 46 were imipenem-resistant. The microdilution method was executed to determine the minimum inhibitory concentration of florfenicol to determine its sensitivity and resistance against *A. baumannii* infections.

Keywords: *Acinetobacter baumannii*, gram-negative coccobacilli, multidrug resistance, MIC, florfenicol, carbapenem resistance

O-216

Sunflower-Assisted Phytoremediation and Pea Peel Extract: Nutri-Priming Alleviate Cadmium Stress in Wheat

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Abstract:

Cadmium (Cd) contamination and nitrogen deficiency in agricultural soils are major constraints limiting wheat productivity and food security under changing climatic conditions. Globally, more than 50% of soils are nitrogen deficient, which negatively affects plant growth, nutrient uptake, and physiological performance, particularly in cereal crops that serve as primary sources of food and fodder for human and animal populations. Nutri-priming has emerged as a simple, cost-effective, and environmentally friendly approach to improve plant tolerance against abiotic stresses. Therefore, the present study was conducted to evaluate the role of pea peel extract as an organic nitrogen source through seed priming and sunflower-based crop rotation for mitigating cadmium stress in wheat. In pot experiment, sunflower was grown under three cadmium stress levels (0, 20µg/kg & 20mg/kg) during the summer season for phytoremediation of contaminated soil. After sunflower harvesting, wheat was cultivated in the same soil under identical cadmium levels for comparison with direct stress conditions. Pea peel extract (0.04%) was applied as seed priming to two wheat varieties, Ujala-16 (Cd-resistant) and MH-21 (Cd-sensitive). The findings demonstrated that pea peel extract and sunflower crop rotation significantly alleviated cadmium-induced toxicity by improving seed germination, plant growth, and biochemical attributes. Enhanced plant performance was associated with improved water relations, increased biosynthesis of photosynthetic pigments, better osmotic adjustment, and a strengthened antioxidative defence system. Moreover, pea peel extract

treatment enhanced mineral uptake and promoted the accumulation of phenolics, flavonoids, tocopherols, and amino acids while reducing lipid peroxidation under cadmium stress. The 0.04% pea peel extract level proved most effective under both crop rotation and direct cadmium stress conditions, with Ujala-16 showing greater tolerance compared to MH-21. Overall, the combined application of sunflower-based phytoremediation and pea peel extract as a nutri-priming provides a sustainable and eco-friendly strategy to mitigate cadmium toxicity and enhance wheat performance in contaminated soils, offering a promising approach for improving cereal productivity under nutrient-deficient and heavy metal-stressed environments.

Keywords: Cadmium stress, Wheat, Pea peel extract, Nutri-priming, Sunflower crop rotation, Phytoremediation, Nitrogen deficiency

O-217

Knowledge–Practice Gaps in Dietary and Lifestyle Management of Type 2 Diabetes Mellitus: Evidence from Pakistan

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Abstract:

Type 2 diabetes mellitus (T2DM) is a rapidly growing public health concern in Pakistan, driven by unhealthy dietary patterns, sedentary lifestyles, and poor adherence to evidence-based self-care practices. Understanding knowledge, attitudes, and practices (KAP) of patients is essential for developing effective lifestyle-based interventions. To assess dietary and lifestyle-related knowledge, attitudes, and practices among adults with T2DM and to identify key barriers to effective diabetes self-management in outpatient hospital settings in Lahore, Pakistan. A cross-sectional mixed-methods study was conducted among 220 adults with T2DM recruited using purposive sampling from outpatient departments of two tertiary-care hospitals in Lahore. Quantitative data were collected using a validated KAP questionnaire and analysed using SPSS

(version 20). Qualitative data from open-ended questions were analysed thematically. Glycaemic control was assessed using self-reported HbA1c values. Although most participants demonstrated adequate knowledge of diabetes and recommended dietary practices, adherence to healthy lifestyle behaviours was poor. Poor glycaemic control (HbA1c >7%) was reported by 74.5% of participants. Approximately one-third followed structured dietary plans, with high fat intake and low consumption of fruits, dairy products, and protein-rich foods. Physical inactivity was prevalent, with 64.3% failing to meet recommended activity levels. Qualitative analysis identified reliance on traditional remedies, emotional distress following diagnosis, difficulty avoiding sweet foods, and limited practical nutrition knowledge as major barriers. A significant gap exists between knowledge and actual dietary and lifestyle practices among adults with T2DM. Culturally tailored nutrition education, behavioural counselling, and community-based lifestyle interventions should be integrated into routine diabetes care to improve adherence, glycaemic control, and health outcomes.

Keywords: Type 2 Diabetes Mellitus, Knowledge, Attitudes and Practices, Dietary Patterns, Lifestyle Modification, Pakistan

O-218

Alleviating The Lead Stress Affect in Tomato *Solanum Lycopersicum* L. by Exogeneously Applied Glutamic Acid & Methionine

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Abstract:

Plants continuously interact with many biotic and abiotic stressors. One of the main abiotic stresses is heavy metals. Seeds of two different varieties of tomato (*Solanum lycopersicum* L.) were obtained from the Ayub Agricultural Research Institute (AARI), Faisalabad Pakistan. This study was carried out at the Botanic Garden of Government College University Faisalabad using a completely randomized design (CRD) with three replicates. Seeds were sown in plastic pots having 10kg soil. Water was applied to pots regularly till germination. After two weeks of germination, lead stress was applied (0 mM & 5 mM) including control. Foliar spray of methionine and Glutamic acid (0 mM and 75mM) including control were applied at vegetative stage. Plants were harvested after 90 days of sowing for recording data of different growth parameters and fresh green leaves were preserved for determination of physiological and biochemical attributes. The obtained data was analyzed by using an appropriate statistical

software. To compare the means, least significant difference of 5% probability level was used. Results of our study demonstrate a marked reduction in growth, chlorophyll content, and nutrient ions in tomato plants under Pb toxicity. The toxicity of these metals manifested a clear rise in MDA, $O_2^{\cdot-}$, H_2O_2 . The non-enzymatic antioxidants like phenolics, flavonoids, ascorbic acid, and anthocyanins were also increased in all plant species under metal stress. The activities of antioxidant enzymes were also enhanced in tomato plant under lead toxicity. Plants exhibit great potential to accumulate metals in different parts. All the given metals accumulated in roots and leaves in a considerable amount and plants potential enhanced by methionine and Glutamic acid foliar treatment. Plants accumulate more metals after foliar application of methionine and Glutamic acid. Exogenous administration of Glutamic acid induced enhancement in growth, chlorophyll content, and nutrient uptake alongside further improvement in the non-enzymatic antioxidant molecules and the activities of antioxidant enzymes in plants under Cd, Cr, Cu, and Zn toxicity. Exogenous methionine and Glutamic acid also reduced the MDA, $O_2^{\cdot-}$, H_2O_2 , tomato plants under Pb toxicity.

Keywords: Lead toxicity, Tomato (*Solanum lycopersicum* L., Methionine, Glutamic acid, Antioxidant enzyme, Oxidative Stress, Reactive Oxygen Species, Chlorophyll Content

O-219

Spermine Enhances Lead Stress Tolerance in Linseed by Modulating Photosynthetic Efficiency, Antioxidant Systems, and Osmolyte Homeostasis

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Abstract:

Lead (Pb) toxicity hinders plant growth and food security by causing oxidative stress, disrupting physiological processes, and increasing metal accumulation in plant tissues. Spermine (Spm), a polyamine, can enhance plant tolerance to stress. This study investigated Spm's role in alleviating Pb toxicity in two linseed varieties, Roshani-2018 and Chandni-1988. The goal was to improve growth, metabolite accumulation, antioxidant defense, and reduce lead uptake. The experiment used 3.0 mM Pb stress and four Spm concentrations (0.5, 1.0, 1.5, and 3.0 mM). Parameters measured included plant growth, chlorophyll content, reactive oxygen species, malondialdehyde, electrolytes, secondary metabolites, osmolytes, antioxidants, and lead accumulation. Lead stress decreased growth and chlorophyll, increased hydrogen peroxide, malondialdehyde, electrolytes. The 1.5 mM Spm treatment was most effective in enhancing growth, metabolites, osmolytes, and antioxidants, especially in Roshani-2018. This treatment improved reactive oxygen species detoxification-maintained chlorophyll stability, and reduced Pb accumulation. Overall, 1.5 mM Spm effectively mitigates Pb-induced stress, offering a sustainable strategy to enhance linseed productivity in Pb-contaminated environments.

Keywords: Spermine, oxidative damage, reactive oxygen species homeostasis, osmolytes, secondary metabolism, linseed

P-01

Clinical and Mutational Analysis of Selected Genes Associated with Intellectual Disability in Pakistan

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Abstract:

Syndromic intellectual disability (S-IDs) is a group of neurodevelopmental disorders characterized by intellectual impairment accompanied by additional clinical abnormalities, including distinctive facial features, microcephaly and congenital organ malformations. The phenotypic overlap and variable clinical presentations make accurate diagnosis based solely on clinical evaluation challenging. Whole exome sequencing (WES) is developed to identify the underlying genetic cause of the disease and improving diagnostic yield. In this study, WES was performed on probands from five Pakistani families presenting with previously undiagnosed and unclassified S-IDs. Variants in five genes including INO80, DROSHA, TRAPPC6B, TCF4 and SGSH were found, indicating genetic heterogeneity of S-IDs. A homozygous missense variant p.Leu929Val in INO80 gene was identified, representing the second independent report of a germline variant in this gene associated with S-IDs. Additionally, a homozygous missense p.Gly554Arg variant in DROSHA was found and is reported here for the first time in the homozygous state, associated with severe intellectual disability, strabismus, facial dysmorphism and depressive features. Three previously reported variants were also identified in the remaining families, including a homozygous splicing variant c.149+2T>A in TRAPPC6B, a de novo heterozygous nonsense variant p.Arg174* in TCF4, and a homozygous missense variant p.Gly122Arg in SGSH. All variants were validated by Sanger sequencing and showed co-segregation with the disease phenotype in all available family members. In summary, our findings expand the genetic spectrum of S-IDs, including a second independent report supporting the role of INO80 and the first report of a homozygous germline DROSHA variant associated with the disorder.

Keywords: INO80, DROSHA, Intellectual disability, consanguineous marriage, whole exome sequencing

P-02

Therapeutic Effect of Ethanolic Extract of Aegle Marmelos (Stone Apple) to Enhance Functional Restoration of Sciatic Nerve Compression

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Abstract:

The sciatic nerve, the largest peripheral nerve in the human body, is essential for lower limb motor and sensory functions. Injuries to this nerve can cause significant functional impairment. *Aegle marmelos*, a medicinal plant known for its antioxidant and anti-inflammatory properties, has been used in traditional medicine to manage neurological disorders. However, its role in peripheral nerve regeneration has not been thoroughly investigated. Thirty albino Wistar rats were randomly divided into three groups: negative control (NC), positive control (PC), and herbal treatment (HT). Sciatic nerve crush injury was induced in the PC and HT groups. The HT group received ethanolic leaf extract of *A. marmelos* (200 mg/kg body weight) for 21 days. Behavioral tests (hot plate latency, grip strength, pin prick response) were conducted on Days 1, 7, 14, and 21. Phytochemical profiling, antioxidant activity, biochemical safety, and histopathological analyses were performed. The *A. marmelos* extract significantly enhanced functional recovery compared to PC. By Day 21, the HT group showed near-normal hot plate latency and improved pin prick response ($p < 0.0002$ vs. PC). Grip strength was significantly higher in the HT group ($p < 0.0001$ vs. PC). The extract demonstrated strong antioxidant activity, high phenolic and flavonoid contents, and contained ferulic acid, quercetin, rutin, salicylic acid, and caffeic acid. Histological analysis confirmed enhanced axonal regeneration and reduced edema. No hepatic or renal toxicity was observed. Ethanolic extract of *A. marmelos* significantly promotes functional and histological recovery after sciatic nerve injury through potent antioxidant and neuroprotective mechanisms. These findings highlight its therapeutic potential for peripheral nerve repair and warrant further clinical validation.

Keywords: Sciatic Nerve Compression, *Aegle Marmelos*, Functional Restoration, Antioxidant, Neuroprotective

P-03

Translational Strategies for Global Control of Hepatitis B and C: From Epidemiology to Neurological Impact

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Abstract:

Hepatitis B virus (HBV) and hepatitis C virus (HCV) continue to cause major global health issues, responsible for over 75% of the disease burden in just 20 high-prevalence countries. Even though an effective HBV vaccine exists and direct-acting antivirals (DAAs) can cure HCV, eliminating these infections remains difficult – especially in low- and middle-income countries. Key obstacles include limited screening, unsafe medical procedures, low HBV vaccination coverage, and the lack of an HCV vaccine. Beyond liver damage, chronic hepatitis infections are linked to cognitive and psychiatric problems, highlighting broader neurological

effects. This qualitative review searched PubMed, Scopus, and WHO databases (2000–2024) for terms like HBV, HCV, antiviral therapy, vaccination, and health policy. Priority was given to studies on drug treatments, translation strategies, and implementation in high-burden settings, plus evidence of extrahepatic and neurocognitive effects. Results show major treatment gaps: poor HBV vaccine coverage, limited diagnostic access, and no DAA reimbursement in 32% of countries. Newer HBV drugs like tenofovir alafenamide and entecavir provide long-term viral suppression with fewer side effects than older drugs, but lifelong therapy is needed due to persistent cccDNA. For HCV, pan-genotypic DAAs (e.g., sofosbuvir/velpatasvir) cure over 95% within 12 weeks. Importantly, chronic HCV can cause measurable neurocognitive impairment even without advanced liver disease, indicating direct or indirect brain involvement. In Pakistan (HCV 4.8%, HBV 2.5%), HCV elimination using generic DAAs has succeeded in Punjab, but HBV elimination lags due to gaps in newborn vaccination and the need for continuous suppression. Priorities include strengthening birth-dose vaccination, safe medical practices, community screening, maternal antivirals, nucleic acid testing in blood banks, and public awareness. HCV elimination is primarily an access issue (affordable DAAs). HBV elimination remains a biological challenge (cccDNA persistence). Bridging epidemiology, translational medicine, and policy is essential not only for disease elimination but also for improving neurological health and quality of life. Treating hepatitis as a systemic and neurobiological problem strengthens the case for integrated strategies to meet WHO's 2030 goals.

Keywords: Hepatitis B, Hepatitis C, translational research, global health, epidemiology, biomedical science, neurocognitive impact, antiviral therapy, vaccination, health policy

P-04

Awareness of Depression and Its Treatment Among Medical

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Abstract:

Depression affects people of all ages and is a major cause of disability worldwide. Medical students are at higher risk due to heavy study loads, academic pressure, and competitive environments. Although awareness of depression is increasing, stigma still prevents many students from seeking help. In Sindh, limited financial resources and poor access to mental health services make this problem worse. Depression negatively affects medical students' academic performance and overall well-being, making it an important public health concern. To assess awareness of depression, knowledge of its treatment, attitudes, stigma, and help-seeking behavior among medical university students in Sindh, a cross-sectional online survey (July–September 2025) was conducted among medical and health sciences students in Sindh (n = 387). Data were analyzed using IBM SPSS statistics version 27 to assess associations with age and gender. Results: Most participants (89.9%) recognized depression as a medical condition, and 88.9% perceived it as a serious health issue. Knowledge levels were rated as

good (51.9%), excellent (19.1%), fair (18.3%), and poor or none (10.6%). Preferred sources of help included general physicians or psychologists (8.8%). Help-seeking behavior differed significantly by gender ($p=0.023$) and age ($p=0.039$). The most commonly reported barriers were fear of judgement (42.1%), lack of awareness (18.6%), belief that depression is not real illness (16.5%), financial constraints (11.1%), and limited access to services (10.1%). Only 29.2% reported mental health workshops at their university, though 67.4% expressed willingness to attend such programs, with significant age-based differences ($p=0.012$). Despite high awareness of depression among medical students, stigma and gaps in treatment knowledge continue to limit professional help seeking. Knowing about mental health is only the first step. Without culturally sensitive and skill-based approaches, awareness rarely turns into the support people actually need.

Keywords: Depression, Medical Students, Mental Health Literacy, Stigma, Help-Seeking Behavior, Treatment Awareness, Sindh

P-05

Multi-Omics Integration for Identification of Early Biomarkers in Alzheimer's Disease Using Machine Learning Approaches

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Abstract:

Alzheimer's disease (AD) is a progressive neurodegenerative disorder in which molecular alterations begin long before clinical symptoms appear, making early diagnosis a major challenge. Existing studies often rely on single-omics approaches, which fail to capture the complex and multi-layered nature of the disease. This highlights the need for integrative strategies that can uncover robust and clinically relevant biomarkers. In this study, a multi-omics framework was employed by integrating transcriptomics, proteomics, and metabolomics datasets obtained from publicly available repositories. Differential expression analysis was performed to identify key genes, proteins, and metabolites associated with AD. Proteomics data from brain tissue were analyzed alongside transcriptomic profiles to capture disease-specific molecular changes, while additional datasets were used to assess biomarker detectability in accessible biofluids. To address the complexity of multi-omics data, integration techniques including Multi-Omics Factor Analysis (MOFA), DIABLO, and Similarity Network Fusion (SNF) were applied to identify shared molecular signatures across different omics layers. The integrated feature set was subsequently used to develop machine learning models for classification and early prediction of Alzheimer's disease. Model performance was evaluated using standard validation approaches. The study identified key molecular patterns associated with neurodegeneration, synaptic dysfunction, and metabolic imbalance. These findings demonstrate that combining multi-omics integration with machine learning provides a powerful strategy for identifying potential biomarkers and improving early detection of Alzheimer's disease.

Keywords: Alzheimer's disease, multi-omics integration, biomarker discovery, transcriptomics, proteomics, metabolomics, machine learning, early detection

P-06

Pharmacological And Toxicological Evaluation of Methyl 4-Hydroxy-2H-1,2-Benzothiazine-3-Carboxylate 1,1-Dioxide Against Haloperidol Induced Parkinson Like Symptoms in Animal Model: In-Vitro and In-Vivo Studies

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Abstract:

In Parkinson's disease (PD), degradation of dopaminergic neurons in substantia nigra causes striatal deficiency of dopamine, which results in tremors, bradykinesia with instability in posture, rigidity and shuffled gait. Prevalence of PD increases with age as from 65 to 85 years. In an attempt to devise targeted safe therapy, nanoparticles of methyl 4-hydroxy-2H-1,2-benzothiazine-3-carboxylate 1,1-dioxide (MBD) (MBDN), were prepared and their acute toxicity and safety was evaluated. Thirty-six healthy albino mice were randomly divided into six groups (n = 6): normal control, diseased control, standard (levodopa/carbidopa (100/25 mg/kg) and the remaining three groups were administered 1.25, 2.5 and 5 mg/kg MBDN during 21 days study. Except control, all mice, were injected haloperidol (1 mg/ kg i.p.) 1-h prior to treatment to induce PD. Acute toxicity test showed, no effect of MBDN on lipid profile, brain, renal and liver function and histoarchitecture of kidney, liver and heart, except decreased (p < 0.05) platelet count. Behavioral studies showed significant improvement (p < 0.001) in motor function and reduction of oxidation status in a MBDN in a dose dependent manner. Thus, the study findings revealed significance of MBDN as a selective MAO-B inhibitor for the improvement of Parkinson's symptoms in animal model.

Keywords: Parkinson's disease, Haloperidol, MAO-B inhibitor, Nanoparticles, MBDN, Acute toxicity

P-07

Impact of Gut Health on Mental Health: Exploring The Gut–Brain Axis and Future Therapeutic Strategies

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Abstract:

The gut–brain axis is a complex bidirectional communication system connecting the gastrointestinal tract and the central nervous system through neural, endocrine, immune, and

metabolic pathways. Recent advances in neuroscience and microbiology have highlighted the significant role of gut microbiota in regulating mental health, mood, cognition, and behavior. Dysbiosis, an imbalance in gut microbial composition, has been linked with several neuropsychiatric disorders including anxiety, depression, stress, and cognitive impairment. This poster aims to explore the relationship between gut health and mental well-being, emphasizing the mechanisms involved in gut–brain communication and potential therapeutic interventions. Gut microbiota contributes to the synthesis and regulation of important neurotransmitters such as serotonin, dopamine, and gamma-aminobutyric acid (GABA), which influence emotional and cognitive functions. Additionally, microbial metabolites including short-chain fatty acids (SCFAs) and tryptophan metabolites play a protective role in maintaining brain homeostasis and reducing neuroinflammation. Emerging therapeutic approaches such as probiotics, prebiotics, dietary modifications, postbiotics, and fecal microbiota transplantation (FMT) have shown promising effects in restoring microbial balance and improving mental health outcomes. Lifestyle factors including nutrition, sleep, stress management, and physical activity also contribute significantly to maintaining a healthy gut microbiome. In conclusion, gut health plays a vital role in mental health through the gut–brain axis. Understanding microbiome-based mechanisms may provide innovative and personalized therapeutic strategies for the prevention and management of mental health disorders.

Keywords: Gut–Brain Axis, Gut Microbiota, Mental Health, Dysbiosis, Probiotics, Neurotransmitters, Microbiome Therapy

P-08

Effect on AI on Mental Health

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Abstract:

Artificial Intelligence (AI) acts as a double-edged sword for mental health, offering significant opportunities for accessible, personalized care while simultaneously posing risks of increased isolation, dependency, and data privacy issues. AI-driven tools, such as conversational agents can provide immediate, 24/7 support and have shown effectiveness in reducing symptoms of depression and anxiety. However, the shift toward AI-mediated interactions may reduce human-to-human contact, potentially exacerbating feelings of loneliness and reducing emotional intelligence. AI-driven conversational agents and machine learning models show promise in reducing symptoms of anxiety and depression, they also raise concerns about digital fatigue, privacy, and reduced human connection. This dual impact highlights the need for a balanced approach, prioritizing ethical considerations and human-centric design, say the studies.

Keywords: Artificial Intelligence, Mental Health, Conversational Agents, Depression, Anxiety, Digital Fatigue, Data Privacy, Human Connection

P-09

The Impact of AI on Brain Health

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Abstract:

Artificial intelligence is increasingly shaping how people think, learn, work, and interact. The infographic presents AI as a powerful tool with both transformative benefits and significant risks for brain health. On one side, AI can enhance creativity, personalized learning, accessibility, and mental healthcare support. On the other, excessive dependence on AI may weaken memory, fragment attention, increase stress, disrupt sleep, and reduce human autonomy through misinformation and cognitive overload. The central idea is balance AI should complement human intelligence rather than replace it. The future of healthy human–AI interaction depends on ethical design, digital literacy, responsible innovation, and protecting vulnerable minds. The key takeaway is that AI itself is neither harmful nor beneficial by nature—its impact depends on how consciously and responsibly society uses it.

Keywords: Artificial Intelligence, Brain Health, Cognitive Function, Human–AI Interaction, Digital Well-Being

P-10

Quorum Sensing–Mediated Interdomain Signaling Between Gut Microbiota and Host Immune–Stress Pathways in Acetaminophen-Induced Liver Injury and Its Modulation by Terminalia (T.) arjuna Bark Extract

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Abstract:

Drug-induced liver injury, especially from acetaminophen overdose, is a growing concern due to systemic effects and secondary organ damage. Beyond hepatotoxicity, it disrupts the gut–liver axis. Quorum sensing regulates microbial–host communication, and its dysregulation may exacerbate hepatic inflammation and apoptosis. Phytochemicals from Terminalia arjuna (T. arjuna), rich in polyphenols, may restore microbial–host balance, modulate gene expression, and confer hepatoprotection. Twenty-four Wistar rats were divided into four groups: Control Negative (CN), Control Positive (CP, acetaminophen 350 mg/kg), N-acetylcysteine (NAC, 150 mg/kg), and T. arjuna ethanolic extract (TAE, 80 mg/kg). Liver injury was induced in CP via acetaminophen over 14 days; NAC and TAE groups received concurrent treatment. On day 15, animals were euthanized for sample collection. Phytochemical profiling determined total phenolic and flavonoid content. Serum catalase, GST, GPx were assayed, and liver gene expression was analyzed for inflammatory (IL-4, IL-10, IL-17a, IL-33), oxidative stress (DUOX1, DUOX2), and signaling (Myd88, STAT-2, STAT-3) pathways. Gut microbiota (Bifidobacteria, Firmicutes, Proteobacteria) were profiled with focus on QS-active taxa. TAE

contained bioactive molecules with strong antioxidant potential. Extract-treated groups showed reduced oxidative stress ($p < 0.0001$), downregulated pro-inflammatory/oxidative markers ($p < 0.0001$), and increased anti-inflammatory signaling ($p < 0.001$) vs CP. QS molecules were upregulated in TAE, supporting beneficial microbial interactions. Correlation analysis revealed a positive association between anti-inflammatory markers and beneficial bacterial taxa. T. arjuna confers hepatoprotection by modulating hepatic stress pathways and restoring QS-mediated host–microbiome interactions, highlighting its promise as a microbiota-targeted hepatoprotective agent.

Keywords: Quorum Sensing, Acetaminophen, Liver Injury, Terminalia arjuna, Gut Microbiota

P-11

Public Awareness and Knowledge About Anti Microbial Resistance (AMR)

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Abstract:

Anti-microbial resistance (AMR) has emerged as one of the most serious public health challenges of our time. This study explores the level of public awareness and knowledge about AMR through a survey-based approach. A described cross-sectional study based on a structured questionnaire which was distributed among individuals of different ages and educational backgrounds to assess their understanding of antibiotic usage, causes of resistance, and prevention methods. Students of the universities were included in the study with a minimum age of 18 years and a maximum age of 35 years. Both males and females were included. Informed consent was taken from all participants before filling up the questionnaire. Demographic measures included age, gender, year of study etc. The questionnaire further contained questions regarding AMR, Are antibiotics necessary for every infection? How can anti-microbial resistance be prevented? The data was entered and analysed by using SPSS. Mean and standard deviation were measured for quantitative variables (i.e., Age). While for qualitative variable (i.e., socio-demographic parameters) frequency and percentage were measured. Result: A total of 203 participants took part in the survey. The number of females was higher (129/63.6%) than males (74/36.4%). Over half (54%) were from non-medical backgrounds, while Pharm D students made up the largest medical group (29.7%). Surprisingly, only 16.3% were from MBBS/BDS or allied health fields. Younger participants (18–35 years) showed the highest awareness, with notable involvement even among school-level students. The study found limited awareness of antimicrobial resistance (AMR), with younger groups more engaged than older populations. Awareness programs and healthcare professionals play a vital role, highlighting the need for targeted education, especially among non-medical and older groups. The study highlights significant knowledge gaps and misconceptions about antibiotic use, stressing the urgent need for public awareness, rational prescribing, and pharmacist involvement to combat antimicrobial resistance (AMR). Strengthening education, stewardship programs, and awareness campaigns is crucial to safeguard antibiotics and protect public health.

Keywords: Antimicrobial Resistance (AMR), Antibiotic Resistance, Public Awareness, Knowledge Assessment

P-12

Exome-Wide Segregation Analysis of Mendelian Neurological Disorders in a Consanguineous South Asian Cohort

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Abstract:

Background and Rationale: Neurological disorders present a significant health challenge globally, particularly those with genetic bases that pose a significant burden on affected individuals and their families. Pakistan, with one of the world's highest rates of consanguineous marriages, presents a uniquely enriched population for the study of rare autosomal recessive disorders. This elevated rate of endogamy substantially increases the probability of homozygosity at disease-associated loci, facilitating the identification of novel pathogenic variants and candidate genes. Neuromuscular disorders (NMDs), both syndromic and non-syndromic, constitute a clinically and genetically heterogeneous group of conditions that remain significantly under characterized in South Asian populations. **Objectives:** This study aims to identify pathogenic and likely pathogenic variants in established disease-associated genes, expand the mutational spectrum of known loci, and characterize novel candidate genes in genetically unresolved cases across a large cohort of Pakistani families presenting with inherited neurological disorders. **Methods:** Participants with syndromic and non-syndromic forms of NMDs were enrolled from rural Punjab and Khyber Pakhtunkhwa provinces. Comprehensive clinical evaluation and detailed pedigree construction were performed for all participants. Genomic DNA was extracted from peripheral blood and subjected to whole-exome sequencing (WES). A multi-tiered variant filtration strategy was implemented, incorporating mode-of-inheritance derived from pedigree analysis, clinical phenotypic profiles, population allele frequency thresholds, and in-silico pathogenicity prediction tools. Candidate variants were subsequently validated through co-segregation analysis using Sanger sequencing across available family members. **Results:** Pathogenic or likely pathogenic variants were identified across the enrolled cohort, confirming the genetic basis of disease in a substantial proportion of families. Co-segregation analysis using Sanger sequencing validated candidate variants in a subset of families, confirming concordance between variant status and disease phenotype. Findings included both variants in previously established NMD-associated genes and potentially novel variants in genes not previously linked to neurological disease. **Conclusion:** This large-scale WES study underscores the diagnostic and scientific value of applying next-generation sequencing in consanguineous Pakistani families with inherited neurological disorders. These findings advance the molecular understanding of NMDs in an understudied population and have direct translational implications for genetic diagnosis, counseling, and reducing disease burden.

Keywords: Whole Exome Sequencing, Neurological Disorders, Sanger Sequencing

P-13

Hepatitis B and C: A Global Overview and Future Directions

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Abstract:

Background: Since their identification in the 1960s, hepatitis B (HBV) and hepatitis C (HCV) have represented major global health concerns, contributing to serious liver-related conditions such as jaundice, hepatic inflammation, cirrhosis, and hepatocellular carcinoma when untreated. Despite sharing some clinical manifestations, the diseases differ in terms of progression, management, and prognosis—variances often shaped by patient age, coexisting health conditions, and the quality of regional healthcare services. Methodology: This review adopted a qualitative, narrative synthesis methodology to evaluate scholarly literature on the epidemiology, treatment, and prevention of HBV and HCV. Sources were drawn from major academic databases including PubMed, Scopus, and the World Health Organization (WHO) repository, focusing on publications from 2000 to 2024. Results: Significant gaps remain in the detection and treatment of HBV and HCV, especially in low-income regions. Key drivers of disease transmission include inadequate needle hygiene, insufficient vaccination uptake, delayed medication access (especially pediatric formulations), and limited prenatal screening programs. Over 75% of global hepatitis cases are concentrated in just 20 countries. The WHO's global elimination strategy aims for a 90% reduction in new infections and a 65% reduction in HCV-related deaths by 2030. In Pakistan, 2.5% of the population tested positive for HBV surface antigen and 4.8% for HCV antibodies. Conclusion: The global fight against hepatitis B and C requires more than clinical solutions. Success hinges on a multifaceted approach—blending medical treatment with public health policy, educational outreach, and accessible care models. Achieving elimination goals will necessitate sustained international collaboration, equitable resource distribution, and investment in preventative measures at both national and community levels.

Keywords: Hepatitis B, Hepatitis C, Global Overview, Viral Hepatitis, Elimination Strategy

P-14

Trends of Erectile Dysfunction in Type 2 Diabetes Patients at a Tertiary Care Hospital of Pakistan

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Abstract:

Purpose: To compare the occurrence of erectile dysfunction (ED) in male type 2 diabetes subjects with healthy controls using IIEF questionnaires at a tertiary care unit of Karachi, Pakistan. **Method:** It was a single-centred case control study with cross sectional study design. A total of 325 subjects comprising of 75 healthy non-diabetic and 250 diabetic males were selected for the study. Male type 2 diabetics of age 18-55 years without hypertension, hormonal problems, smoking, psychological disorders, and alcoholic habits were included as cases in this study. ED was assessed by using the IIEF-5 questionnaire. SPSS-20 was used for analysis. **Results:** Diabetics were 3.6 times more prone to develop ED than non-diabetic subjects. Severe ED category was more prevalent in the diabetic group (17.12%) as compared to the non-diabetic group (p value = 0.003). IIEF scores of diabetic subjects showed an inverse correlation with age, testosterone, duration of diabetes, and fasting blood sugar at p<0.05. **Conclusion:** Occurrence of ED is high amongst type 2 diabetes subjects at older age. Further larger scale community-based studies are required to ascertain the findings of this study.

Keywords: Erectile Dysfunction, Diabetes Mellitus, IIEF

P-15

Mental Health Status of University Students of Larkana: Assessment of Depression, Anxiety, and Stress Using Standardized Psychological Scale (DASS-21)

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Abstract:

Objectives: This study assesses depression, anxiety, and stress among Larkana university students using DASS-21, examines links with sociodemographic factors, and evaluates academic, environmental, and bullying stressors. It also explores lifestyle influences like sleep and social support, and investigates how psychological distress may lead to suicidal ideation and maladaptive coping behaviors. **Methods:** This study employed a cross-sectional, observational design using convenience sampling among university students of Larkana. Participants were screened via an anonymous digital questionnaire consisting of demographic profiles, lifestyle assessments, and the standardized DASS-21 scale. Data analysis was performed using SPSS v27, utilizing descriptive statistics for prevalence and inferential tests (Chi-squared and regression) to identify significant predictors of distress. **Results:** The study findings reveal a severe mental health crisis among university students, with DASS-21 scores showing that 77.7% struggle with positive affect and 68.6% experience chronic stress. This burden is particularly acute among the 82.3% of respondents in medical fields, where 52.1% live in hostels, distanced from family support systems. About 84.3% report high academic stress, while 38.8% suffer from sleep deprivation. Nearly half of the students feel life is meaningless, with 42% reporting worthlessness. **Conclusion:** This study confirms a critical prevalence of psychological distress among university students in Larkana, mirroring global trends in high-pressure academic environments. Urgent institutional reforms are required,

including mandatory mental health frameworks, anti-bullying policies, and integrated support systems.

Keywords: Mental Health, University Students, Depression, Anxiety, Stress, DASS-21

P-16

Multi-Agent AI Clinical Decision Support System Using LLMs

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Abstract:

The increasing healthcare demand, limited clinical resources, and the intricacy of patient data have created an urgent need for intelligent, scalable decision-making systems. Traditional clinical decision support systems are inflexible, lack context awareness and semantic specificity when dealing with unstructured patient cases. To address these gaps, this research proposes a Multi-Agent AI Clinical Decision Support System (CDSS) using large language models (LLMs) for generating clinically relevant diagnoses and treatment plans. The system employs two advanced API-based LLMs—OpenAI's ChatGPT-4o and Anthropic's Claude Sonnet 4—integrated within a Retrieval-Augmented Generation (RAG) framework using FAISS and server-based Qdrant vector databases. The proposed system experiments with six pretrained embedding models—three general and three clinical. The performance of general embedding models (all-MiniLM-L6-v2, all-mpnet-base-v2, multi-qa-MiniLM-L6-cos-v1) was evaluated against three clinical embedding models (BioBERT, SapBERT, SciBERT) to enhance domain-specific semantic matching. The workflow involves the collaboration of three specialized agents: History, Diagnosis, and Treatment. The pretrained results revealed that the all-mpnet-base-v2 general embedding model attained a notable 0.9418 cosine similarity score with Claude + Qdrant configuration. Fine-tuned SapBERT attained the highest 0.9738 cosine similarity score with GPT-4o + FAISS configuration. These LLM-generated responses were semantically evaluated with the PubmedQA dataset on two patient cases.

Keywords: Multi-Agent AI, Clinical Decision Support System, LLMs, RAG, Semantic Matching

P-17

Comparative In Vitro and In Silico Study of *Salvadora persica* (Miswak) Extracts and Mouthwash Compounds on Oral Pathogens and Normal Flora

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Abstract:

Objectives: Excessive and prolonged use of commercial mouthwashes has been linked to hypertension, possibly due to the disruption of beneficial oral microbiota that convert dietary and atmospheric nitrogen into nitric oxide (NO), a key regulator of vasodilation and blood flow. This study aimed to evaluate the harmful effects of common mouthwash compounds on NO-producing oral flora and compare them with the protective role of *Salvadora persica* (Miswak), a traditional oral hygiene tool used for centuries. **Methodology:** Antibacterial activity of aqueous, methanolic, and ethanolic extracts of Miswak was carried out against *S. mutans*. Qualitative and quantitative phytochemical screening of the extracts were conducted. In silico molecular docking using AutoDock Vina was performed targeting the GTFB protein of *S. mutans* to validate wet lab findings. Binding affinities of Miswak bioactive compounds were compared with five commonly used mouthwash compounds. STITCH analysis was performed to study interactions of these compounds with beneficial NO-producing bacterial strains. KEGG pathway analysis was carried out to investigate pathways associated with NO conversion in normal bacterial flora. **Findings:** Miswak ethanolic extracts exhibited strong antibacterial activity against *S. mutans*, supported by higher docking affinity of Miswak compound Salvadoraside (-10.7) with GTFB compared to mouthwash compound citric acid (-6.0). STITCH analysis showed low interaction scores of Miswak compounds with normal flora, indicating a protective effect, while mouthwash compounds displayed high interaction scores, suggesting detrimental effects. KEGG pathway analysis confirmed the presence of nitrogen cycle genes (*nar*, *nos*) in normal flora, supporting their role in NO production.

Keywords: *Salvadora persica*, In-Silico, STITCH, Docking, KEGG

P-18

Brain–Body Interaction in the AI-Driven Era: Effects of Technology-Assisted Rehabilitation (Virtual Reality and Robotics) on Functional and Psychosocial Outcomes in Upper Extremity Disorders – A Systematic Review

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Abstract:

Background and Rationale: Upper extremity orthopaedic disorders, including distal radius fractures, proximal humerus fractures, and post-traumatic hand dysfunction, contribute significantly to functional impairment and reduced quality of life. Traditional rehabilitation approaches, although effective, are often limited by inadequate patient engagement, restricted therapy intensity, and lack of real-time feedback. In the evolving AI-driven era, technology-assisted rehabilitation modalities—particularly virtual reality (VR) and robotics—have emerged as advanced interventions that integrate principles of brain–body interaction, neuroplasticity, and motor learning. **Objective:** This systematic review aimed to critically evaluate and synthesise current evidence on the effects of technology-assisted rehabilitation (VR and robotics) on functional and psychosocial outcomes in individuals with upper extremity disorders. **Methods:** A systematic review was conducted across PubMed, Scopus, Web of Science, Cochrane Library, and Google Scholar for studies published up to March 2026. Study

selection, data extraction, and quality assessment were performed following PRISMA 2020 guidelines. Results: Five studies (n = 97 participants; 2021–2024) met the inclusion criteria. VR-based interventions demonstrated significant improvements in joint range of motion, muscular strength, motor performance, and functional disability scores compared to conventional therapy. Robotics-assisted rehabilitation showed comparable clinical outcomes to conventional therapy while providing superior objective assessment of motor function. Emerging evidence also indicated positive psychosocial effects, such as reduced anxiety, increased confidence, and enhanced patient satisfaction. Conclusions: Technology-assisted rehabilitation, encompassing VR and robotic systems, represents a transformative approach by bridging brain–body interaction and enhancing both functional and psychosocial recovery in upper extremity disorders.

Keywords: Brain–Body Interaction, Artificial Intelligence, Virtual Reality Rehabilitation, Robotic-Assisted Therapy, Upper Extremity Disorders, Functional Outcomes, Psychosocial Outcomes, Neuroplasticity, Systematic Review, PRISMA 2020

P-19

Model Development of Dextran Sodium Sulphate Induced Inflammatory Bowel Disease

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Abstract:

Inflammatory Bowel Disease (IBD), including ulcerative colitis and Crohn's disease, is a chronic inflammatory disorder of the gastrointestinal tract influenced by genetic, immune, microbial, and environmental factors. This study focuses on the development of a Dextran Sodium Sulphate (DSS)-induced experimental model of IBD to better understand disease pathophysiology and evaluate potential therapeutic approaches. DSS is a synthetic sulfated polysaccharide that disrupts intestinal epithelial integrity, leading to inflammation similar to human ulcerative colitis. In this model, mice were administered a 4% DSS solution in drinking water for seven days, while body weight, food intake, and clinical symptoms were monitored regularly. The DSS-treated mice exhibited significant signs of colitis, including rectal bleeding, diarrhea, weight loss, reduced mobility, and inflammatory damage to intestinal tissues. Histological and microbiota-related changes further confirmed successful induction of colitis. The findings demonstrate that the DSS-induced model effectively mimics human IBD and provides a reliable platform for studying gut microbiota interactions, inflammatory mechanisms, and future therapeutic interventions for inflammatory bowel disease.

Keywords: Inflammatory Bowel Disease, DSS-Induced Colitis, Ulcerative Colitis, Intestinal Inflammation, Experimental Animal Model

P-20

Effects of *Withania Somnifera* (L.) Dunal in acute pulmonary pathophysiology in a rat model of smoke induced lung injury role of IRS-1 and SOX-2

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Abstract:

The respiratory structure has a broad capacity for regeneration. The recent study was intended to determine the efficacy of *Withania somnifera* (L.) Dunal and expression levels of IRS-1 and SOX-2 genes in the smoke-induced Pulmonary Injury. The present study included 3 groups (n = 9): Normal/negative control (NC), positive control/disease control (PC), and treatment group (TG; treated orally with 350 mg/kg of ethanol extract). Lung injury was induced in PC and TG groups in rats by cigarette smoke (4 CG/day). Decapitation (n = 3) was done on the 14th, 18th, and 21st day of treatment. Phenolic acid quantification by HPLC-UV/VIS showed a significant concentration of p-coumaric acid (130.2 mg/kg) that may also contribute to the extract's efficacy. Hematological parameters (leukocytes, hemoglobin, hematocrit) and serum oxidative parameters (total oxidant status and malondialdehyde) were significantly improved ($P \leq 0.05$) in the TG compared to the PC group. Moreover, the total antioxidant capacity, total plasma protein, albumin, globulin, and platelet count significantly decreased in the PC while increasing in the treatment group ($P \leq 0.05$). Histology showed damaged histological structures in the PC group, while there was obvious regeneration of architectural damage in the TG group. The IRS-1 and SOX-2 genes were up-regulated in the PC group, indicating the role of IRS-1 and SOX-2 gene expression in tissue homeostasis and regeneration in smoke-induced Pulmonary Injury. These results rationalize the traditional use of *W. somnifera* in pulmonary diseases and encourage further studies to exploit it in the pharmaceutical industry.

Keywords: Smoke-Induced Lung Injury, HPLC-UV/VIS, *W. Somnifera*, Acute Pulmonary, Oxidative Stress

P-21

Machine Learning-Driven Pharmaceutical Nanotechnology for Targeted Drug Delivery in Neuropsychiatric Disorders

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Abstract:

Neuropsychiatric disorders remain difficult to treat due to the blood-brain barrier (BBB), which severely limits drug delivery to the brain. This study highlights the emerging role of machine

learning (ML) in pharmaceutical nanotechnology for developing intelligent nanocarriers optimized for targeted brain delivery. By integrating ML algorithms with nanoparticle design, we enable rapid prediction and optimization of key parameters such as size, surface chemistry, and drug release profiles to enhance BBB penetration and site-specific delivery in depression and neurodegeneration models. These AI-driven approaches significantly improve therapeutic efficacy while reducing development time and off-target effects. This interdisciplinary strategy represents a powerful advancement toward precise, effective, and personalized nanomedicine solutions of neuropsychiatric disorders.

Keywords: Machine Learning (ML), Pharmaceutical Nanotechnology, Targeted Drug Delivery, Neuropsychiatric Disorders, Blood-Brain Barrier (BBB), Artificial Intelligence (AI), Nanoparticle Design, Personalized Nanomedicine, Therapeutic Efficacy

P-22

Multi-Organ Protective Potential of Magnesium Oxide-Zinc Gluconate Combination Supplementation in Rtas: A Proposed Experimental Study

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Abstract:

Inflammation and oxidative stress are key contributors to multi-organ injuries, as evidenced in Acetaminophen induced hepatic injury and acetic acid-induced colitis experimental models. Magnesium oxide (MgO) and zinc gluconate are essential micronutrients with well-established anti-inflammatory and antioxidant properties, making them promising elements for multi-organ protection. This proposed study aims to evaluate the multi-organ protective potential of Magnesium oxide and Zinc Gluconate combination supplementation in rat experimental models of inflammatory bowel disease (IBD) and acute liver injury. Wistar albino rats will be divided into four groups: normal control, positive control, low-dose MgO+ZnG, and high-dose MgO+ZnG, with oral gavage as the route of administration. The study will assess inflammatory markers (C-reactive protein), oxidative stress parameters, organ function markers, and histopathological changes in intestinal and hepatic tissues. The findings are expected to demonstrate dose-dependent protective effects of MgO & Zinc Gluconate combination therapy, providing a scientific basis for its use as an adjunct treatment in inflammatory and oxidative stress-related multi-organ disorders.

Keywords: Magnesium Oxide, Zinc Gluconate, Inflammatory Bowel Disease, Acute Liver Injury, Oxidative Stress

P-23

Neuro-Inflammation: A Key Link Between Brain Disorder and Biomedicine

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Abstract:

Neuroinflammation has emerged as a central mechanism linking diverse brain disorders with broader biomedical processes. It refers to the activation of the brain's innate immune system, primarily mediated by microglia and astrocytes, in response to injury, infection, or pathological stimuli. While acute neuroinflammatory responses can be protective facilitating tissue repair and pathogen clearance chronic or dysregulated inflammation contributes to neuronal dysfunction and degeneration. Increasing evidence implicates neuroinflammation in the pathogenesis of major neurological and psychiatric conditions, including Alzheimer's disease, Parkinson's disease, multiple sclerosis, and depression. At the molecular level, neuroinflammation is characterized by the release of pro-inflammatory cytokines, chemokines, and reactive oxygen species, along with disruption of the blood brain barrier. These processes not only exacerbate neuronal damage but also create feedback loops that sustain and amplify inflammatory signaling. Importantly, systemic inflammation originating from peripheral conditions such as metabolic disorders, infections, or autoimmune diseases can influence brain function, highlighting a bidirectional communication between the central nervous system and peripheral immune pathways. Recent advances in biomedicine have underscored the translational potential of targeting neuroinflammatory pathways. Novel therapeutic strategies, including anti-inflammatory drugs, immunomodulators, and lifestyle interventions, are being explored to mitigate disease progression and improve clinical outcomes. Furthermore, biomarkers of neuroinflammation are gaining attention for early diagnosis and monitoring treatment responses. In conclusion, neuroinflammation serves as a critical intersection between brain disorders and biomedical science, offering new insights into disease mechanisms and therapeutic innovation. Understanding its dual role as both a protective and pathological process is essential for developing effective interventions in modern neuroscience and medicine.

Keywords: Neuroinflammation, Brain Disorders, Microglia, Neurodegeneration, Blood-Brain Barrier, Biomarkers, Immunomodulation.

P-24

Diagnostic Accuracy of AI-Based Drug-Drug Interaction Tools Compared to Standard Clinical Databases: Implications for Patient Safety

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Abstract:

Drug-drug interactions are the major cause of adverse effects worldwide leading to increased morbidity and mortality. Traditional methods like Lexi comp and Micromedex are widely used for DDI screening however emerging AI models like language models (LLMs) and AI-integrated clinical decision support systems (CDSS) offer better results. While prior reviews have focused on computational DDI prediction in drug development real-world diagnostic accuracy of AI-based tools remains largely untested. To systematically evaluate and compare the diagnostic accuracy (sensitivity, specificity, and predictive values) of AI-based DDI interaction tools with standard clinical databases, and to examine their implications for patient

safety in clinical practice. A systematic review is being conducted while the material for studies is being collected from PubMed, Embase, Google Scholar, Research gate following PRISMA guidelines. The articles are being collected from 2018 to present. Studies comparing AI-based DDI tools with standard clinical databases reporting sensitivity, specificity, or accuracy metrics will be included. Risk of bias will be assessed using the QUADAS-2 tool. Preliminary evidence suggests that there is variability in the working/sensitivity of AI-based tools, particularly in polypharmacy while standard databases give us more consistent results. The final analysis is expected to highlight critical gaps in AI performance and their potential impact on patient safety. This systematic review is being done to know the comparative evaluation of diagnostic accuracy of AI based drug drug interaction tools and standard clinical database in clinical settings. The findings are expected to inform clinicians, pharmacists, and policymakers how much AI tools are effective in predicting drug drug interactions and helpful in patient safety.

Keywords: Artificial intelligence, Drug-drug interaction, Diagnostic accuracy, Clinical decision support system, Polypharmacy

P-25

A Comparative Analysis Between Physical Inactivity and Blood Glucose Levels in University Students

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Abstract:

Introduction: Physical inactivity is one of the major lifestyle factors contributing to abnormal blood glucose regulation and an increased risk of developing type 2 diabetes. When the body remains inactive for long periods, glucose uptake by muscles decreases because muscle contractions play a key role in utilizing blood glucose for energy. This leads to higher circulating glucose levels and, over time, insulin resistance. Young adults today often have sedentary routines involving prolonged screen time and reduced physical movement, making it important to study how their activity patterns relate to blood glucose levels. **Objectives:** 1. To assess physical activity levels among university students using the IPAQ-Short Form. 2. To measure blood glucose levels in university students. 3. To determine the relationship between different levels of physical activity and blood glucose values. 4. To identify the potential risk of impaired glucose regulation associated with sedentary behavior in young adults. **Methodology:** A cross-sectional survey for 2 months was conducted among young adults aged 18-28 years old. Data were collected using a structured questionnaire that included the International Physical Activity Questionnaire (IPAQ-Short Form) to assess physical activity levels and additional items about diet, sleep, and family history of diabetes. Random or fasting blood glucose levels of 40 participants were measured using a portable glucometer. A total of 160 participants were included in the study. Data were analyzed using descriptive statistics and correlation tests to determine the relationship between physical activity levels and blood

glucose values. Results: A total of 160 young adults (aged 18-28 years) participated in the study. Of these, 40 completed both the IPAQ questionnaire and blood glucose testing, while 120 completed only the survey. The mean age was 21.6 ± 2.4 years; 58% were females. According to IPAQ results, 42% had low activity, 38% moderate, and 20% high. The average sitting time was 4 hours/day, reflecting sedentary habits. Among tested participants, the mean fasting glucose was 95.7 ± 10.4 mg/dL. Those with low activity had higher glucose levels (102.4 ± 9.8 mg/dL) than the highly active group (88.7 ± 7.9 mg/dL). A moderate negative correlation ($r = -0.42$, $p < 0.01$) was found between physical activity and blood glucose. Discussion: The findings of this study show that physical inactivity is associated with higher blood glucose levels among university students. Participants with low physical activity exhibited elevated glucose values compared to those with higher activity levels, indicating the negative impact of sedentary behavior on glucose metabolism. The moderate negative correlation observed suggests that increased physical activity helps in maintaining normal blood glucose levels. The high average sitting time reflects a sedentary lifestyle common in young adults, which may increase the risk of early metabolic disturbances. These results support existing evidence that regular physical activity plays an important role in preventing impaired glucose regulation and reducing future diabetes risk. Conclusion: The study found that higher physical inactivity was associated with elevated blood glucose levels among young adults. These findings suggest that even in early adulthood, sedentary behavior can negatively affect glucose metabolism and increase the risk of prediabetes. Promoting regular physical activity such as daily walking, sports, or exercise could be an effective preventive strategy to maintain healthy blood sugar levels and reduce future diabetes risk.

Keywords: Physical Inactivity, Diabetes, Blood Sugar Level, Youth, University Student

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Harnessing the Gut-Brain Axis: Probiotic Supplementation Attenuates Amphetamine-Induced Dependence and Anxiety in a Rodent Model

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Abstract:

Amphetamine use disorder represents a significant global health challenge with no FDA-approved pharmacotherapy, necessitating the exploration of novel therapeutic targets such as the gut-brain axis. Chronic amphetamine abuse induces gut pathology, including dysbiosis, increased intestinal permeability, and systemic inflammation, which contribute to neurochemical dysregulation and addictive behaviors. This study investigated the potential of a multi-strain probiotic (Ecotac) to attenuate amphetamine-induced neurochemical alterations in a male Wistar rat model. Rats were divided into four groups: Water-Water, Water-

Amphetamine, Probiotic–Water, and Probiotic–Amphetamine, and treated for two weeks. Neurochemical analysis revealed that chronic amphetamine administration significantly disrupted monoaminergic balance, characterized by alterations in dopamine, serotonin, and their metabolites (e.g., DOPAC, HVA, and 5-HIAA) in key brain regions, namely the prefrontal cortex, caudate, and nucleus accumbens. Additionally, oxidative stress markers were assessed in both brain and plasma, revealing increased lipid peroxidation and reduced antioxidant enzyme activities, including superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GSH-Px) following amphetamine exposure. Probiotic co-treatment markedly restored neurotransmitter level equilibrium and significantly improved antioxidant defense systems by reducing oxidative stress and normalizing antioxidant enzyme activity. These findings suggest that probiotic supplementation reduces amphetamine-induced neurochemical and oxidative damage. The proposed mechanisms may involve restoration of gut barrier integrity, modulation of microbial-derived neuroactive metabolites such as short-chain fatty acids and GABA, and attenuation of systemic and neuroinflammation. This research validates the gut-brain axis as a promising target and positions probiotic interventions as a novel, non-dopaminergic strategy for managing amphetamine dependence.

Keywords: Gut-Brain Axis, Probiotic, Amphetamine, Anxiety, Neurochemical

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Therapeutic Effect of Silver Nanoparticles on Wet Gangrene and Diabetic Foot

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Abstract:

Background: Diabetic foot ulcers (DFUs) and wet gangrene are among the most serious complications of diabetes, often leading to infection, prolonged hospitalizations, and amputation. Traditional wound management strategies have limited efficacy due to microbial resistance, impaired healing, and chronic inflammation. Silver nanoparticles (AgNPs) have gained attention as a novel therapeutic agent because of their strong antimicrobial properties and potential to accelerate wound repair. **Objectives:** To systematically review the therapeutic effects of silver nanoparticles in the treatment of diabetic foot ulcers and wet gangrene, focusing on mechanisms of action, clinical efficacy, safety, and formulation strategies. **Methods:** Following PRISMA guidelines, a comprehensive literature search was conducted across PubMed, Scopus, and Web of Science, including all study types that evaluated AgNP-based therapies for DFUs or gangrene. **Results:** A total of 35 studies met the inclusion criteria. Clinical evidence indicates that AgNP dressings significantly improve healing rates and reduce time to closure compared with standard wound dressings. Preclinical studies demonstrate that AgNPs accelerate epithelialization, collagen deposition, and angiogenesis, while reducing bacterial burden. Mechanistically, AgNPs disrupt microbial membranes, generate reactive oxygen species, and inhibit biofilm formation, while simultaneously stimulating keratinocyte and fibroblast proliferation and modulating inflammation. **Conclusions:** Silver nanoparticles

represent a promising adjunctive therapy for diabetic foot ulcers and wet gangrene due to their dual antimicrobial and wound-healing properties. Careful formulation and dosing are essential to minimize toxicity while maximizing therapeutic benefits.

Keywords: Silver Nanoparticles, Diabetic Foot Ulcers, Wet Gangrene, Wound Healing, Antimicrobial

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**Behavioral Modulation of Sleep: The Role of Sleep Hygiene in Insomnia Management;
A Psychophysiological Evaluation in Young Adults**

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Abstract:

Background: Sleep is a fundamental physiological process which is essential for maintaining physical health, emotional regulation and optimal cognitive functioning. Despite its importance, poor sleep quality and insomnia are very prevalent among young adults, which is often driven by academic pressures, irregular routines, and inadequate sleep hygiene practices. Persistent sleep disturbances in this population can contribute to long-term health consequences including cardiometabolic disorders and psychological conditions such as anxiety and depression. **Objective:** This study aimed to evaluate the effectiveness of sleep hygiene practices as a non-pharmacological intervention for improving sleep quality and reducing insomnia severity in young adults. **Methodology:** A randomized control trial was conducted involving participants aged 18-25. Participants were randomly assigned to either a control group (no intervention) or an intervention group, who followed a 4-week sleep hygiene program. Subjective measures included Pittsburgh Sleep Quality Index (PSQI), Sleep Hygiene Index (SHI) and Insomnia Severity Index (ISI). Objective data was recorded through a smartphone app called Sleep Cycle. Statistical analysis included analysis of co-variance (ANCOVA) for subjective outcomes and mixed model linear regression for objective data. **Results:** The intervention produced significant improvement in individuals with poor sleep quality and elevated insomnia severity across subjective sleep measures. Average PSQI score decreased from 11.3 to 7.9 ($p=0.006$) while no change was observed in the control group. Notable reduction was also recorded in ISI scores from 18.8 to 5.1 ($p=0.059$) indicating a meaningful improvement in symptom severity. Objective findings further supported these results, demonstrating a significant reduction in sleep latency (-2.82 minutes per week, $p=0.003$). **Conclusion:** A structured four-week sleep hygiene intervention effectively improves sleep quality and reduces insomnia severity in young adults with elevated insomnia severity scores and poor sleep quality.

Keywords: Sleep Hygiene, Sleep Quality, Insomnia, Pittsburgh Sleep Quality Index, Non-Pharmacological Intervention

Better Nights, Brighter Days: Sleep Hygiene and Aromatherapy in Combating Daytime Sleepiness

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Abstract:

Background: Sleep is an important physiological process which is important for physical health, emotional stability and cognitive functioning. According to recent studies, young individuals have reported sleep disturbances due to modern gadget usage, academic stress and irregular lifestyle. Chronic poor sleep is associated with serious long-term risks including tachycardia, hypertension and other psychological disorders. **Objective:** This study aimed to determine the effectiveness of sleep hygiene specifically for individuals experiencing daytime sleepiness, and also determine the effectiveness of aromatherapy in enhancing overall sleep quality and behavioural adherence. **Method:** A randomized control trial was conducted with participants aged 18 to 25, where subjects were assigned randomly into two groups—a control group and a four-week sleep hygiene intervention group. The participants reported their subjective data through the Epworth Sleepiness Scale (ESS) to measure daytime sleepiness, the Pittsburgh Sleep Quality Index (PSQI) to measure sleep quality, and the Sleep Hygiene Index (SHI). Objective data was tracked via the Sleep Cycle smartphone application. Statistical significance was determined using analysis of covariance (ANCOVA) and Mixed Linear Models. **Results:** In participants with daytime sleepiness (n=16), the intervention group (n=11) showed a reduction in mean ESS from 15.54±5.41 to 7.5±7.0, compared to the control group (n=5), which only dropped from 10.0±3.8 to 16.6±4.97. Aromatherapy combined with sleep hygiene (n=42): the intervention group (n=21) showed a strong effect on sleep quality (ANCOVA: $p < 0.001$, partial $\eta^2 = 0.694$) and a moderate effect on sleep hygiene behaviors ($p = 0.033$). **Conclusion:** The structured four-week sleep hygiene program is highly effective as a non-pharmacological intervention in reducing daytime sleepiness, promoting cognitive functioning and alertness. The inclusion of aromatherapy provides additional significant benefits for further enhancing the subjective sleep quality and stabilizing sleep patterns.

Keywords: Sleep hygiene; Daytime sleepiness; Aromatherapy; Sleep quality; Epworth Sleepiness Scale; Non-pharmacological intervention

Prevalence of Cognitive Decline Associated with Temperament Among Youth of Karachi: A Cross-Sectional Study

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Abstract:

Background: Cognitive decline is reduced memory, attention, learning, and decision-making. Though age-related, it is rising in youth due to stress, poor sleep, nutrition, and excessive digital use. Cognitive decline involves impaired neural homeostasis, reduced neuroplasticity, and dysfunction of neuroendocrine, metabolic, and immune pathways affecting the central nervous system. This descriptive cross-sectional research was conducted from September to October 2025. **Objectives:** 1. To assess the level of cognitive decline among youth. 2. To evaluate the relationship between cognitive decline and quality of life among youth with their temperament and maltemperament. **Methodology:** A cross-sectional study was conducted among 130 individuals aged 17–25 years. Cognitive performance was assessed using the Cognitive Failure Questionnaire, and Unani parameters were evaluated through a structured questionnaire based on Al-Qanoon fi'l-Tibb. Data were analyzed using SPSS version 26. **Results:** A statistically significant association was found between maltemperament and cognitive status ($p < 0.05$). Participants with balghami (phlegmatic) maltemperament showed a higher prevalence of cognitive decline, whereas those with safrawi (bilious) maltemperament demonstrated preserved cognitive abilities. **Conclusion:** These findings validate that maltemperament (dyscrasia) influences cognitive performance. Correction of maltemperament may play a key role in preventing and managing cognitive deterioration among youth.

Keywords: Cognitive Decline, Youth, Unani Medicine, Temperament (Mizaj), Sue Mizaj Dimagh, Balghami Temperament, Cognitive Performances

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Non-Pharmacological Auditory Intervention for Sleep: A Psychophysiological Comparison in Shift Workers

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Abstract:

Background: Night shift workers are especially susceptible to sleep disturbances due to irregular work schedules, circadian rhythm misalignment, and stress. These disruptions negatively impact mental, physical and overall health. Relaxing music is one of the non-pharmacological interventions that has gained attention for improving sleep quality. **Objective:** To evaluate the impact of relaxing music (nature sounds) on the sleep quality of night shift workers. **Method:** A randomized controlled trial was conducted over a two-week period and included 30 participants aged 20 to 40 years, comprising night shift workers recruited from call centres, universities, and software companies in Karachi, Pakistan. Participants were randomly divided into two groups: the intervention group and the control group: The intervention group listened to relaxing nature sounds for 20 minutes, and the control group did not receive any

intervention. Sleep quality was measured using two validated scales, PSQI and SQS, administered before and after the intervention. Results: Among night shift workers, the intervention group showed a significant improvement in sleep quality, as demonstrated by a reduction in mean PSQI scores from 8.13 ± 3.16 at baseline to 5.87 ± 3.02 post intervention ($p < 0.05$). In contrast, the control group demonstrated a minimal decrease in PSQI scores (7.00 ± 3.25 to 6.73 ± 3.43). For assessing subjective sleep quality, SQS scores showed a slight decrease from 35.47 ± 10.86 to 34.00 ± 12.26 in intervention group, while a control group showed a greater reduction from 38.40 ± 13.85 to 30.47 ± 11.03 . However, these changes in SQS scores were not statistically significant ($p > 0.05$). Conclusion: Relaxing music especially natural sounds, appears to be an effective, non-pharmacological strategy for improving the quality of sleep of night shift workers. Without the risks associated with medication, incorporating mindfull music listening into regular sleep routines may help reduce sleep issues and improve overall wellbeing.

Keywords: Sleep Quality, Relaxing Nature Sounds, Night Shift Workers, Non-Pharmacological Intervention, PSQI, SQS

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Better Sleep with Nature Sounds: A Study in Day Shift Workers

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Abstract:

Background: Day shift workers often experience sleep issues due to work-related stress, circadian rhythm disruption, and irregular sleep-wake cycles. Poor sleep quality has detrimental effects on the mind, body and emotions. Relaxing music is one non-pharmacological intervention that has gained popularity as a safe and cost-effective way to enhance the quality of sleep. Objective: To evaluate the impact of relaxing music (nature sounds) on quality of sleep in day shift workers. Methods: A randomized controlled trial was performed over a two-week period and included 32 participants aged 20 to 40 years, comprising day shift workers recruited from call centres, universities, schools, and software houses in Karachi, Pakistan. Participants were randomly divided into two groups: the intervention group and the control group. The control group received no intervention, while the intervention group listened to relaxing natural sounds for 20 minutes. To measure the sleep quality, two validated scales, PSQI and SQS, were used both before and after the intervention. Results: After the intervention, improvement was observed in the sleep quality of day shift workers. Improved subjective sleep quality was indicated by the mean PSQI score, which dropped from 6.81 ± 3.51 at baseline to 5.18 ± 2.60 after the intervention ($p < 0.05$). The PSQI scores of the control group increased slightly from 5.87 ± 2.76 to 6.37 ± 2.65 , indicating no improvement. SQS scores did not significantly change in either the intervention or control groups ($p > 0.05$). Conclusion: Relaxing music, especially natural sounds, seems to be a safe, successful, non-pharmacological

intervention for enhancing the quality of sleep of day shift workers. Incorporating mindful music listening into regular sleep practices may help lessen sleep problems and improve general wellbeing.

Keywords: Sleep quality, relaxing music, nature sounds, non-pharmacological intervention, day shift workers, PSQI, SQS

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Improving Maternal Sleep: Results from a Tailored sleep hygiene Intervention

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Abstract:

Mothers of infants and toddlers frequently experience sleep disturbances due to caregiving demands and psychological stress, adversely affecting maternal well-being. While sleep hygiene is a recognized non-pharmacological approach, data on interventions tailored specifically for postpartum mothers remains limited. Objective: To evaluate the effect of a tailored sleep hygiene intervention on maternal sleep quality and hygiene practices, accounting for baseline characteristics. Methods: A randomized controlled trial was conducted in Karachi, Pakistan, among mothers with poor sleep (PSQI>5; SHI>16). After block randomization, 29 participants were analyzed: Intervention (n=14) and Control (n=15). The intervention group received two weeks of personalized sleep hygiene education, including relaxation and deep breathing techniques, while the control group received standard care. Outcomes were measured using the Pittsburgh Sleep Quality Index (PSQI) and Sleep Hygiene Index (SHI). Analysis of Covariance (ANCOVA) was employed, using baseline scores as covariates. Results: The intervention group showed significant improvements compared to the control group. For sleep quality (PSQI), the adjusted mean difference was -3.39 (p=0.001; 95% CI: [-5.27, -1.50]) with a large effect size (partial $\eta^2=0.344$). Raw scores improved from 9.00 ± 2.32 to 5.29 ± 1.89 in the intervention group, remaining stable in the control group. For sleep hygiene (SHI), the adjusted mean decrease was -8.37 (p< 0.001; 95% CI: [-12.24, -4.50]), with an effect size of partial $\eta^2=0.431$. Intervention SHI scores improved (21.79 ± 3.33 to 17.21 ± 4.44) while control scores declined (20.60 ± 5.17 to 25.13 ± 5.81). Conclusion: The tailored sleep hygiene program significantly improved maternal sleep quality and habits regardless of baseline severity. Despite potential attention bias, the strong effect sizes suggest this low-cost intervention is an effective strategy for enhancing maternal sleep health.

Keywords: Sleep Hygiene, Maternal Health, Sleep Quality, PSQI, SHI, Randomized Controlled Trial

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Fabrication of transdermal drug in adhesive patches for stress modulation A characterization and optimization study

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Abstract:

The present study was aimed at the formulation and evaluation of drug-in-adhesive transdermal patches of Buspirone for the management of anxiety. Buspirone, owing to its extensive first-pass metabolism and low oral bioavailability, was selected as a suitable candidate for transdermal delivery. Transdermal patches were prepared using varying concentrations of adhesive matrix along with lavender oil as a permeation enhancer. The patches were fabricated by solvent casting method and evaluated for physicochemical properties and in-vitro drug release. Dissolution studies were carried out using phosphate buffer (pH 7.4) as the dissolution medium, and drug release was analyzed using UV spectrophotometry at 239 nm after preparing a suitable calibration curve. The results indicated that drug release increased with time, demonstrating a controlled release pattern. The optimized formulation (4 cm² patch containing 40 mg drug per 100 cm²) showed approximately 37% drug release within 3 hours. Variations in adhesive concentration significantly influenced the release profile, where higher adhesive content resulted in slower drug release. Minor fluctuations in absorbance values were observed due to sampling dilution effects during dissolution studies. Overall, the study concludes that Buspirone transdermal patches can be successfully developed using a drug-in-adhesive approach, providing controlled drug release. The formulation holds potential as an alternative to oral therapy for improved patient compliance and therapeutic efficacy.

Keywords: Buspirone; Transdermal Drug Delivery; Drug-in-Adhesive Patch; Controlled Release; Anxiety Management

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Assessment of Knowledge and Awareness Regarding the Role of Inflammatory Markers in Antidepressant Resistance Among Healthcare Students

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Abstract

Depression is a complex and multifactorial disorder, and a considerable number of patients fail to respond adequately to standard antidepressant therapies, resulting in antidepressant resistance. Emerging evidence highlights the role of inflammation—particularly biomarkers such as interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF- α), and C-reactive protein (CRP)—in the development and progression of depression, as well as in treatment resistance. Despite growing scientific interest, awareness and detailed understanding of this relationship among healthcare students remain uneven, emphasizing the need for improved education and integration of this concept into academic curricula. A cross-sectional survey was conducted among 551 healthcare students using a structured, self-administered questionnaire. Participants included students from various disciplines, with Pharm-D (44.3%, n=244) and MBBS (28.3%,

n=156) representing the largest groups. The questionnaire assessed demographic characteristics, training background, awareness of antidepressant resistance, knowledge of inflammatory markers, and perceptions regarding their clinical significance. Data were analyzed using descriptive statistics and chi-square testing through SPSS. The study included 551 participants, with Pharm-D students (44.3%, n=244) and MBBS students (28.3%, n=156) forming the majority. Most respondents were undergraduates (80.9%, n=446), followed by graduates (15.1%, n=83) and postgraduates (4.0%, n=22). Formal mental health training was reported by 61.7% (n=340). Awareness of antidepressant resistance was observed in 67.5% (n=372) and showed a highly significant association with training ($\chi^2 = 123.30$, $p < 0.001$). Similarly, 56.6% (n=312) were familiar with inflammatory markers ($\chi^2 = 142.37$, $p < 0.001$). A strong majority demonstrated correct conceptual understanding: 87.3% (n≈481) agreed that inflammation affects neurotransmitter systems ($\chi^2 = 59.97$, $p < 0.001$), while 80.6% (n≈444) recognized the role of cytokines in neurotransmitter metabolism. Additionally, 69.7% (n≈384) acknowledged inadequate response to antidepressants ($\chi^2 = 41.28$, $p < 0.001$). From a clinical perspective, 67.9% (n≈374) supported combination therapy ($\chi^2 = 39.61$, $p < 0.001$), 63.5% (n≈350) believed that high inflammation requires modified treatment ($\chi^2 = 34.72$, $p < 0.001$), and 57.4% (n≈316) recognized anti-inflammatory drugs as adjunct therapy ($\chi^2 = 29.84$, $p < 0.001$). Overall, although the majority showed awareness and a positive inclination toward the role of inflammation in antidepressant resistance, awareness and detailed understanding remain limited. These findings highlight the need to integrate this field into academic curricula and clinical practice, and emphasize that further research is required to better define this relationship. The findings suggest that while a majority of participants recognize the importance of inflammatory processes in depression, their knowledge remains uneven. Responses to open-ended questions particularly highlight gaps in detailed understanding, indicating that awareness does not always translate into comprehensive knowledge. This reflects a broader need for enhanced educational strategies, especially within healthcare training programs, to bridge the gap between basic awareness and clinical application. In conclusion, the study demonstrates that although most participants believe that inflammation—particularly IL-6, TNF- α , and CRP—plays a significant role in the development of depression and antidepressant resistance, overall awareness and in-depth understanding remain limited. The variability in participant responses further indicates that knowledge is uneven across the sample. These findings underscore the need to strengthen awareness and education among healthcare students and to integrate this emerging concept into both academic curricula and clinical practice. Furthermore, additional research is required to better define the relationship between inflammatory mechanisms and antidepressant resistance, ultimately contributing to improved treatment strategies.

Keywords: Depression; Antidepressant Resistance; Inflammation; Inflammatory Biomarkers; Healthcare Students; IL-6; TNF- α ; C-Reactive Protein

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Prevalence Of Type 2 Diabetes an Youth And its Association with Stress, Sleep Patterns, and Screen Time: A Cross-Sectional Study

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Abstract:

Background: Type 2 Diabetes Mellitus (T2DM), once considered an adult-onset disorder, is increasingly prevalent among younger populations. According to the World Health Organization (WHO), the global prevalence of T2DM in individuals under 25 has nearly doubled over the past decade. Emerging evidence emphasizes the significant yet underrecognized influence of psychosocial stress, inadequate sleep, and excessive screen time on metabolic health and diabetes risk. **Objective:** This study aimed to examine the associations between perceived stress, sleep patterns, and daily screen exposure with established risk markers of Type 2 diabetes among adolescents and young adults. **Methods:** A cross-sectional survey was conducted using a structured, pre-tested questionnaire to collect data on sociodemographic factors, stress, sleep habits, screen time, and physical activity. Descriptive statistics, correlation testing, and multivariable regression analyses were performed to identify independent associations between lifestyle factors and diabetes risk markers. **Results:** Among participants, 51% were aged 18-25 years; 58% used screens before sleep, and 32% spent over 7 hours daily on screens. About 42% reported sleeping less than 5 hours per night, 38% stayed awake after midnight, and 97% experienced academic stress. Only 24% engaged in regular physical activity. **Conclusion:** Stress, poor sleep, and excessive screen time are overlooked yet critical contributors to T2DM risk in youth. Implementing preventive strategies such as awareness campaigns, free diabetes screening camps, health education programs, and lifestyle interventions within educational institutions is essential to mitigate this growing concern.

Keywords: Type 2 Diabetes Mellitus, Stress, Sleep Patterns, Screen Time, Youth, Lifestyle Factors, Insulin Resistance

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Role of Pharmacists in Implementing Personalized Medicine in Sindh

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Abstract:

Background: Personalised Medicine (PM) tailors drug therapy using genetic, biomarker, and lifestyle data for maximum efficacy and safety. PM implementation in Sindh is limited by fragmented diagnostics and traditional pharmacy practice. Given Sindh's high burden of G6PD deficiency, clopidogrel resistance, and warfarin sensitivity, pharmacists must expand from dispensing to leading precision-based pharmacotherapy. **Objective:** To assess awareness, familiarity, and attitudes of PharmD students, pharmacists, doctors, and medical students in Sindh regarding PM and pharmacists' role in implementation. **Methodology:** A cross-sectional

online survey of 399 healthcare students and professionals in Sindh was conducted via Google Forms using convenience sampling through academic WhatsApp groups. The questionnaire assessed PM awareness, pharmacogenomics knowledge, attitudes toward pharmacist-led implementation, and barriers. Participants included pharmacy students (47.2%), medical students (40.9%), pharmacists (6.2%), and doctors (5.7%). Data were analyzed using descriptive statistics. Results: Among 399 respondents, 66% were aware of PM but 55% lacked formal training. While 75% agreed/strongly agreed pharmacists should implement PM, only 24.3% were very familiar with pharmacogenomics. Key contribution areas were patient counseling (33%) and side effect monitoring (30.8%). Major barriers were lack of knowledge (36.6%) and high cost (25.5%). Curriculum inclusion was supported by 58.2%. Conclusion: This study reveals strong support for pharmacist-led PM implementation in Sindh, with 75% endorsing the role despite only 24.3% being very familiar with pharmacogenomics. Findings underscore the urgent need for PM-focused curricula, pharmacist training programs, and improved genetic testing infrastructure to translate positive attitudes into clinical practice.

Keywords: Personalized medicine, Pharmacogenomics, Biomarker, Genetic testing, Pharmacist
