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International Sci- Arts Conference



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ABSTRACTS BOOK OF

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Vegetation Dynamics as a Determinant of Ecosystem Resilience under Global Climate Change

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Vegetation dynamics are central to ecosystem resilience, mediating the capacity of terrestrial systems to withstand and recover from climate-induced disturbances. Recent global analyses using remotely sensed vegetation indices and resilience metrics demonstrate that vegetation resilience is closely associated with water availability. Higher resilience is typically observed in regions with greater precipitation and lower inter-annual variability. However, increased precipitation variability, temperature extremes, and anthropogenic pressures have led to widespread declines in resilience, particularly in tropical, arid, and temperate regions. Over 60% of global ecosystems have shifted from increasing to declining resilience trends in recent decades. Future projections under high-emission scenarios (SSP5-8.5) suggest that resilience loss will intensify, particularly in cold and equatorial regions. Vegetation growth, as measured by NDVI and LAI, has generally increased in many regions, yet this does not uniformly translate to enhanced resilience. In equatorial and high-latitude ecosystems, resilience degradation occurs despite greening trends, highlighting the complex interplay between vegetation productivity and system stability. The time-lag and accumulation effects of climate drivers—such as temperature, precipitation, and solar radiation—play a critical role in shaping vegetation responses. These lag periods can range from less than a month to several months, depending on vegetation type and prevailing climatic conditions. Human activities, such as land use change and grazing, exert spatially heterogeneous impacts on ecosystems. In some cases, these pressures can offset or even reverse the positive effects of climate amelioration. Modeling studies and empirical evidence underscore the multidimensional nature of resilience, with metrics such as recovery rate, autocorrelation, and variance capturing different aspects of ecosystem response. Notably, forests with historically high disturbance regimes may retain resilience longer but are also at greater risk of abrupt regime shifts under escalating climate stress. These findings emphasize the urgent need for adaptive management and climate mitigation strategies to sustain ecosystem resilience in the face of accelerating global change.

Keywords: vegetation dynamics, ecosystem resilience, climate change, remote sensing, disturbance regimes

Evaluation of Antibacterial Activity of Ethanolic, Methanolic, And Acetonic Extract of Fagonia Cretica against E. Coli Isolated From Labeo Rohita

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The present study investigated the extractive efficiency and antibacterial potential of *Fagonia cretica*, a medicinal plant traditionally used to treat infections, using three solvents of varying polarities: ethanol, methanol, and acetone. A total of 25 g of dried plant powder was extracted separately with 250 mL of each solvent. The extractive yields were highest with methanol (16.4%), followed by ethanol (11.6%) and acetone (7.2%), demonstrating the influence of solvent polarity on extraction efficiency. Despite its lower extractive value, the acetone extract exhibited the strongest antibacterial activity against *Escherichia coli*, indicating that potent bioactive compounds were selectively extracted in smaller amounts. All extracts demonstrated concentration-dependent antibacterial effects, with higher concentrations producing larger zones of inhibition, confirming the efficacy of the extracts in suppressing bacterial growth. The study employed the agar well diffusion method to evaluate antibacterial activity at concentrations of 50 mg/mL, 75 mg/mL, and 100 mg/mL. Results showed that the acetone extract achieved the highest inhibitory effect (19 ± 1 mm at 100 mg/mL), followed by methanol (18.33 ± 0.58 mm) and ethanol (16.33 ± 0.58 mm), while the standard antibiotic exhibited a zone of inhibition of 28 ± 2.65 mm. These findings validate the traditional medicinal use of *Fagonia cretica* and highlight its potential as a natural antibacterial agent, particularly in aquaculture, where antibiotic resistance is a growing concern. Overall, the study concludes that *Fagonia cretica* contains bioactive compounds with significant antibacterial activity, and its extracts could be developed into herbal formulations for managing bacterial infections. Future research should focus on isolating active compounds, optimizing extraction methods, evaluating in vivo efficacy, and exploring applications in sustainable aquaculture practices.

Keywords: *Fagonia cretica*, antibacterial activity, extractive value, ethanol, methanol, acetone, *Escherichia coli*, aquaculture, herbal formulations.

First-principles investigation of optoelectronic, thermoelectric, and mechanical properties of double perovskites K_2AgGaX_6 ($X = \text{I}, \text{Br}$) for energy harvesting applications

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Potassium-based perovskites have significant potential to advance renewable technology through the development of eco-friendly devices. A comprehensive analysis of the structural, electronic, optical, transport, and mechanical properties of the double perovskites K_2AgGaX_6 ($X = \text{I}, \text{Br}$) was performed using the Wien2K code. Stability was confirmed by examining optimization curves, tolerance factors, and formation enthalpies, while AIMD simulations further validated the thermodynamic stability of both compounds. Electronic band structure analysis shows that K_2AgGaI_6 has a bandgap of 1.75 eV, which decreases to 1.24 eV for $\text{K}_2\text{AgGaBr}_6$. Optical properties, evaluated using the Kramers-Kronig relations, reveal strong absorption across the visible spectrum for both materials, making them suitable for photovoltaics and optoelectronics. Thermoelectric properties, calculated using the Boltzmann semi-classical

approach, indicate high ZT values, supported by elevated Seebeck coefficients and electrical conductivities, demonstrating potential for renewable energy applications. The mechanical analysis confirms ductility, stiffness, anisotropy, and high melting points. Overall, this study provides theoretical evidence that these perovskite compounds are promising candidates for green energy harvesting.

First-principles investigation of lead-free double perovskite materials Cs₂LiBiX₆ (X = Cl, F, Br, I) for optoelectronics and solar cell gadgets

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The physical properties of cubic inorganic double perovskites Cs₂LiBiX₆ (X = Cl, F, Br, I) were investigated using Density Functional Theory (DFT) within the Wien2K framework. Structural parameters were determined via the Murnaghan equation of state and Chapin's method. Mechanical properties and formation enthalpies confirm the stability of these materials. This study extensively explores the optical and transport properties of Cs₂LiBiCl₆, Cs₂LiBiF₆, Cs₂LiBiBr₆, and Cs₂LiBiI₆ for optoelectronic devices and thermoelectric applications. The calculated indirect band gap values are 3.96, 2.62, 1.93, and 1.03 eV for Cs₂LiBiF₆, Cl₆, Br₆, and I₆, respectively. Optical properties, including dielectric constants, absorption coefficient, refractive index, and reflectivity, show maximum absorption in the ultraviolet region, highlighting their suitability for optoelectronic applications. Electron transport properties, such as electrical conductivity, thermal conductivity, Seebeck coefficient, and figure of merit (ZT), were analyzed over a temperature range of 100–1200 K using the BoltzTraP code. The analysis indicates a p-type semiconducting nature for Cs₂LiBiX₆ compounds, demonstrating their potential for thermoelectric devices.

A DFT study of vacancy-ordered lead-free double inorganic perovskites Na₂PtA₆ (A = Cl, I) for sustainable technologies

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The structural, optoelectronic, mechanical, and thermoelectric properties of Na₂PtA₆ (A = Cl, I) for renewable energy applications were examined using Density Functional Theory (DFT) calculations. Structural and thermodynamic stabilities were confirmed through the Birch-Murnaghan equation of state, cohesive energy, and formation energy. The compounds exhibit ductility, as indicated by structural parameters and elastic constant analysis. The calculated direct band gaps of 2.50 eV for Na₂PtCl₆ and 2.18 eV for Na₂PtI₆ suggest effective light absorption in the visible and ultraviolet ranges, making these materials suitable for solar cell and optoelectronic applications. Thermoelectric properties were analyzed using the Boltztrap code, based on the semi-classical Boltzmann transport equations (BTE). Electrical and thermal

conductivities, Seebeck coefficient, power factor, and figure of merit (ZT) were calculated across temperature, carrier concentration, and chemical potential variations. This study indicates that Na_2PtA_6 (A= Cl and I) holds significant promise as a thermoelectric material for power generation devices over a wide temperature range in the future.

Structural, elastic, electronic, and optical properties of double perovskites Ba_2NaXO_6 (X = Br, I) for Optical gadgets; A DFT Study

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The structural, elastic, electronic, and optical properties of double perovskites Ba_2NaXO_6 (X=Br, I) were investigated through first-principles calculations. The results show that all three compounds exhibit stable mechanical and dynamical properties, with anisotropic elastic behavior. These materials are direct bandgap semiconductors, with bandgap values of 0.61 eV (2.43 eV), and 2.38 eV (4.09 eV) for PBE (HSE06), respectively. The electron localization function (ELF) was used to analyze their internal chemical bonds and electronic characteristics. In terms of optical properties, all three materials show strong absorption and photoconductive behavior in the UV region. Among these compounds, $\text{Ba}_2\text{NaBrO}_6$ demonstrates the most favorable photovoltaic performance and conversion efficiency, making it a promising candidate for optoelectronic applications in the UV region.

Characterization of TetM and FosX multi-drug resistant genes in *Listeria monocytogenes* isolated from canned food samples

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Listeria monocytogenes is a critical foodborne pathogen implicated in severe infections and is increasingly exhibiting antibiotic resistance, presenting a public health challenge. The aim of this study was to detect the presence of *Listeria monocytogenes* in canned food samples and to identify antibiotic resistant genes tetM and fosX. A total of 30 canned and retailed food samples comprising canned mushrooms, retailed chicken, milk, and canned pineapple were collected for analysis. Isolation and biochemical identification of *L. monocytogenes* were conducted using standard microbiological techniques. Additionally, antibiotic susceptibility testing was performed via the Kirby-Bauer disk diffusion method as per CLSI guidelines. Molecular detection of the tetM and fosX genes was carried out using DNA extraction, PCR amplification, and genome sequencing. *Listeria monocytogenes* isolates were successfully isolated from 55.33% of canned food samples. Nine antibiotics were tested on the positive samples and then 16S rRNA sequencing was performed. Phenotypic resistance to tetracycline corresponded with the molecular detection of the tetM gene in 100% positive isolates. The fosX gene was not detecting any isolate. Other antibiotics, including amoxycillin, meropenem, gentamicin, chloramphenicol, and ciprofloxacin, retained high efficacy against the isolates. The presence of tetM highlights the potential for

tetracycline resistance dissemination in foodborne *L. monocytogenes*. Overall, the data suggest that canned foods could serve as reservoirs for antimicrobial resistance genes. Continued molecular surveillance and phenotypic testing are vital to monitor emerging resistances. The detection of the *tetM* gene confirms tetracycline resistance in *L. monocytogenes* from canned foods, posing a possible public health risk. Ongoing surveillance and strict food safety measures are essential to control the spread of resistant *Listeria* strains.

Keywords: *Listeria monocytogenes* (*L.monocytogene*), Polymerase chain reaction (PCR)

Toxicity Profiling And Catalytic Applications Of Green Synthesized Binary ZnO-MgO And Ternary ZnO-MgO-CuO Metallic Nanocomposites

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The aim of this work was to synthesize binary zinc oxide-magnesium oxide and ternary zinc oxide-magnesium oxide-copper oxide nanocomposites through green synthesis approach using *Capparis decidua* extract. XRD technique was used to examine the structure of the synthesized nanocomposites. The surface morphology of the nanocomposites were studied by SEM. The molecular components of the aforementioned nanocomposites were confirmed using FTIR. Optical characterization was done by analyzing the UV absorption spectrum. The photocatalytic activity was evaluated by the degradation of methylene blue under natural sunlight. Nanocomposites toxicity profile was also checked for plants and animals.

Keywords: Binary Zinc Oxide-Magnesium Oxide nanocomposite, Ternary Zinc Oxide-Magnesium Oxide-Copper Oxide nanocomposites, Photocatalytic degradation, Toxicity Profiling

Impacts of heavy metals stress on plants and their mitigation approaches; a global perspective

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Heavy metal contamination has emerged as a critical environmental issue, posing significant risks to plant growth, productivity, and ecosystem stability. Elevated concentrations of metals such as cadmium, lead, arsenic, and mercury disrupt physiological, biochemical, and molecular processes in plants, leading to reduced germination, impaired photosynthesis, oxidative stress, and altered nutrient uptake. The severity of these impacts varies across species, environments, and degrees of exposure, highlighting the complexity of plant responses under metal stress. To cope with toxicity, plants employ a range of avoidance and tolerance strategies, including metal exclusion, chelation, sequestration in vacuoles, and activation of antioxidant defense mechanisms. Recent advances in plant biotechnology, phytoremediation, and soil management have provided promising avenues to enhance resilience and reduce contamination. Techniques such as the use of phytoremediation, GMO crops, nano particles approaches are increasingly recognized as sustainable approaches for mitigating heavy metal stress. This global perspective underscores

the urgent need for integrated strategies that combine ecological, technological, and policy-based approaches to address heavy metal pollution. Strengthening research on plant tolerance mechanisms, remediation technologies, and risk assessment frameworks will be crucial for ensuring ecosystem health, food security, and environmental sustainability in contaminated landscapes.

Keywords: Heavy metal, tolerance strategies, phytoremediation, nanoparticle approaches.

Mitigating SARS-CoV-2–Exacerbated Neuroinflammation and Alzheimer’s Pathology: Synthesis of Quinoline-Based Dual Inhibitors Targeting Cysteine and Aspartyl Proteases

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Viral and neurodegenerative proteases, such as the cysteine protease and aspartyl protease, offer strategic targets in a multi target therapeutic approach for Alzheimer’s disease, especially when viral infection may exacerbate neurological degeneration. To establish a multi target therapeutics for treating Alzheimer disease, we chose β -secretase (BACE-1), an aspartyl protease, and the SARS-CoV-2 main protease (Mpro), a cysteine protease, as dual targets. In search of BACE-1 and M pro inhibitors, a set of novel quinoline-4-carboxamide derivatives (2a-k, 3a-c, 4a-d, 5a-c, 6a-c) was synthesized using the Suzuki coupling reaction in good to excellent yields. All the synthesized compounds were screened in vitro for their potential inhibitory activities against two proteases. Compounds 2e, 6b, and 6c emerged as dual inhibitors of both proteases. Furthermore, a kinetic study revealed the mechanism of BACE-1 inhibition by compound 6c. Safety profiling of the most potent dual inhibitor 6c was performed via an in vivo acute cytotoxicity assay on Swiss albino mice. Molecular docking studies were conducted against aspartyl protease (2HM1) and cysteine protease (6XHM) to elucidate the binding interaction of synthesized quinolone derivatives. The compound 6c exhibited strong binding affinities through multiple hydrogen bonds, π -Sulphur and π - π stacking interactions, within key subpockets of both targets, supporting inhibitory potential. These studies revealed that the lead compound 6c could be a good drug candidate with further structural modifications.

Keywords: Aspartyl protease, cysteine protease, Quinoline, Suzuki coupling, Alzheimer’s Disease

Next-Generation Universal Influenza Vaccines: Broad-Spectrum Immune Targets

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The development of next-generation universal influenza vaccines is based on the assumption that wide-ranging immunity will be produced by targeting conserved viral antigens or those with little sequence variation in the entire range of circulating influenza strains. Two antigenic determinants have become of special interest in this regard: the extracellular domain of matrix protein 2 (M2e) and the stalk region of hemagglutinin. Both are highly conserved and play critical roles in the infectivity and replication of the virus, thus making them resistant to the antigenic

drift and shift that can render the current seasonal vaccines less effective. Recent developments in nanoparticle-based delivery systems have significantly improved the immunogenicity of these epitopes by enhancing the stability of antigens, independent release, and optimal presentation of antigens to the immune system. The resulting immunological environment is one of strong humoral and cellular immune responses, in particular, the generation of broadly neutralizing antibodies and the recruitment of cytotoxic T lymphocytes that can attack various strains of influenza. In addition to systemic immunity, there has been immense focus on the induction of mucosal immunity with the help of intranasal vaccination. The initial line of defense is the mucosal defenses, specifically secretory IgA antibodies and resident memory tissues situated in the respiratory mucosa, which neutralize the virus particles at their point of entry, thus reducing the infection as well as further infection. The combination of conserved antigen targets with nanoparticle-mediated delivery models and mucosal immunization approaches is likely to overcome the drawbacks of conventional vaccines. This is a versatile strategy that not only enhances the protective range but also increases the longevity and total effectiveness of the immune response. Overall, this review summarizes the current advances in the field of conserved antigen detection, nanoparticle vaccines, and mucosal immunization approaches and highlights the combination of these systems to achieve actual universal influenza vaccines. Such innovations constitute a significant milestone towards effective, broad-spectrum influenza prophylaxis, which can swiftly adapt to emerging viral strains, ultimately reducing the impact of influenza worldwide.

Keywords: Universal influenza vaccine, Broad-spectrum immunity, Conserved viral antigens, Matrix protein 2 ectodomain (M2e), Hemagglutinin stalk domain, Nanoparticle-based vaccine Delivery

Phytochemical Evaluation of Pongamia Pinnata Husk via Different Solvents and Their Potential for Antioxidant and Drug-Resistant Bacterial Activity

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This study investigates the phytochemical composition, antioxidant potential, and antibacterial activity of Pongamia pinnata husk extracted using solvents of varying polarity, including n-hexane, ethyl acetate, acetone, methanol, and water. Qualitative phytochemical screening revealed that the methanol, acetone, and ethyl acetate extracts contained a wide range of secondary metabolites, including flavonoids, tannins, phenolics, carbohydrates, and proteins. In contrast, the aqueous and n-hexane extracts showed limited phytochemical diversity. The antibacterial activity was evaluated against drug-resistant strains of *Pseudomonas aeruginosa*, *Escherichia coli*, *Bacillus subtilis*, and *Staphylococcus aureus* using the agar well diffusion method. The Ethyl acetate, acetone, and methanol extracts exhibited measurable inhibition zones that increased with concentration, whereas aqueous and n-hexane extracts showed no activity. The lowest MIC values were observed for methanol and ethyl acetate extracts, indicating the presence of moderately polar antibacterial compounds effective even against resistant isolates.

The antioxidant activity assessed through DPPH and ABTS assays showed concentration-dependent radical scavenging for all extracts. The ethyl acetate, methanol, and water extracts demonstrated stronger antioxidant potential with lower IC₅₀ values compared to acetone and n-hexane extracts, though all were less potent than ascorbic acid. Overall, the findings highlight that *P. pinnata* husk contains significant bioactive compounds, particularly in its semi-polar and polar fractions, supporting its potential as a natural source of antioxidants and antibacterial agents, and emphasizing its value in developing alternative therapeutics against drug-resistant pathogens.

Keywords: phytochemical, antioxidant, antibacterial, drug resistant.

Development Of Spectrophotometric Method For Quantification Of Lead In Water Samples After Its Supramolecular-Based Liquid Microextraction

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The present work describes the invention of a sensitive, environmentally friendly spectrophotometric technique that uses supramolecular-based liquid liquid micro extraction to quantify lead (Pb) in water samples. Even at trace quantities, lead a hazardous heavy metal, poses major health concerns and need effective pre concentration for precise detection. This developed method does not require the need of expensive instrumentation and operation unlike the conventional extraction techniques which were integrated with atomic absorption spectroscopy (AAS). The suggested technique combines a decanol–methanol supramolecular solvent system and 4-(2pyridylazo) resorcinol (PAR) as a complexing agent with single-drop hydrophilicity supramolecular liquid–liquid micro extraction (SD-HSLLME). The self-assembly of amphiphilic molecules produced the supramolecular solvent (SUPRAS), which made it easier to extract Pb ions selectively. After being removed into the SUPRAS phase and separated by centrifugation, the reddish-orange Pb–PAR complex was measured at 510 nm using UV-Vis spectrophotometry. The conventional standard addition method was used to validate the method on actual ambient water samples, and the results showed good recovery and reliability. With the ability for regular environmental monitoring of lead pollution, this system provides a cost-effective and environmentally friendly substitute for traditional techniques.'

Keywords: Supramolecular solvent, micro extraction, Spectrophotometric determination, Lead, 4-(2pyridylazo) resorcinol, Pre concentration.

Microplastics as Emerging Contaminants in Freshwater and Marine Ecosystems: A Critical Review of Their Impact on Aquatic Food Web Dynamics

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Microplastics (MPs) have become the emerging contaminants in the aquatic resources, especially freshwater and marine, where they enter mainly through anthropogenic activities such as improper waste management and neglected MPs disposal mitigation strategies. Micro plastics, as very small particles of size less than 5 millimeters in dimension, enter the aquatic food chain at the lower trophic level (microalgae) and migrate, concentrate, and magnify towards the higher trophic levels (human, marine mammals, and sea birds) across the aquatic feeding networks. They become concentrated in the animal tissues and which has adverse effects on its health and transfers low energy to the next trophic level as they are consumed by their predator and ultimately reduces the energy flux in the ecosystem dynamics. MPs, as emerging pollutants, have adverse toxicological impacts on the health system, such as disturbance of the immune system, Oxidative stress, and nanoparticles induce cell membrane permeation. By understanding MPs' bio magnification mechanism and trophic transfer, we can ensure a stable aquatic system. To maintain the aquatic biodiversity and stable aquatic ecosystem resilience, we need to make conservation and mitigation strategies, policy making, and implementation, and raise their awareness about their adverse effects.

Keywords: Microplastics, Aquatic resources, Toxic impacts, Aquatic food web dynamics, Biomagnification, Disruptions,

Green Synthesis Of Cerium Oxide Nanoparticle Using Marrubium Vulgare Leaf Extract And Their Potential For Uric Acid Sensing

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The present study focuses on the green synthesis of cerium oxide nanoparticles (CeO_2 NPs) using Marrubium vulgare leaf extract as a natural reducing and stabilizing agent. The synthesized nanoparticles were characterized using UV–Visible spectroscopy, FTIR, XRD, SEM, and EDX to confirm their structural, morphological, and compositional properties. The green approach offers an eco-friendly and cost-effective alternative to conventional chemical synthesis methods. Furthermore, the electrochemical potential of the synthesized CeO_2 NPs was evaluated for uric acid sensing using cyclic voltammetry and chronoamperometry techniques. The study aims to develop a sensitive, stable, and sustainable non-enzymatic uric acid sensor, promoting the integration of green nanotechnology into biomedical applications.

Keywords: Cerium oxide nanoparticles, Marrubium vulgare, green synthesis, uric acid sensor, electrochemical sensing, cyclic voltammetry, nanotechnology, biosensor.

Assessing the Differences between Agriculture Techniques and Indigenous Farming Practices: A Study on Crop Productivity and Sustainability

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This study examines the differences between modern agricultural techniques and farming practices, with a focus on their impacts on crop productivity and long-term sustainability. Using wheat, chana, makai, ganna, and mongi (local names) as representative crops, the research compares input requirements, soil health outcomes, water use efficiency, and yield patterns across both systems. Findings indicate that modern techniques generally enhance short-term productivity through high-yield varieties, chemical inputs, and mechanization, while indigenous methods prioritize ecological balance, resilience, and resource conservation. The study highlights how traditional practices such as mixed cropping, organic soil amendments, and water-conserving cultivation contribute to sustained productivity under variable climatic conditions. Overall, the research underscores the potential for integrated approaches that combine the efficiency of modern methods with the sustainability of indigenous knowledge to support both food security and environmental health.

The agricultural sector in Pakistan is a significant contributor to the country's economy, with crops such as wheat, chana (chickpea), Makai (maize), Ganna (sugarcane), and mongi (mung bean) being major players. However, the sustainability of these crops is threatened by the widening gap between technical agricultural techniques and indigenous farming practices. This study aims to assess the differences between these two approaches and their impact on crop sustainability. Technical agricultural techniques involve the use of modern machinery, high-yielding varieties, and chemical fertilizers, which can lead to increased yields but also contribute to environmental degradation and soil fertility decline. In contrast, indigenous farming practices, passed down through generations, emphasize the use of local varieties, organic fertilizers, and traditional irrigation systems, promoting soil conservation and biodiversity. The study focuses on the Bhakkar region, where these crops are commonly grown, and evaluates the effects of technical and indigenous practices on crop yields, soil health, and water usage. Results show that while technical practices increase short-term yields, indigenous methods promote long-term sustainability and environmental stewardship.

Development of Nanomaterial-Based Portable Sensors for Detecting Trace Environmental Pollutants

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The escalation of industrial and urban activities has led to increased release of trace environmental pollutants, such as heavy metals, (VOCs), and fine particulate matter, which pose serious threats to both human health and ecosystems. Conventional laboratory-based detection methods, although precise, are often time-consuming, expensive, and unsuitable for on-site monitoring. This study explores the design and development of portable sensors utilizing nanomaterials for rapid, sensitive, and selective detection of trace pollutants in air, water, and soil. Nanomaterials including graphene, carbon nanotubes (CNTs), metal oxide nanoparticles (ZnO, TiO₂), and noble metal nanoparticles (Au, Ag) are employed due to their high surface-to-volume ratio, excellent electrical conductivity, and customizable surface properties, which

significantly enhance detection capabilities. For instance, graphene-based electrochemical sensors have successfully measured lead (Pb^{2+}) and cadmium (Cd^{2+}) ions in water at sub-parts-per-billion (ppb) levels, while CNT-based chemiresistive devices enable real-time detection of NO_2 and NH_3 in ambient air. The portable prototypes incorporate microcontrollers and wireless data transmission for on-site analysis and remote monitoring. Experimental results confirm rapid response, reproducibility, and selectivity against interfering species, demonstrating the potential of nanomaterial-enhanced sensors as efficient tools for environmental monitoring and pollution management.

Keywords: Portable sensors (CNTs), Graphene-based sensors, Real-time detection

Real-World Case Studies Featuring Dermatologist Guidance in Comparison with AI Skincare Assessments (e.g., YourAIDerm)

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Introduction and Background: In the past few years, skincare assessment AI websites and software have risen ominously to provide virtual medical for common dermatological concerns such as YourAIDerm. AI is a valuable tool to assist dermatologists by enhancing diagnostic accuracy and clinical decision-making, but there are some challenges surrounding AI from under representation of skin of colour in datasets and issues with image quality and standardization. The accuracy of image-based AI tools is incumbent on images in training sets, which requires patient consent for sharing. Despite its potential, the ethical, clinical, and practical implications of its application remain insufficiently explored. In contrast to this perspective, traditional dermatological techniques observe proper clinical evaluations through guidelines and years of specialized training in their domain. This paradigm shift towards technology-based skincare consultancy, leaves population with two simultaneous advisory paths.

Objective: AI is fast emerging in the field of dermatology. While it boasts great capabilities, it still faces some issues, such as its inability to perform any direct image analyses and the risk of inaccurate suggestions. AI still has insufficient

The Effects Of Bacteria-Based *Serratia Marcescens* Biofertilizer On Maize Seedlings Growth In Bpa Contaminated Soil

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Bisphenol A (BPA) is an emerging environmental pollutant that adversely affects plant growth and physiology. In the present study, maize plants were subjected to BPA stress (100mg) and treated with different remediation strategies, including *Serratia marcescens*, biochar and their combination as a biofertilizer. Plant growth parameters such as roots and shoots length, fresh biomass and antioxidants enzymes activities (SOD, POD, CAT, and H_2O_2) were evaluated. Results revealed that BPA stress significantly reduced roots and shoots growth, as well as fresh

biomass compared to the control. *Serratia marcescens* and biochar individually improved plant performance under BPA toxicity, while their combined application as a biofertilizer showed the most pronounced effect. Biofertilizer treatment not only enhanced root length and root fresh weight but also increased shoot growth surpassing the control. Under BPA stress, biofertilizer application mitigated toxicity, restoring root and shoot biomass close to control levels. Enhanced antioxidants enzyme activities in biofertilizer treated plants further demonstrated their protective role against oxidative stress induced by BPA.

KeyWords: Bisphenol A, *Serratia marcescens*, Biofertilizer, Biochar, Antioxidants Enzymes.

Effects of vulnerable deforestation and it's impacts on Pakistan Natural Resources

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Forests are one of the most important forms of management .and the region's temperature, climate and Carbon levels. It also encourages industrial developmental cities caused a significant increase in deforestation, resulting in % increase in average temperature around the world. It's also extreme uncontrolled deforestation that led to a large population in the recent past deforestation, land use, human expansion, settlements Deforestation, erosion and logging all have a negative impact on the park. Amount and size of wood used, trees from Pakistan were used to calculate grain size Illegal trees were cut down. Illegal logging found to be four times more expensive. The main causes of deforestation in Pakistan are necessary. The government should pay attention to solving these reasons and implementing strong laws to reduce the negative impact of deforestation and save this ecosystem.

AI-Driven Predictive Nutrition: Integrating Metabolomics, Machine Learning, and Digital Phenotyping for Next-Generation Dietary Interventions

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Recent advances in artificial intelligence (AI) have transformed human nutrition and dietetics from empirical dietary assessment to data-driven precision nutrition. This research explores the innovative integration of metabolomic profiling, machine learning algorithms, and digital phenotyping to predict individual dietary responses and optimize nutrient interventions. A hybrid deep learning framework is proposed, combining convolutional and recurrent neural networks to analyze multi-layered datasets that include metabolomic biomarkers, gut microbiome diversity indices, and lifestyle digital traces captured through wearable devices. These AI models enable the identification of hidden nutritional patterns and metabolic phenotypes that are often undetectable through conventional statistical methods. Preliminary findings demonstrate that AI-based predictive nutrition systems can forecast glycemic variability and lipid metabolism responses with over 90% accuracy, facilitating the design of dynamic and adaptive meal plans for

personalized health management. Moreover, the study addresses the ethical and translational challenges of implementing AI in clinical dietetics, emphasizing the need for transparent algorithms, equitable datasets, and cross-disciplinary collaborations between nutritionists, computer scientists, and healthcare practitioners. The integration of intelligent algorithms into dietetic practice has the potential to revolutionize preventive nutrition, metabolic disorder management, and public health policy design. This interdisciplinary framework situates AI not merely as a computational tool but as an evolving cognitive partner in advancing human nutrition science.

Keywords: Predictive Nutrition, Artificial Intelligence, Metabolomics, Digital Phenotyping, Precision Dietetics, Machine Learning

Isolation of lactic acid bacteria from raw cow milk samples collected from Bhakkar district

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Raw cow milk is a rich source of beneficial microorganisms, especially lactic acid bacteria (LAB), which are essential for dairy product fermentation and contribute significantly to human health. This study was conducted to isolate and characterize LAB present in raw cow milk samples collected from the Bhakkar district of Punjab, Pakistan. A total of 20 raw milk samples were aseptically collected from lactating cows at local dairy farms and households during the period from March to May 2025. The samples were processed using standard microbiological techniques, including serial dilution and culturing on MRS agar under anaerobic conditions at 37°C. A total of 68 LAB isolates were successfully obtained and subjected to morphological, physiological, and biochemical characterization. The study identified isolates based on Gram staining, catalase reaction, cell shape, carbohydrate fermentation, temperature tolerance, and salt tolerance tests. The most prevalent genus was *Lactobacillus* (23.41%), followed by *Lactococcus* (23.53%), *Leuconostoc* (16.18%), *Enterococcus* (14.71%), *Pediococcus* (10.29%), and *Streptococcus* (5.88%). Fermentation tests showed all isolates could ferment glucose and lactose, with sucrose fermentation primarily observed in *Leuconostoc* and *Enterococcus*. Temperature tolerance test showed most isolates grew well at 15°C and 45°C. The findings of this study confirm that raw cow milk from the Bhakkar district is a valuable source of diverse LAB populations, particularly *Lactobacillus* species known for their probiotic and fermentation potential. This diversity not only reflects the natural microbial richness of raw milk but also highlights its potential for application in dairy fermentation and probiotic product development.

Keywords: Cow milk, Lactic acid bacteria (LAB), *Lactobacillus*, Bhakkar, fermentation

Mealworms (*Tenebrio molitor* L.) as a Substituent of Protein Source for Fisheries and Aquaculture: A Mini Review: Mealworms as a Substituent of Protein Source

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Development of aquaculture and fisheries depend on the availability of sustainable feed sources. Using insects is one new option that is gaining popularity. The high protein content, rapid growth and little environmental impact of yellow mealworms have made them an appealing solution. Mealworms contain a substantial protein content (47-64%), essential amino acids, energy-dense lipids, and vital micronutrients, making them a viable substitute for traditional protein sources in fisheries and aquaculture. Historically consumed in various cultures, Mealworms have gained attention for their economic and nutritional value. In aquaculture, they enhance fish growth, feed efficiency, and overall health. Studies have shown that incorporating mealworm meal into fish diets improves immune functions, growth performance, and liver health, although excessive inclusion may have adverse effects. The nutritional content of mealworms can be optimized by adjusting rearing conditions, diet, and developmental stage. The European Union approval of mealworms for human consumption further validates their safety and potential as a sustainable protein source. This review emphasizes the nutritional benefits of mealworms as a substitute for fishmeal, addressing protein shortages and environmental concerns associated with traditional feed production. By integrating mealworms into aquaculture, we can significantly improve sustainability, economic efficiency, and global food security.

Keywords: Sustainable Feed Sources, Aquaculture, Yellow Mealworms, Fishmeal Substitute, Environmental Impact

US-China Competition in Artificial intelligence: A Quest for dominance Rubab

Rubab

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The AI is often compared to the space race of the Cold War, with nations seeking dominance in AI as a means of enhancing their global influence and securing strategic advantages. AI is increasingly perceived as a driver of geostrategic competition among global powers, particularly the United States (US) and China. The struggle between the United States and China in artificial intelligence (AI) has the potential to alter the balance of power drastically. These actors are heavily investing in AI development to redefine power dynamics in economic, military, and political spheres. Both countries are striving to achieve technological supremacy, recognizing the transformative potential of AI in economic growth, national security, and global influence. As a result, the AI race has become a critical aspect of their broader geopolitical strategies, influencing international collaborations, regulatory frameworks, and ethical considerations in AI deployment. This paper will explain what artificial intelligence actually is and examine the US and China Competition in artificial intelligence in economic, military and political spheres.

Keywords: Artificial Intelligence, balance of power, space race, cold war, geostrategic competition.

Green Synthesis Of Cerium Oxide Nanoparticles Using Rosa Multiflora Leaf Extract And Their Potential For Glucose Sensing

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This study focuses on the eco-friendly synthesis of cerium oxide nanoparticles (CeO₂ NPs) using Rosa multiflora leaf extract as a natural reducing and stabilizing agent. The green synthesis approach offers a sustainable alternative to traditional chemical methods by minimizing toxic by-products and improving nanoparticle stability through phytochemical interactions. The synthesized CeO₂ NPs will be characterized using UV–Visible spectroscopy, FTIR, XRD, SEM, and EDX to analyze their structural, morphological, and elemental properties. Furthermore, the electrochemical performance of the CeO₂ NPs will be evaluated for glucose sensing applications using cyclic voltammetry and chronoamperometry. This research aims to develop a cost-effective, stable, and sensitive non-enzymatic glucose sensor while promoting green nanotechnology for biomedical and diagnostic applications.

Keywords: Cerium oxide nanoparticles, Rosa multiflora, green synthesis, glucose sensor, electrochemical sensing, cyclic voltammetry, biosensor, nanotechnology.

Development and evaluation of self-emulsifying drug delivery system based tablet for carbamazepine

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Introduction: Carbamazepine is an antiepileptic drug categorized under BCS class II, characterized by low solubility in water and unpredictable oral absorption, which leads to fluctuating therapeutic responses. To overcome these issues, a self-emulsifying drug delivery system (SEDDS) was formulated and optimized with the objective of improving the solubility, dissolution and bioavailability of carbamazepine in a solid tablet dosage form

Methodology: Carbamazepine solubility was tested in different oils, surfactants, and co surfactants. From these studies, sesame oil was chosen as the oil phase, tween 80 as the surfactant, and PEG 400 as the co surfactant. The liquid SEDDS was then turned into a solid form by mixing it with microcrystalline cellulose to make self-emulsifying tablets. These tablets were tested for emulsification time, droplet size, zeta potential, drug content, and drug release rate. The optimized batch was further assessed according to ICH guidelines.

Results: Among the tested oils, sesame oil showed the highest solubility for carbamazepine (31mg per ml). The optimized SEDDS containing oil, surfactant, and co surfactant in a 1:2:1 ratio formed an emulsion within 30 seconds and produced droplets with an average size of 190 ± 5 nm and a zeta potential of -18 mV, showing good stability. The self-emulsifying tablets released more than 90% of showed no major changes in appearance, drug content, or dissolution.

Conclusion: The developed self-emulsifying tablet of carbamazepine significantly enhanced solubility and dissolution rate, suggesting improved bioavailability potential. The SEDDS based approach offers a promising strategy for the formulation of poorly water soluble drugs.

Effect Of Varying Concentration Of Unripe Citrus Reticulata Extract On Properties Of Biopolymeric Film

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Biopolymers have occupied an indispensable role in almost all types of industries for their immense physical and mechanical characteristics, mainly in food, packaging, pharmaceutical and therapeutic sectors. Pharmaceutical researchers around the world are looking into thin films as a novel pharmaceutical delivery mechanism, as they have been identified as a viable alternative to standard dosage forms. Sodium carboxymethyl cellulose is one of the most widely studied and least expensive natural polymers for fabricating film formulations. This study aims to evaluate the effect of varying concentration of unripe citrus reticulata extract on properties of biopolymeric films. Sodium carboxymethyl cellulose films were developed loaded with varying concentrations of citrus reticulata extract in 0, 0.25, 0.5, 0.75 and 0.86% w/v and subjected to various physicochemical characterization tests like thickness, folding endurance, moisture uptake, erosion, water vapor permeability rate and vibrational analysis. The results indicated that as the quantity of extract increases the thickness and water up take of film increases while percent erosion, Water vapors transmission rate and water vapor permeation rate decrease as the quantity of extract increases with no cracks. Vibrational analysis results indicated significant fluidization of lipophilic domains (Asymmetric and Symmetric CH, and C=O moieties), which hydrophilic domains (OH/NH, and Amide I moieties) underwent rigidification indicating extract imparted elasticity to the film in addition to formation of additional bonds with polar domains of the polymer, which is envisaged to not only improve film mechanical strength to stress, but also slower erosion. Sodium carboxymethyl cellulose films loaded with 0.86g Citrus reticulata extract represents an ideal combination for film formation.

Keywords: Biopolymeric film. Citrus reticulata extract. Physicochemical properties

Prevalence, Antimicrobial Resistance and Molecular Characterization of Pseudomonas Aeruginosa Isolated from UTI Patients of South Punjab, Pakistan

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Background: Pseudomonas is an opportunistic pathogen that has been implicated more and more in urinary system infections (UTIs), especially in immunocompromised individuals or those who have medical devices implanted. P. aeruginosa rising antimicrobial (AMR), particularly carbapenem-resistant strains, has been a major public health concern. This study examines the

prevalence of *P. aeruginosa*, antimicrobial resistant patterns, and molecular characterizations of *P. aeruginosa* from urine samples taken from UTI patients living in South Punjab, Pakistan. It focuses on the bla IMP gene, which is associated with carbapenem-resistant *P. aeruginosa*.

Methods: A cross-sectional survey was conducted at Multan Institute of Kidney Diseases (MIKD Campus), Multan, managed by Indus Health and Hospital Network (IHHN), South Punjab in Pakistan. Midstream urine samples collected were cultured on CLED Agar to isolate *P. aeruginosa*. Antibiotic susceptibility testing was performed using the Kirby-Bauer disk diffusion method, following CLSI guidelines, against 12 antibiotics: Ceftazidime (CAZ), Aztreonam (ATM), Imipenem (IPM), Meropenem (MEM), Gentamicin (G), Norfloxacin (NOR), Ciprofloxacin (CIP), Tobramycin (TOB), Levofloxacin (LFX), Piperacillin-Tazobactam (TZP), Amikacin (AK), and Colistin (CT). The bla-IMP was detected using polymerase chain's reaction (PCR), and confirmed with gel electrophoresis. Results: Out of 170 isolates, 27 (15.9%) were positive for bla-IMP, indicating carbapenem resistant. The highest antibiotic resistance rates were found against Meropenem (84.7%), Gentamicin (83.5%), and Imipenem (70.8%). Ciprofloxacin (81.1%), Tobramycin (77.6%) and Ciprofloxacin showed moderate resistance. Colistin, on the other hand, showed the lowest rate of resistance (2.3%), which makes it the most efficient antibiotic in this study. Most of the patients affected were females (61.7%), and the most affected age group was between 31-60.

Conclusions: This study highlights a significant prevalence of carbapenem resistant *P. aeruginosa* in UTI patients from South Punjab. Bla-IMP is a genetic factor that contributes to resistance. These alarming patterns of resistance highlight the need for regular AMR monitoring, strict antibiotic stewardship and targeted molecular diagnosis to control the spread resistant strains. To guide empiric treatment and prevent further spread of *P. aeruginosa* multidrug resistant in clinical settings, immediate interventions are necessary.

Keywords: South Punjab, antimicrobial resistant, carbapenem-resistant *Pseudomonas aeruginosa*.

Effects of Anger and Locus of Control on False Confession Tendency and Decision-Making among Prisoners.

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This study was conducted to examine the Effects of Anger and Locus of Control on False Confession Tendency and Decision-Making among prisoners. The study employed a correlational research design. Data was collected from sample of (N=200) male and female prisoners using a Purposive sampling technique. Data was collected by administering four standardized scales Novaco Anger Inventory-Short Form (Novaco, 1975), the Rotter's Locus of Control Scale (Rotter, 1966), The Gudjonsson Confession Questionnaire (Gudjonsson, 1997) and The Decision Making Style Questionnaire (French et al., 1993). Furthermore, in this study three statistical analyses such as T-test, correlation and regression were conducted using SPSS to examine the relationship among study variables. The finding indicated that high level of anger and external locus of control

was closely associated with poor decision-making, increasing likelihood of compliant confession. It also shows that male prisoners tended to score high on anger, while female prisoners showed higher levels of external locus of control. Limitations, suggestions and future recommendations all were mentioned in this study.

Keywords: Anger, Locus of Control, False Confession Tendency, Decision Making

Effect of Social Comparison on Psychological Resilience and Academic Self-efficacy among University Students: Mediating Role of Fear of Missing Out

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This study was conducted with a research population of (N=200) which was equally divided between male and female university students. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering four standardized scales Lowa-Netherlands Comparison Orientation Measure (Gibbons & Buunk, 1999), Connor-Davidson Resilience Scale (Connor & Davidson, 2003), Academic Self-Efficacy Scale (Gafoor& Ashraf, 2006), and Fear of Missing Out Scale (Przybylski et al., 2013). Furthermore, in this study four statistical analyses were used T-test, correlation, regression and mediation analyses were run on SPSS to find out the relationship among study variables. Findings indicated that social comparison has a significant positive correlation with psychological resilience and academic self-efficacy, and fear of missing out plays a significant mediating role between social comparison and academic self-efficacy. It also showed that male students scored high on psychological resilience, while female students scored high on academic self-efficacy and fear of missing out as compared to males. Social comparison and psychological resilience were taken as predictor variables, fear of missing out as a mediating variable, and academic self-efficacy as an outcome variable. Limitations, suggestions, and future recommendations were also mentioned in this study.

Keywords: Social Comparison, Psychological Resilience, Academic Self-Efficacy, Fear of Missing Out

Effect of Birth Order, Personality Development and Parental Attachment on Emotional Intelligence among Teenagers

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The present study aimed to explore the effect of birth order, personality development, and parental attachment on emotional intelligence among teenagers. The study was conducted with a research population of (N = 200) equally divided between male and female students. Apurposive sampling technique and correlational research design were employed for this study. Data were collected by administering the Wong and Law Emotional Intelligence Scale (Wong & Law, 2002), the Ten-Item Personality Inventory (Gosling et al., 2003), and the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987). Furthermore, T-test, correlational, and

regression analyses were conducted using the latest version of SPSS to determine the relationships among study variables. Findings indicated that birth order and parental attachment have a significant positive relationship with emotional intelligence, and personality traits such as extraversion, agreeableness, and conscientiousness also showed a significant positive correlation with emotional intelligence. First-born teenagers scored higher on emotional intelligence and parental attachment as compared to later-borns, while females scored higher on emotional intelligence and parental attachment than males. Personality development and parental attachment were taken as predictor variables, while emotional intelligence was taken as the outcome variable. Limitations, suggestions, and future recommendations were also discussed in the study.

Keywords: Birth order, Personality development, Parental attachment, Emotional intelligence, Teenagers.

Impact of Personality Traits and Peer Influence of Smoking Behavior among University Students: Mediating Role of Health Risk Perception

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This study was conducted with a research population of (N=200) which was equally divided between male and female university students. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering three standardized scales Adult Attachment Scale (Collins & Read, 1990), the Relationship Skills Scale (Buhrmester, 1990), and the Connor-Davidson Resilience Scale (Connor & Davidson, 2003). Furthermore, in this study four statistical analyses were used T-test, correlation, regression and mediation analyses were run on SPSS to find out the relationship among study variables. Results revealed that secure attachment style showed a significant positive relationship with relationship skills and resilience, while insecure attachment styles anxious and avoidant were negatively related to both. Moreover, female participants scored higher on relationship skills, while males showed higher resilience levels. Attachment style was found to be a significant predictor of both relationship skills and resilience. Limitations, suggestions, and future recommendations were also mentioned in the study.

Keywords: Attachment style, Relationship skills, Resilience, Young adults

Relationship among Post-Traumatic Growth, PTSD Symptoms, and Quality of Life among Orphans who lost their Parents in Early Childhood

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This study was conducted with a research population of (N=200) which was equally divided between male and female selected through purposive sampling from various orphanages in Punjab. Data was collected by administering three standardized scales The Post-Traumatic Growth Inventory (Tedeschi & Calhoun, 1996), the PTSD Checklist for DSM-5 (PCL-5)(Weathers

et al., 2013), and the World Health Organization Quality of Life Scale BREF (WHO, 1996). Furthermore, in this study three statistical analysis were used T-test, correlation, regression analysis were run on SPSS to find out the relationship among study variables. Results revealed that post-traumatic growth had a significant positive correlation with quality of life, whereas PTSD symptoms showed a significant negative correlation with both post-traumatic growth and quality of life. Regression analysis indicated that PTG significantly predicted higher levels of QoL, while PTSD symptoms negatively predicted QoL scores. Gender differences showed that female orphans scored higher on PTG compared to male orphans, while male orphans reported slightly higher PTSD symptoms. The findings highlight the importance of promoting post-traumatic growth and psychological rehabilitation to enhance the well-being of orphaned children. Limitations, implications for mental-health professionals, and future research recommendations were discussed in the full report.

Keywords: Post-traumatic growth, PTSD symptoms, Quality of Life, Orphans, Early childhood

Impact of Emotional Dysregulation and Peer Pressure on Drug Addiction Risk and Social Attitudes among Youth

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This study was conducted to examine the impact of emotional dysregulation and peer pressure on drug addiction risk and social attitudes among youth. The study aimed to explore how difficulties in regulating emotions and the influence of peers contribute to the likelihood of substance use and the formation of negative or antisocial attitudes. A correlational research design was employed, and data was collected from a purposive sample of youth (N=200) aged 18–25 years. Standardized instruments including the Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004), Peer Pressure Inventory (Brown et al., 1986), Drug Addiction Risk Scale (Conway et al., 2003), and Social Attitudes Scale (adapted version by Eysenck & Eysenck, 1975) were used to measure the variables. Statistical analyses such as Pearson correlation, multiple regression, and mediation tests were performed using SPSS. Findings indicated that emotional dysregulation had a significant positive relationship with drug addiction risk and a negative relationship with prosocial attitudes. Peer pressure also showed a strong positive association with addiction risk and was linked to more permissive attitudes toward drug use. Furthermore, it suggested that peer pressure partially mediated the relationship between emotional dysregulation and drug addiction risk. It also emphasizes the importance of emotional regulation training and peer influence management in preventive interventions for youth. Limitations, implications, and future research recommendations were discussed in detail in the full document.

Keywords: Emotional Dysregulation, Peer Pressure, Drug Addiction Risk, Social Attitudes, Youth

Effect of Sleep Quality, Anxiety Level and Physical Activity on Cognitive Vulnerability and Development of Physical Illness among University Young Adults

Eman Iftikhar, Dawra

This study was conducted with a research population of (N=200) University student, which was equally divided between male and female. Purposive sampling technique and correlational research design were used in this study. Data was collected by administrating four standardized scales Pittsburgh Sleep Quality Index (Buysse et al., 1989), Generalized Anxiety Disorder Scale (Beck & Steer, 1990), International Physical Activity Questionnaire- Short Form (Craig et al., 2003), and the Cognitive Vulnerability scale Physical Health Symptoms Checklist. Furthermore, in this study four statistical analyses were used T-test, correlation and regression and were run on SPSS to find out the relationship among study variables. Findings indicated that poor sleep quality and higher anxiety level had a significant positive correlation with cognitive vulnerability and increase development of physical illness symptoms among students. It showed that higher level of physical activity was associated with lower cognitive vulnerability and better physical health outcomes. Gender comparison related that female student scored higher on anxiety and poor sleep quality, whereas male students showed higher level of physical activity. In this study, sleep quality, anxiety, and physical activity were taken as predictor variables, while cognitive vulnerability and physical illness were treated as outcome variables. Limitations, suggestions and future recommendations have been discussed in the study.

Keywords: Sleep Quality, Anxiety Level, Physical Activity, Cognitive Vulnerability, Physical Illness

Effect of Post-Divorce Trauma and Depression: Mediating Role of Social Support among Divorced Women

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This study was conducted with a research population of (N=200). Purposive sampling technique and correlational research design were used in this study. Data was collected by administrating four standardized scales Multidimensional scale of perceived social support (Zimet et al., 1988), Impact of event scale (Weiss & Marmar, 1997), beck depression inventory II (Beck et al., 1996). Furthermore, in this study four statistical analyses were used T-test, correlation, regression and mediation analyses were run on SPSS to find out the relationship among variables. Finding indicated the importance of supportive social relationship in promoting emotional resilience after divorce. The result reveals a significant positive relationship between post-divorce trauma and depression. Limitations, implications, and future recommendations were discussed in this document.

Keywords: Post-Divorce Trauma, Depression, Social Support, Divorce Women, Mediation, Emotional well-being

Effect of Spousal Neglect on Psychological Well-being and Behavioral Adjustment in Retired Older Adults

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The study was conducted to examine the effect of spousal neglect on psychological well-being and behavioural adjustment among retired older adults. A total sample of (N=200) participants, consisting of both male and female retired individuals, was selected using the random sampling technique. A correlational research design was employed. Data was collected using standardized instruments including the Elder Abuse Suspicion Index (Yaffe et al., 2008) to assess spousal neglect, the Ryff Scales of Psychological Well-Being (Ryff, 1989), and the UCLA Loneliness Scale (Russell, 1996) and Geriatric Depression Scale (Yesavage et al., 1983) to evaluate behavioral adjustment. Statistical analyses including T-test, correlation, and regression analysis were performed using the latest version of SPSS. The results revealed that spousal neglect has a significant negative effect on psychological well-being and behavioral adjustment among retired older adults. Findings also indicated that individuals experiencing higher levels of neglect showed lower psychological well-being and poorer behavioral adjustment. Limitations, suggestions, and future recommendations are discussed in the full study.

Keywords: Spousal neglect, Behavioral adjustment, Psychological well-being.

Role of Parental Warmth, Parental Bonding and Siblings Interaction on Mindfulness and Coping Skills among College Students

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The study was conducted with a research population of (N= 200), which was equally divided between male and female college students. A purposive sampling technique and correlational research design were used in this study. Data were collected by administering the Parental Bonding Instrument (Parker, Tupling, & Brown, 1979), the Parental Warmth Scale (Rohner, 2005), the Sibling Relationship Questionnaire (Furman & Buhrmester, 1985), the Mindful Attention Awareness Scale (Brown & Ryan, 2003), and the Brief COPE Inventory (Carver, 1997). Furthermore, three types of analyses were used T-test, correlational, and regression analysis, which were run on the latest version of SPSS to determine the relationships among the study variables. Findings indicated that parental warmth had a significant positive correlation with mindfulness, and sibling interaction showed a significant positive relationship with coping skills. Results also showed that male students scored higher on coping skills, whereas female students scored higher on mindfulness as compared to males. Parental warmth, parental bonding, and sibling interaction were taken as predictor variables, while mindfulness and coping skills were considered as outcome variables. Limitations, suggestions, and future recommendations were all discussed in further study.

Keywords: Parental warmth, Parental bonding, Sibling interaction, Mindfulness, Coping skills

Relationship between Perfectionism, Rumination, and Decision Paralysis among Adults: A Correlational Study.

Bakhtawar Aamir, Dawra
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The present study was conducted with a research population of (N=200) examining the relationship among perfectionism, rumination, and decision paralysis in the adult samples. A correlational research design was employed using purposive sampling for participant selection. Data was collected through standardized instruments including the Frost Multidimensional Perfectionism Scale (Frost et al., 1990) and the Ruminative Response Scale (Nolen-Hoeksema, 1991) along with the Decision-Making Inventory (Harren, 1979). Researcher used three types of analyses T-test, correlation and regression analyses were conducted using the latest version of SPSS to examine the associations among variables in this study. Findings indicated a significant positive correlation between perfectionism and both rumination and decision paralysis. Furthermore, the analyses revealed gender-related differences, with female participants exhibiting higher rumination scores and greater decision-paralysis symptoms than those observed in males. Perfectionism and rumination as predictor variables, with decision paralysis as the outcome variable. Study provided the insights into the cognitive and personality mechanisms underlying indecisiveness in adulthood. Implications for therapeutic interventions targeting perfectionism and rumination to reduce decision paralysis were discussed. Limitations, recommendations, and directions for future research were presented.

Keywords: Perfectionism, Rumination, Decision Paralysis and Correlational Analysis

Effects of Emotional Intelligence and Digital Communication Styles on Relationship Satisfaction among Long-distance Married Couples

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The present study aimed to investigate the effects of emotional intelligence and digital communication styles on relationship satisfaction among long-distance married couples. A correlational research design was employed to explore how emotional awareness and digital interaction patterns contribute to marital satisfaction in geographically separated partners. The research sample consisted of married individuals (N=200) currently engaged in long-distance relationships, selected through purposive sampling. Data was collected using the Emotional Intelligence Scale (Schutte et al., 1998). Digital Communication Styles Scale (Ledbetter, 2009), Relationship Assessment Scale (Hendrick, 1988). The study's findings are expected to reveal that higher emotional intelligence and positive digital communication styles predict greater relationship satisfaction among long-distance married couples.

Keywords: Emotional intelligence, Digital communication styles, Relationship satisfaction, Emotional intelligence scale

Relationship of Predictive Role Gender Stereotypes and Perceived Social Constraints in Entrepreneurial Self-Efficacy among Aspiring Independent Young Women

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The present study was conducted to examine the relationship of the predictive role of gender stereotypes and perceived social constraints in entrepreneurial self-efficacy among aspiring independent young women. The research was based on a sample of (N=200) participants, selected through purposive sampling technique. A correlational research design was used to assess the associations among study variables. Data was collected using standardized instruments: the Gender Role Stereotypes Scale (Hentschel et al., 2019) to measure gender stereotype beliefs, the Perceived Social Constraints Scale (adapted from Ślusarczyk, 2023) to assess social and cultural barriers, and the Entrepreneurial Self-Efficacy Scale (Chen, Greene & Crick, 1998) to measure confidence in entrepreneurial abilities. Data was analyzed through correlation, regression, and T-test using the latest version of SPSS to determine the predictive relationship among the variables. Findings are expected to show that gender stereotypes and perceived social constraints negatively predict entrepreneurial self-efficacy among aspiring independent young women. Limitations, suggestions, and recommendations for future research were discussed in this study.

Keywords: Gender Stereotypes, Perceived Social Constraints, Entrepreneurial Self-Efficacy

Effect of Classroom Environment and Teacher-Student Relationship on Learning Behavior among High School Students

Zunaira Bibi, Dawra

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The present study was conducted with a research population (N = 200) to examine the Effect of Classroom Environment and Teacher-Student Relationship on Learning Behavior among High School Students. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering three standardized scales Classroom Environment Scale (Moos & Trickett, 2002), Student Teacher Relationship Scale (Pianta, 2001), and Learning Behaviors Scale (McDermott et al., 1999). The collected data were analyzed through T-test, correlation, and regression analyses were run on SPSS to find out the relationship among study variables. Findings indicated that classroom environment and teacher student relationship both have a significant positive effect on student learning behavior. Who perceived their classroom as supportive, organized, and engaging with their teachers, showed higher levels of motivation, attention, and persistence in learning. Classroom environment and teacher student relationship were taken as predictor variables, while learning behavior was considered as the outcome variable. Limitations, suggestions, and future recommendations were also mentioned in this study.

Keywords: Classroom environment, Teacher student relationship, Learning behavior, Academic engagement

Effects of Psychological Resilience, Burnout and Social Support on Quality of Life and Coping Strategies among Caregivers of Patients Undergoing Prolonged Hospitalization

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The study was conducted to examine the Effects of Psychological Resilience, Burnout, and Social Support on Quality of Life and Coping Strategies among Caregivers of Patients Undergoing Prolonged Hospitalization. The research population consisted of (N=200) caregivers, including both males and females. Purposive sampling technique and correlational research design was used in this study. Data was collected by administering four standardized scales Psychological Resilience Scale (Wagnild & Young,1987), Maslach Burn out Inventory (Maslach & Jackson,1996), Multi-dimensional Scale of Perceived Social Support (Zimet et al.,1988), WHO Quality of Life Scale (WHOQOL-BREF,1997), and Brief COPE Inventory (Carver,1997). Furthermore, in this study three type of statistical analysis was used T-test, Correlation and regression analysis were run on the latest version of SPSS to examine the relationship among study variables. Finding indicated that psychological Resilience and Social Support have significant positive correlation with quality of life and Adaptive Coping Strategies, while Burnout showed a significant negative correlation with both. Furthermore, regression analysis indicated that psychological resilience and Social Support were strong predictors of better quality of life and effective coping, whereas Burnout emerged as a negative predictor. Limitations, suggestions and future recommendations all were mentioned in the study.

Keywords: Psychological Resilience, Burnout, Social Support, Quality of life, Coping Strategies, Caregivers

Role of Sleep Quality, Physical Activity and Emotional Regulation on Mood Regulation among Young Adults

Maria Gul, Dawra
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This study was conducted with a research population of (N=200) which was equally divided between male and female. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering four standardized scales Pittsburgh sleep Quality index PSQI (Berman, 1989), International Physical Activity questioner (Booth, 2003). Emotional Regulation Questioner (Gross & John, 2003) and Beck Depression inventory BDI (Beck & Street, 1996) Furthermore, in this study four statistical analysis were used T-test , correlation, and regression analysis were run on SPSS to find out the relationship among study variables. Findings indicates that role of sleep has a significant positive correlation with physical activity and mood regulation. It showed that male scored high on physical activities, while female scored high on mood regulation. Physical active and emotional regulation were taken as predictor variables, and sleep and mood regulation as an outcome variables. Limitations, suggestions, and future recommendations were also mentioned in the study.

Keywords: Sleep Quality, Physical Activity, Emotional Regulation, Mood Regulation

Impact of Social Media Use, Self Esteem, Peer Envy and Attitude on Social Decision-Making among University Students

SaweraNasreen, Noreen, Dawra

The present study aims to examine the impact of social media use, self-esteem, peer envy, and attitude on social decision-making among university students. The study was conducted with a research population of (N= 200), equally divided between male and female students. A purposive sampling technique and correlational research design were used in this study. Data were collected through standardized psychological scales, including the Social Media Use Integration Scale (Jenkins-Guarnieri et al., 2013), Rosenberg Self-Esteem Scale (Rosenberg, 1965), Dispositional Envy Scale (Smith et al., 1999), and a Likert-type Attitude Scale constructed for this research. Social Decision-Making was measured using the Social Decision-Making Scale (Strough et al., 2008). Statistical analyses such as t-test, correlation, and regression analysis were performed using SPSS to examine the relationships among study variables. Findings indicated that social media use, self-esteem, peer envy, and attitude have significant relationships with social decision-making. Results further showed that high social media use and peer envy negatively influence decision-making, whereas higher self-esteem and a positive attitude contribute to better social decisions among students. Limitations, implications, and future recommendations were also discussed in the full study.

Keywords: Social media use, Self-esteem, Peer envy, Attitude, Social decision-making

Effect of Marital Harassment on Mental Health Outcomes among Divorced Individuals:

Mediating Role of Overthinking

Nimra, Dawra

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The study was data was collected from sample of (N= 200) divorced participants which was equally divided between male and female selected through purposive sampling. Data was collected by administrating four standardize scales. Composite abuse scale (Hegarty et al., 1999) for marital harassment, Ruminative Response Scale (Nolen-Hoeksema & Morrow, 1991) for overthinking patterns, and Depression Anxiety Stress Scales (Lovibond & Lovibond, 1995) for mental health outcomes in this study three statistical analysis were used T-test, correlation, regression and mediation analysis were run on SPSS to find out the relationship among study variables. Results showed that marital harassment positively correlated with overthinking and poor mental health, and overthinking significantly mediated this relationship. Female divorced individuals reported higher levels of distress compared to males.it was concluded that marital harassment negatively affects the mental health of divorced individuals, and overthinking patterns strengthen this negative impact. The findings highlight the need for counseling interventions to improve mental well-being among divorced individuals. Limitations, suggestions, and future recommendation were also mentioned in the study.

Keywords: Marital harassment, Overthinking, Mental health, Divorced individuals

Impact of Learning Disabilities, Parental Support, and Self Efficacy in Predicting Academic Achievement among College Students

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The present study was designed to investigate the impact of Learning Disabilities, Parental Support, and Self-efficacy in predicting Academic Achievement among College Students. Data was collected from a purposive sample of college students (N= 200) Standardized scales such as the Learning Disabilities Checklist (Hammill, Leigh, McNutt and Larsen, 1981), Parental Support Scale (Robbins et al., 1994), and the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) were utilized to measure respective constructs, while students grade point averages were used as indicators of academic achievement. Statistical analyses, including Pearson correlation, multiple regression, and independent sample T-tests, were performed using SPSS to assess predictive relationships. Findings revealed that higher levels of parental support and self-efficacy significantly predicted better academic performance, whereas the presence of learning disabilities was negatively correlated with achievement. Results emphasized the crucial role of family involvement and students' self-belief in enhancing academic outcomes, suggesting the need for targeted educational interventions and counseling support for students with learning difficulties. Limitations, implications, and recommendations for future research were discussed in the study.

Keywords: Learning Disabilities, Parental Support, Self-Efficacy, Academic Achievement

Correlation Study of Social Media Exposure, Fear of Crime and Trust in Law Enforcement among Urban Youth

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The study was a correlational research design was employed to analyze data collected from a sample of (N=200) urban youth, including both males and females aged 18 to 25 years, selected through random sampling. Standardized scales were used, including the Social Media Usage Scale (Tuck & Thompson, 2024), Trust in Police Scale (Hawdon et al., 2014), and Fear of Crime Scale (Ferraro, 1995). Findings revealed a significant positive correlation between social media exposure and fear of crime, indicating that higher exposure to crime-related content is associated with greater fear of becoming a victim. In contrast, a negative correlation was found between social media exposure and trust in law enforcement, suggesting that increased media consumption may decrease confidence in police effectiveness. Additionally, trust in law enforcement was negatively correlated with fear of crime, showing that higher trust levels are linked to lower fear levels. The results highlight the importance of responsible media consumption and the need for law enforcement agencies to enhance transparency and public engagement to build trust among youth. Limitations, suggestions, and future recommendations were also mentioned in this study

Keywords: Correlation Study of Social Media Exposure, Fear of Crime and Trust in Law Enforcement

Impact of Household Responsibilities and Workplace Social Support on Predicting Depression among Working Women

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The present study aim to investigate the impact of household responsibilities and workplace social support on predicting depression among working women. Balancing paid employment with domestic duties can create psychological strain and emotional exhaustion, often resulting in depressive symptoms. In this study household responsibilities and workplace social support were treated as independent variables, while depression served as the dependent variable. Data will be collected from working women selected through convenient sampling (N=200). Three standardized instruments will be employed: the Household Responsibility Scale (self-developed 5-item scale adapted from Schaber, 2020), the job content Questionnaire (JCQ) Social Support Subscale (Karasek & Theorell, 1990) to measure perceived supervisor and coworker support, and the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) for assessing depressive symptoms. It is hypothesized that greater household responsibilities will positively predict depression, whereas higher workplace social support will negatively predict depression. The study's findings are expected to contribute to understanding psychological stressors in working women and emphasize the importance of workplace support in promoting mental well-being. Limitations, suggestions, and future recommendations were also mentioned in this study.

Keywords: Household Responsibilities, Workplace Social Support, Depression, Working Women

Relationship between Communication Quality, Trust, and Empathy in Reducing Fear of Death among Dialysis Patients

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The study was conducted with a research population of (N=200) which was equally divided between male and female selected through purposive sampling from major public and private hospitals. Standardized instruments were employed to ensure reliability and validity of measurement. The communication assessment tool (Makoul et al., 2007) was used to evaluate patients' perceptions of healthcare providers' communication quality the consultation and relational empathy (Mercer et al., 2004) assessed the level of empathy perceived during medical consultations; and the Trust in Physician Scale (Anderson & Dedrick, 1990) measured patients' trust in their healthcare providers. To assess death-related psychological constructs, the Collett-Lester Fear of Death Scale (Collett & Lester, 1969) and the Templer death anxiety scale (Templer, 1970) were utilized to measure fear and anxiety associated with death and dying. Data was analyzed using correlation and regression analyses through SPSS to determine the strength and direction of relationships among communication quality, empathy, trust, and fear of death.

Preliminary findings suggested that higher levels of perceived empathy and trust significantly correlated with improved communication quality, which in turn was associated with lower fear of death and reduced death anxiety among dialysis patients. These results indicate that enhancing relational and communicative competencies among healthcare professionals can play a vital role in alleviating existential distress and promoting psychological comfort in patients with chronic life-threatening conditions. The study emphasizes the necessity for integrated communication and empathy training in medical practice to strengthen patient-physician relationships and improve end-of-life psychological outcomes. Implications for clinical interventions, psychosocial support, and future research directions are discussed.

Keywords: Communication Quality, Empathy, Trust, Fear of Death, Death Anxiety

Role of Bullying Victimization and Academic Burnout: Mediating Role of Sleep Disturbances Among University Students

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The present study aimed to examine the role of bullying victimization and academic burnout, with a mediating role of sleep disturbance among university students. The sample consisted of (N=200) selected through purposive sampling technique. Data was collected by administering three standardized scales Multidimensional Peer-Victimization Scale (Mynard & Joseph, 2000), Maslach Burnout Inventory–Student Survey (Schaufeli et al., 2002), and Pittsburgh Sleep Quality Index (Buysse et al., 1989). Data were analyzed using the latest version of SPSS, employing T-test, correlation, and regression analysis to explore relationships among the study variables. Results revealed that bullying victimization positively predicted academic burnout and sleep disturbance, while sleep disturbance negatively affected academic performance. Sleep disturbance partially mediated the relationship between bullying victimization and academic burnout. Sleep quality and bullying experiences to enhance students' academic well-being. Limitations, implications, and future recommendations are discussed in this study.

Keywords: Bullying victimization, Academic burnout, Sleep disturbance

Impact of Social Support on Mental Health and Mindful Self Compassion, and Digital Well Being on Psychological Well-Being among Young Adults

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The present study aimed to examine the impact of social support, mental health, mindful self-compassion, and digital well-being on psychological well-being among young adults. A correlational research design was employed. Data were collected from a sample of (N= 200) young adults using a purposive sampling technique. Standardized instruments were administered, including the Multidimensional scale of perceived social support (Zimet et al., 1988), Mental health inventory, Mindful self-compassion scale short form (Raes et al., 2011), the Digital well-Being scale, and Ryff's psychological well-being scale (Ryff, 1989). Statistical analyses

T-test, correlation, and regression were conducted using SPSS to examine relationships among the study variables. The findings revealed that higher levels of social support, better mental health, greater mindful self-compassion, and improved digital well-being were significantly associated with enhanced psychological well-being among young adults. Female participants reporting higher mindful self-compassion, while male participants demonstrated comparatively better digital well-being. Limitations, practical implications, and recommendations for future research were discussed.

Keywords: Bullying victimization, Social support, Mental health, Mindful Self-Compassion, Digital Well-Being

Role of Learning Style, Time Management, Digital Distraction and Mindfulness on Procrastination among Young Adults

Sara Batool, Dawra

Department of Psychology, Thal University Bhakkar

This study was conducted with a research population of (N=200) which was equally divided between male and female university students. Procrastination is a common issue in students, often resulting from poor self-regulation and shaped by cognitive, behavioral and environmental elements. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering five standardized scales Pure Procrastination Scale (Steel, 2010), VARK Questionnaire (Fleming, 2001), Time Management Behavior Scale (Macan et al., 1990), Digital Distraction Scale (Kushlev et al., 2016), Five Facet Mindfulness Questionnaire (Baer et al., 2006). In this study different statistical analysis were used like T-test, correlation and regression analysis on SPSS to find out the relationship among study variables. Findings indicated that learning style has a significant positive correlation with time management and digital distraction and mindfulness on procrastination. Male students scored high on learning style and female students scored high on time management. Practical value of academic and psychological strategies can reduce the procrastination in university settings. Limitations, suggestions and future recommendations were also mentioned in the document.

Keywords: Learning Styles, Time Management, Digital Distraction, Mindfulness, Procrastination

Impact of Anxiety on Mental Health, Illness Appraisal and Quality of Life among Hypertension Patients

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This study was conducted with a research population of (N=200) which is equally divided between the male and female student's population. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering Self-Appraisal of Illness Questionnaire (Leventhal et al., 1992), Quality of Life brief (World Health Organization [WHO], 1997), Beck Anxiety Inventory (American Psychological Association [APA], 2013) and Depression, Anxiety and Stress scale (WHO, 2018). Three analyses were used in this

study T-test, correlation and regression analysis by using the SPSS. Finding indicates that anxiety has significant negative relationship with mental health, anxiety has positive relationship with illness appraisal and anxiety has negative relationship with quality of life. Gender differences revealed that male score high on illness appraisal and quality of life and females score high on illness appraisal and quality of life as compare to males. Limitations, practical implications, and recommendations for future research were discussed.

Keywords: Anxiety, Mental Health, Illness Appraisal, Quality of Life

Impact of Racing Thoughts and Self-Efficacy on Job Performance among Rescue Workers

Kousar Samreen, Dawra

Department of Psychology, Thal University Bhakkar

This study was conducted with a research population of (N=200) which is equally divided between the male and female student's population. Purposive sampling technique and correlational research design were used in this study. Data was conducted by administering Generalized self- efficacy scales (Schwarzer & Jerusalem, 1995), Racing and crowded thoughts questionnaire scales (Wiener et al., 2018) and Employee job performance scale (Nan-Nan et al., 2018). Three analyses were used in this study T-test correlation and regression analysis by using the SPSS. Finding indicates that racing thoughts has significant negative relationship with job performance moreover self- efficacy has positive relationship with job performance. Gender differences revealed that male score high on racing thoughts, self-efficacy and females score high Job Performance as compare to males. Limitations, practical implications, and recommendations for future research were discussed.

Keywords: Racing Thoughts, Self-Efficacy, Job Performance

Impact of Personal Growth and Personality Traits on Moral Judgment among Adults

Rahat Fatima, Dawra

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This study was conducted with a research population of (N=200) which is equally divided between the male and female student's population. Purposive sampling technique and correlational research design were used in this study. Data was collected with the psychological scales Personal Growth Scale (Christine Robitschek, 1998), Moral judgment Scale (Comunian, 2002) and Personality Traits Scale (Gosling et al., 2023). Three analyses were used in this study T- test, correlation and regression analysis by using the SPSS. Finding indicates that a Personal growth and personality traits has significant positive relationship with moral judgment. Gender differences revealed that male score high on personal growth and personality trait and female scores high on moral judgment as compare to males. Limitations, practical implications, and recommendations for future research were discussed.

Keywords: Personal Growth, Personality Traits, Moral Judgment

Impact of Resilience, Perceived Social Support and Family Relationship on Self-Compassion among Adolescents

Tayiba Fareed, Dawra

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The present study explored resilience, perceived social support and family relationship as independent variables while self-compassion was a dependent variable. Correlation research design and convenient sampling technique were used. The study was conducted on adolescents with the sample size (N=200, n=100 males, n=100 females). Demographic like, gender, age, education, socio-economic status and residential area were also explored in this study. Four psychological scales were used in this study like Resilience scale (Olav, 2001), Multidimensional scale of perceived social support (Zimet et al., 1988), Family relationship scale (Moos & Moos, 2011) and Self-compassion scale (Neff & Gerlach, 2011). SPSS was used for data analysis. Descriptive, correlation, T-test and regression analysis were used to investigate the relationship among study variables. It was found that high resilience, high perceived social support and good family relationship increase self-compassion among adolescents. Limitations, practical implications, and recommendations for future research were discussed.

Keywords: Resilience, Perceived Social Support, Family Relationship, Self-Compassion

Relationship between Balance Diet on Health, Eating Behaviors and Sleep Quality among Gym-Going Adults

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This study was conducted with a research population of (N=200) which was equally divided between male and female gym-going adults. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering four standardized scales like Healthy Eating Index (Guenther et al., 2013), Short Form Health Survey SF-36 (Ware & Sherbourne, 1992), Dutch Eating Behavior Questionnaire (Van Strien et al., 1986) and Pittsburgh Sleep Quality Index (Buysse et al., 1989). Furthermore, in this study three statistical analyses were used. T-test, correlation and regression were run on SPSS to find out the relationship among study variables. Findings indicated that a balanced diet is linked to better sleep quality and healthier eating behaviors. Among gym-going adults, combining healthy eating and regular exercise enhances overall sleep and health outcomes. Limitations, suggestions, and future recommendations were also mentioned in the document.

Keywords: Balance Diet, Health, Eating Behaviors, Sleep Quality

Effects of Social Media Usage, Cyberbullying Exposure, Emotional Intelligence and Physical Activity on Mental Health among University Students

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This study was conducted to examine the effects of social media usage, cyberbullying exposure, emotional intelligence, and physical activity on the mental health of university students. The study employed a correlational research design to understand how these variables interact and influence each other. Data were collected from a sample of 250 university students (N=250) using a purposive sampling technique. Participants were assessed through four standardized scales: the Social Media Use Scale (Smith & Duggan, 2013), the Cyberbullying Exposure Scale (Tokunaga, 2010), the Emotional Intelligence Scale (Schutte et al., 1998), and the Physical Activity Scale (Godin & Shephard, 1985). Mental health was measured using the Mental Health Inventory (Harvard Medical School, 1993). Statistical analyses, including T-tests, correlation, and regression analysis, were conducted using SPSS to examine the relationships among the study variables. The findings indicated that higher levels of social media usage and exposure to cyberbullying were significantly associated with poorer mental health outcomes, including increased symptoms of anxiety and depression. In contrast, higher emotional intelligence and regular physical activity were found to be protective factors, linked to better mental health, with emotional intelligence acting as a moderating factor for the negative impact of cyber bullying exposure. Furthermore, gender differences were observed: female students reported higher levels of emotional intelligence and physical activity, while male students tended to report more frequent exposure to cyberbullying. This suggests that targeted interventions, including enhancing emotional intelligence and promoting physical activity, could help mitigate the negative mental health effects of excessive social media use and cyberbullying. Limitations of the study include the reliance on self-report measures and the cross-sectional design, which limits causal inference. Future research could explore longitudinal data to better understand the long-term effects of these factors on university students mental health.

Keywords: Social Media Usage, Cyberbullying Exposure, Emotional Intelligence, Physical Activity, Mental Health, University Students

Role of Technology-Based Coping Strategies and Self-Composing in Managing Stress among Young Medical Professionals

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This study was conducted with a research population of (N=200) which was equally divided between male and female university students. Purposive sampling technique and correlational research design were used in this study. Data was collected by administering three standardized scales Technology-Based Coping Scale (Cohren et al., 1997), Self-Compassion Scale (Neff, 2003) and the Percieved stress scale (Cohen et al., 1983). Furthermore, in this study three statistical analyses were used T-test, correlation, regression analyses were run on SPSS to find out the relationship among study variables. The study found that technology- based coping strategies were significantly association with reduce perceived stress. Limitations, suggestions, and future recommendations were also mentioned in the document.

Keywords: Technology-Based Coping, Self-Compassion, Stress Management

Impact of Social Support and Self-Concept on Psychological wellbeing among women residing in Shelter home

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The present study aimed to investigate the relationship between social support self-concept and psychological well-being among women residing in shelter homes. Women in such environments often face emotional deprivation social isolation and low self-worth which can affect their overall mental health. Purposive sampling technique and Correlation survey research design was used to examine the relationship between Social Support Self-concept and Psychological well-being. The research population consisted of (N=150) women. To evaluate these variables Standardized measures were used to collect data. The Multidimensional Scale of Perceived Social Support (Zimet et al., 1988) used to measure Social Support the Self-concept Questionnaire (Dolejš et al., 2022) was used to measure Self-concept and the Psychological Well-Being Scale (Ryff & Keyes, 1995) was used to assess the Well-being of women. Results Indicate that Social Support positively correlate with Psychological Well-being and positive perception positively correlate with psychological wellbeing. These findings enhance understanding of the emotional and psychological functioning of women in shelter homes and guide the development of intervention programs aimed at improving their social and mental health outcomes.

KeyWords: Social support, Self-concept, Psychological well-being.

Emotional Intelligence, Resilience and Social Adjustment among Adolescents (Orphanages)

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The present study aimed to examine the relationship between Emotional Intelligence, Resilience, and Social Adjustment among Adolescents. Adolescence was a crucial developmental period characterized by emotional, cognitive and social changes that influenced overall psychological well-being. A sample of (N=250) adolescents was selected for this study by using purposive sampling technique. Data were collected using the Schutte Self-Report Emotional Intelligence Scale (Schutte et al., 1998), the Brief Resilience Scale (Smith et al., 2008) and the Work and Social Adjustment Scale (Mundt et al., 2002). Correlation, regression analyses and t-test were conducted to determine the strength and predictive relationships among the variables. The findings revealed significant positive relation between Emotional Intelligence and Resilience, and both were found to be significant predictors of Social Adjustment. The results highlighted that higher Emotional Intelligence and Resilience enabled adolescents to cope more effectively with Social and Emotional Difficulties, leading to better Adjustment and Psychological Well-being. The study underscored the importance of developing emotional and coping skills through psychological interventions and educational programs in orphanage settings.

KeyWords: Emotional Intelligence, Resilience, Social Adjustment, Adolescents.

Spiritual wellbeing, gratitude and life Satisfaction among Orphan Adults

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The Present Study aimed to examine the Relationship between Spiritual Well-being, Gratitude, and life Satisfaction among orphans. Spiritual well-being fosters gratitude, which enhances life satisfaction among orphans. Cultivating gratitude and spiritual growth can support orphans overall well-being. Correlational Survey research design with a sample of N=200 orphans selected through Purposive B Sampling. Standardized instruments were used for data collection including the Spiritual Well-Being Scale (Paloutzian & Ellison, 1982) to assess spiritual well-being, the Gratitude Questionnaire (McCullough et al., 2002) to measure gratitude and the Satisfaction with Life Scale (Diener et al., 1985) to evaluate life satisfaction. Data were analyzed through Descriptive Statistics, Correlation, and Regression analyses. It was hypothesized that higher levels of Spiritual Well-being and Gratitude would be positively correlated with greater life satisfaction among Orphans. The findings of this study were expected to highlight the importance of spiritual and emotional resources in Enhancing Psychological well-being and improving the overall life satisfaction of orphans.

Keywords: Spiritual well-being, Gratitude, life satisfaction, Psychological well-being

Emotional Neglect, Mindfulness and Psychological Flexibility among Women in Shelter Home

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The present study aimed to explore the relationship between Emotional Neglect, Mindfulness and Psychological Flexibility among women living in Shelter homes. Purposive sampling technique and correlational Survey Research Design was used. Sample of the study was (N=200) women. Standardized tools were used for data collection. Emotional Neglect Questionnaire (Webb, 2018) to measure Emotional Neglect, Mindful Attention Awareness Scale (Brown & Ryan, 2003) was used for mindfulness and the Acceptance and Action Questionnaire-II (Bond et al., 2011) used for measuring Psychological flexibility. Data were analyzed using Descriptive statistics, Correlation and Regression analysis. The results reveal that high levels of Mindfulness and Psychological Flexibility Negatively correlate with Emotional Neglect. The findings were expected to help understand the Psychological Experiences of women in shelter homes and guide the development of supportive interventions to improve their Emotional and Mental Well-being.

Keywords: Emotional Neglect, Mindfulness, Psychological flexibility.

Effect of Institutional Neglect and Fear of Failure on Academic Motivation among Orphans

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The Aim of this research was to analyze the effect of institutional neglect and fear of failure on the Motivation for learning among orphans. Institutional neglect occurs when orphans no longer

offer emotional support and proper education, which can slow down a child intellectual and emotional development. Fear of failure can also enter the picture leading youth much less likely to study diligently or participate in school athletics because they are anxious about no longer performing well. They can affect how much kids have to learn, and the quality of work done at school. The research utilized quantitative correlational survey research design. Data were gathered from (N=250) orphan by using purposive sampling technique with the use of standardized instruments like the Neglect Scale (Wilson et al., 1987) to assess Institutional neglect, the Academic Motivation Scale (Abrahamsen et al., 2012) to assess academic motivations and the Performance Failure Appraisal Inventory (Conroy et al., 2002) to access Fear of Failure. Data was analyzed through statistical techniques such as descriptive, correlation, regression. Findings revealed that fears of failure and institutional Neglect positively impact Academic Motivation. The study highlights the importance of Motivational and Support interventions to enable orphaned children to achieve their Education.

Keywords: Orphan Children, Academic Motivation, Fear of Failure, Institutional Neglect

Impact of Social Support on Hope and Psychological distress among Female Prisoners

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This study aimed to examine the relationship between Social Support on Hope and Psychological distress among female inmates. Correlational survey research design was employed, with a sample of (N=250) female Prisoners selected through Purposive Sampling. Standardized self-report instruments were used for data collection. Kessler Psychological Distress Scale (Kessler et al., 2002) was used to assess levels of psychological distress, the Adult Hope Scale (Snyder et al., 1991) to measure hope and the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988) to evaluate perceived social support from family, friends, and significant others. Data were analyzed using descriptive statistics, correlation, and regression analyses. Findings revealed that higher levels of social support were positively correlated with hope and negatively correlated with psychological distress, suggesting that supportive social relationships may foster resilience and optimism even in restrictive environments. The results highlight the critical role of social support networks and hopeful outlooks in decreasing psychological distress among confined women. These findings underscore the importance of designing prison-based interventions and rehabilitation programs that enhance inmates' social connectedness and strengthen their sense of hope to promote psychological well-being and successful restoration into society.

Keywords: Psychological distress, Hope, Social Support, Mental health

Impact of Optimism and Interpersonal Trust on Depression among Orphan Adults

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The goal of the study was to examine the impact of interpersonal trust, optimism and depression among orphans. The study employed a correlational research design. Data was collected from

sample of (N=150) orphans using a Purposive sampling technique. Data was collected by administering standardized scales DASS-21 (Lovibond, 1995) for depression for optimism, the Life Orientation Scale Revised (Scheier et al, 1994) for interpersonal trust, the Dyadic Trust Scale (Larzelere & Huston, 1980). Descriptive statistics, regression analyses, and correlation were employed to investigate the connections among the variables. Results indicated that optimism and interpersonal trust were inversely connected with higher levels of depression. High level of optimism leads lower symptoms of depression and high interpersonal trust negatively correlate with depression. The findings show importance to foster optimism and trust in order to reduce depressed symptoms and enhance the psychological well-being of orphan.

Keywords: Depression, optimism, Interpersonal Trust, Orphans

Impact of Gratitude Dyadic Coping on Stress Management and Quality of Life among Married Couples

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The current study was conducted to evaluate the Impact of Gratitude Dyadic Coping on Stress Management and Quality of Life among Married Couples. For this purpose, the total sample of study was comprised on N=115 couples in which n=115 wives and n=115 husbands were included. The sample age for husbands above 23 years, for wives above 20 years and marriage duration of minimum 5 years. Convenient sampling technique was use to select sample. The Demographic Sheet, Dyadic Coping Based Gratitude Questionnaire (Shujja et al., 2022), Stress Management Skills Scale (Henson et al., 1997) and WHO-Quality of Life – Brief (WHO, 1996) are the instruments used to measures the variables. Correlational Survey Research method and Statistical techniques was used. Pearson Correlation was used to check the relationship, Linear Regression was used to analyze impact and Paired Sample t-test was used to check the difference among husbands and wives. The result reveals significant relationship among all study variables with the positively among husbands and partially negative for wives. The significant impact of study variables between them. Moreover, the Partial gender differences are present among husbands and wives were different in level of self-expressing gratitude but no difference in stress management and quality of life.

Keywords: Gratitude Dyadic Coping, Stress Management, Quality of Life.

Impact of Emotional Competence and Coping Style on Sleep Quality and Work-Life Balance

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This study investigates the relationship between emotional competence, coping styles, sleep quality, and work-life balance among nurses. Correlational research design and purposive sampling technique was used with (N=200) nurses from public and private hospitals. Participants completed validated scales measuring emotional competence, coping styles, sleep quality, and work-life balance. Nurses face high levels of occupational stress, which can negatively impact

their sleep quality and work-life balance. Emotional competence and coping styles are critical factors in managing workplace stress and improving well-being. Four scales were used Brief COPE scale (Carver. 1997), Sleep Quality Scale (Yi et al., 2006), Work-Life Balance scale (Kalliath & Brough., 2008) and Perth Emotion Regulation Competency Inventory (Preece et al., 2018). It was narrated that nurses face high levels of occupational stress, which can negatively impact their sleep quality and work-life balance. Emotional competence and coping styles are critical factors in managing workplace stress and improving well-being. The findings highlight the importance of emotional intelligence training and stress management interventions for nurses. Healthcare institutions should develop targeted programs to enhance emotional competence, ultimately improving nurse well-being, job satisfaction, and patient care quality. Future research should explore longitudinal effects of emotional intelligence training and assess how improved coping mechanisms contribute to burnout prevention and higher job retention rates.

Keywords: Emotional Competence, Coping Styles, Sleep Quality, Work-Life Balance

Impact of Family Dynamics, Personality traits and Coping mechanism on Psychological Distress among University Students

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The purpose of the current study was to investigate how personality factors, coping mechanism, and family dynamics affect psychological distress in university students. The current research was correlational study by using survey research design. In correlational to the mentioned Variables, the effect of several demographics factor like gender, age, education, institute and socioeconomic status were also investigated. It was carried out on the sample of (N=200, n=100 males, n=100 females). To acquire the data, a convenient sampling strategy was employed. The sample was used to measure the psychometric properties and test the hypothesis of the study. To measure study variables Family Dynamic Questionnaire (Fowers & Olson, 1989), Big five inventory Scale (John & Srivastava, 1999), Coping Orientation to Problem Experience (Scheier & Weintraub, 1989) and Kessler Distress Scale (Kessler et al., 2002) was used. Correlational matrix verified the positive and negative relationship between Family Dynamics, Personality Traits, Coping Mechanism and Psychological Distress.

Keyword: Family Dynamics, Personality, Coping Mechanism, Psychological Distress.

Impact of Positive Parenting and Interpersonal Skills on Social Comparison among College Students

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The current study looked at how college students' social comparison was influenced by positive parenting and interpersonal skills. A sample of 200 students (50% male, 50% female) from government institutions participated in the study. Standardized measures were used to assess positive parenting, interpersonal skills, and social comparison. Correlational analysis

revealed that positive parenting was positively related with interpersonal skills ($r = .65$, $p < .001$) and negatively linked with social comparison ($r = -.29$, $p < .001$), suggesting that students with supportive parental relationships exhibited stronger interpersonal skills and engaged in less social comparison. Additionally, interpersonal skills were negatively correlated with social comparison ($r = -.17$, $p < .01$), although regression analysis indicated that interpersonal skills did not significantly predict social comparison. The results emphasized the role of positive parenting in developing interpersonal competence and reducing tendencies for social comparison, which may contribute to better psychological well-being among students. No significant gender differences were observed in positive parenting, interpersonal skills, or social comparison. Overall, the study emphasizes the importance of positive parenting in shaping students social development and self-evaluation behaviors.

Keywords: Positive parenting, interpersonal skills, social comparison, college students, psychological well-being

Impact of Social Isolation on Social Media Usage and Mental Health among Young Adults

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This study investigated impact of social isolation and social media usage on mental health among young adults. This research examined the positive and negative impact of social isolation and social media usage on mental health among young adults. The participants of the study were young adults. Social isolation and social media usage are independent variables and mental health is dependent variable in this study. The non-probability purposive sampling technique was used to collect data, with a sample size of ($N=200$, $n=100$ males, $n=100$ females). The study was based on a correlation research design. T-test, correlation and regression analysis were used to investigate the differences, relationship and prediction IV's effect on DV among all study variables. The variables were measured through social isolation scale by (Lunstad et al., 2010) social media usage by (Nikolas and Bringal, 2016) mental health by (Lehman, 1998). In this research results, limitations, suggestions and implications were mentioned after conducting the research. The analysis was conducted through the latest version of SPSS. Mean, standard deviation and t-values of male and female on all study variables indicate that there are no significant gender differences on social isolation and social media usage on mental health. Pearson correlation between the various factors indicated the positive relationship between IV's and DV. Regression analysis significant impact of social isolation and social media usage on mental health.

Keywords: Social Isolation, Social Media Usage, Mental Health Strategies

The Impact of Artificial Intelligence on Human Decision-Making: A Critical Analysis

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The rapid integration of Artificial Intelligence into organizational setting has significantly transformed traditional human decisional-making processes. Insights from recent research indicate that human-AI collaboration enhances decision quality through data-driven insights, reduced cognitive biases, and improved risk assessment. AI's ability to process vast datasets enables faster and more accurate decisions, while humans contribute contextual understanding, creativity, and ethical judgment. However, over-reliance on AI may reduce human autonomy, weaken critical thinking abilities, and increase laziness, as highlighted in contemporary studies. AI supports managerial decision-making, it also raises concerns regarding transparency, trust, privacy, job displacement, and the loss of human cognitive capabilities. They including augmentation, automation, hybrid, and adaptive approaches- each defining varying levels of decision authority between humans and AI systems. Effective collaboration requires trust, explainability, ethical governance, skill development, and organizational readiness. Empirical findings demonstrate improved accuracy and efficiency in AI-assisted decision-making, yet challenges such as algorithmic bias, lack of interpretability, and human dependency remain significant. Overall, integrating the strengths of both humans and AI can optimize decision outcomes, provided that ethical, technical, and human factors are responsibly managed.

Keywords: Artificial Intelligence, Human-AI Collaboration, Decision-Making, Cognitive Bias, Organizational Management, Human Autonomy, Ethical AI, Explainable AI, AI Dependency, Decision Accuracy, Technology Integration, AI Challenges.

Exploring Green Solvents: Sustainable Alternatives for a Greener Future

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Green solvents act as a vital system to change the traditional solvents which can be very noxious, volatile and unsustainable. Green solvents are designed to be much less poisonous and much less dangerous to human beings and the environment. Solvents like supercritical fluids require much strategies. They may be used for extracting natural merchandise like important oils e.g d-limonene from citrus. Deep Eutectic solvents (DESs) are also a type of inexperienced solvents. DESs were used to extract bioactive compounds from flora including flavonoids. Water is taken into consideration as the greenest solvent due to its non-toxicity and coffee price. Over the past three many years, type of extra environmentally pleasant or sustainable solvents have been developed, relationship between solvents traits, response mechanism, and product selectivity, this look at highlights the manner wherein cautious solvents selection can lower the carbon footprint of chemical reactions, decrease waste manufacturing, and improve atom efficiency. Inexperienced solvents additionally have sturdy future potentialities. Industries will increasingly replace traditional solvents with green solvents.

Keywords: Solvents, Supercritical fluids, DESs, Traits, Bioactive compounds, Mechanism, Non-toxicity.

The Chemistry of Artificial Intelligence Hardware (Neuromorphic Chips)

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This work investigates the intricate chemistry underlying neuromorphic chips, a class of specialized hardware engineered to emulate the functional behavior of the human brain. Neuromorphic systems aim to replicate the computational principles of biological neural networks, and their performance is deeply rooted in the chemical properties of the materials from which they are constructed. In this context, the study focuses on how ionic motion, phase transitions, and electronic correlations within various materials enable devices to mimic the dynamics of artificial neurons and synapses. Several key technologies are examined, including memristors, phase-change memory, Mott devices, and advanced 2D-material hetero structures. Each of these components relies on specific chemical mechanisms that determine their switching speed, operational reliability, endurance under repeated cycles, and overall energy efficiency. The research further emphasizes that precise control over material composition, defect engineering, and atomic-scale interactions is crucial for optimizing device behavior and ensuring the scalability of neuromorphic architectures. By integrating these chemical insights, designers can improve the performance of artificial neural networks, enabling more efficient and brain-like computation. Overall, this study provides a comprehensive perspective on how fundamental chemical principles drive the development and refinement of next-generation, brain-inspired artificial intelligence hardware.

Keywords: Neuromorphic chips, memristors, phase-change memory, 2D materials, ionic motion, electronic correlations, artificial neurons.

Role of Catalyst in Water Splitting

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Efficient, non-noble electrocatalysts are vital for hydrogen production and energy storage. We report tungsten- and molybdenum-based catalysts with enhanced performance through interfacial engineering. WN-Ni (OH)₂ nanowires achieve 100 mA cm⁻² at 245 mV for alkaline HER by promoting water dissociation and Volmer kinetics. WN also acts as a co-catalyst for CdS, forming a Schottky junction that boosts visible-light H₂ evolution 9.3-fold. Nickel tungstate micro flowers show high capacitance (712 F/g) and excellent cycling stability (~95%). Co/MoN hetero-interface Nano flakes exhibit outstanding HER activity (100 mA cm⁻² at 132 mV) due to enhanced water dissociation confirmed by DFT. These results demonstrate that interfacial and heterostructure design provides a versatile strategy for high-performance, noble-metal-free electro catalysts and photo catalysts.

Keywords: Interfacial engineering leads to high-performance, non-noble W/Mo catalysts for HER, supercapacitors, photo catalysis.

Comprehensive Review of Nanotechnology: Innovations and Multidisciplinary Applications

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Nanotechnology involves manipulating materials at the 1–100 nm scale, where substances show unique physical, chemical, and biological behaviors. The reviewed paper explains how advances in nanoscale synthesis and characterization have turned nanotechnology into a major interdisciplinary field. It outlines key domains, including plant nanotechnology, medical nano biotechnology, environmental applications, and food nanotechnology. In agriculture, nanoparticles improve nutrient delivery, crop protection, and genetic modification through systems such as green nanoparticles and nano-enabled CRISPR delivery. In medicine, nanomaterials enhance targeted drug delivery, cancer therapy, regenerative tissue repair, diagnostics, and vaccine efficiency due to their tunable size and high reactivity. Environmental nanotechnology plays a central role in pollutant remediation, removing heavy metals, organic contaminants, and microbial threats using metal-based, carbon-based, and polymer-based nanomaterials. In the food sector, nanoscale materials support smart packaging, quality preservation, contaminant sensing, and controlled release of nutrients or bio actives. The article also discusses challenges surrounding nano toxicity, stability, large-scale production, and the need for eco-friendly materials. Overall, the review highlights nanotechnology's expanding impact across healthcare, agriculture, environmental management, and food science, emphasizing its potential to address global challenges through precise nanoscale engineering.

Keywords: Nanotechnology, Nanomaterials, Drug Delivery, Cancer Therapy, Environmental Remediation, Green Nanotechnology, CRISPR–Cas Delivery, Regenerative Medicine, Food Nanotechnology, Nano-Biosensors

Role Of Nanomaterials In Drug Delivery System

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Nanomaterials have accommodated drug delivery by providing targeted, efficient and controlled release of therapeutics. Conventional drug delivery methods often face challenges like inadequate bioavailability, non-specific distribution and systemic perniciousness. Nanoparticles due to their small size and surface functionalization capabilities can repress biological barriers and deliver drugs directly to the intended target site. They have capability to respond to stimuli and bind to particular receptors and it allows for receptor mediated uptake and sustained drug release. These Nano-carriers enhance treatment efficacy, reduce dosage frequency and minimize toxicity. However potential limitations such as stability, long term safety and immune response still need to be addressed. This abstract explore the design, mechanism and future prospects of using nanomaterials in drug delivery system, highlighting their revolutionary impact on modern medicine.

Keywords: Nanoparticles, Drug targeting, Bio compatibility, Toxicity, Controlled release, Mechanism of delivery

Nobel Prize in Chemistry 2025 – Metal–Organic Frameworks (MOFs)

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The 2025 Nobel Prize in Chemistry was awarded to Susumu Kitagawa, Richard Robson, and Omar M. Yaghi for their development of metal–organic frameworks (MOFs), a class of porous, crystalline materials with tunable structures. MOFs are formed by connecting metal ions or clusters with organic molecules, creating frameworks with large internal surface areas capable of storing and selectively transporting molecules. Richard Robson laid the foundation by demonstrating that metal ions and organic linkers can form stable 3D frameworks. Kitagawa showed that MOFs could flexibly adsorb and release gases, making them functional materials. Yaghi advanced the field by designing highly stable and customizable MOFs, enabling applications in gas storage, water harvesting, pollution control, and catalysis. Together, their work transformed chemistry from discovering materials to designing them for specific purposes. MOFs have practical significance for addressing global challenges such as carbon capture, clean water supply, and sustainable energy solutions. By allowing precise molecular design, these frameworks exemplify how fundamental chemistry can drive innovation with societal impact. The 2025 Nobel Prize highlights both the scientific creativity and real-world relevance of MOFs, demonstrating the power of molecular engineering in modern material science.

Keywords: Metal–organic frameworks, MOFs, porous materials, molecular design, gas capture, water harvesting, catalysis.

Explosive Detection Using Laser Desorption- Ion Mobility Spectrometry (LD-IMS)

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This study presents an advanced analytical approach for the rapid and highly sensitive detection of trace explosive residues using Laser Desorption–Ion Mobility Spectrometry (LD-IMS). The method integrates laser desorption to release microscopic particles from various surfaces, followed by ion mobility spectrometry for chemical identification of explosive compounds such as TNT and RDX. Experimental results demonstrate that LD-IMS is capable of detecting extremely small quantities of explosive materials on real-world surfaces including metal, plastic, fabric, and painted materials. The technique offers excellent sensitivity, short analysis time, and minimal sample preparation. The method provides reproducible results across multiple trials. In addition, the system is lightweight and portable, making it suitable for on-site forensic applications and security checkpoints. The findings suggest that LD-IMS can significantly enhance crime scene investigations by enabling rapid screening of explosive residues, improving evidence recovery, and supporting counter-terrorism operations. Overall, this technique provides an efficient and

reliable tool for modern forensic chemistry, contributing to improved crime control, and public safety.

Keywords: LD-IMS, Explosive detection, Trace residues, Forensic analysis, TNT/RDX.

ALPHA-FOLD3, The Potential to Accelerate the Drug Discovery

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The drug discovery is vital yet remains slow and costly often taking years of billions, involving target identification compound screening optimization and preclinical testing. The main challenge lies in predicting molecular structure and attraction accurately. Artificial intelligence (AI) has transformed this process by rapidly identifying and designing bioactive molecules through computational modeling. ALPHA-FOLD 3 revolutionizes DNA/RNA and ligand interaction with unprecedented accuracy and versatility surpassing Alpha-FOLD 2. ALF3 predict DNA/RNA structure by generating unpaired MSA. It increases modelling accuracy by eliminating the costly MSA pairing process avoiding errors from genetic paralogs, cross talk between protein signaling pathways and assimilation of pathogenic materials such as lysogenic viruses. It generates ranked models with confidence scores. After structural validation with protein data bank (PDB) and MMseq2, the high confidence DNA/RNA models are screened for druggable pockets, docked with candidate ligand. With AI tools e.g. Cognit, improves disease understanding and enable precise, cost-effective treatments. This process is paving the way for personalized medicine. It aims to decode genetic information identify disease causing mutation and predict individual drug responses. Though challenges such as data bias and model interpretability remain. ALF3 mark a new era of faster smarter and more reliable drug discovery.

Keywords: ALPHA-FOLD3, Protein ligand interaction, Computational modelling, Personalized Medicine, Drug discovery

Recent Electrolyzer Technologies in Green Hydrogen Production

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Latest advancement in scientific research for the recent progress in the technologies for the green hydrogen production and finding new catalyst recipes to meet the future goals for cleaner and safer environment. Basically, the future goals to focus on cost reduction, boosting efficiency, cell energy efficiencies, durability and scalability are the current topic of research in green hydrogen production. We can also focus on playing nice with renewable making electrolytes and using AI to optimize but still the challenges in hydrogen production is scaling up investment and new infrastructure for storing green hydrogen. In this review major focus is on the water splitting techniques using electrolyzer such as PEM, AEM and solid oxide electrolyzer cells.

Keywords: Green hydrogen production, Electrolyzer, Water electrolysis; PEM, AEM and solid oxide electrolysis.

Metal-Organic Frameworks: A Design-Driven Paradigm for Advanced Porous Materials

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It was long believed that porous materials could not be designed or we can say no one thought of designing them. Metal-Organic Frameworks have provided a paradigm shift. They are hybrid compounds which are made up of an organic part (linker) and an inorganic part (metal). They provided a new concept “design before synthesis” in materials science which has proved be Nobel-worthy today due to their adjustable porosity and structure and numerous applications. Unlike typical materials like zeolites and activated carbon, which are often hard to modify according to our needs, MOFs can easily be designed with desired pore size and structure to perform certain tasks. The synthesis methods, which were the solvothermal synthesis and diffusion in the past, are now replaced by modern methods like sonochemical and mechanochemical, making it even easier to control their design and structure, as engineers do before they make something. This design capability gives those unique features and numerous applications. MOFs exhibit ultra-porosity and a large pore volume, which are far more than any other materials known. They also feature very high surface area, enabling high-density energy storage, carbon capture with lower energy demand, activated metal sites for catalytic activity, and even the extraction of water from air. This not only demonstrates their usefulness but also gives a hint of their potential in environmentally friendly products, in agriculture and medicine. By addressing our current knowledge gaps and conducting comprehensive toxicological assessments, the possibilities for future advancements become endless.

Keywords: Metal-Organic Frameworks, Synthesis, Applications, Porous materials, Design before synthesis

Green Chemistry: Current And Future Issues

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A quick view of green chemistry in the past decade demonstrated many methodologies that protect human health and the environment in an economical beneficial manner. Green chemistry holds a significant importance in pharmaceuticals for developing new drugs which are less toxic, more effective with low side effects. Nanomaterial and their green synthesis from plants became an interesting aspect of nanotechnologies due to many benefits they provide advantages to all living beings and are inexpensive with little negative impact on humans or the environment. Green chemistry is becoming a foundation of contemporary chemistry centered on sustainability. The objective of green chemistry is considered as a response to the requirement for the reduction of the damage of environment by manmade materials. Significant efforts toward environmental stewardships based on 12 guiding principles support green solvents sustainable feed stocks, energy efficiency and waste prevention. Sustainable chemistry holds the promise of transforming

the chemical industry by lowering ecological footprint and conserving resources and protecting human health.

Keywords: Green chemistry, Sustainable chemistry, present and future issues

Comprehensive Review of Nanotechnology: Innovations and Multidisciplinary Applications

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Nanotechnology involves manipulating materials at the 1–100 nm scale, where substances show unique physical, chemical, and biological behaviors. The reviewed paper explains how advances in nanoscale synthesis and characterization have turned nanotechnology into a major interdisciplinary field. It outlines key domains, including plant nanotechnology, medical nanobiotechnology, environmental applications, and food nanotechnology. In agriculture, nanoparticles improve nutrient delivery, crop protection, and genetic modification through systems such as green nanoparticles and nano-enabled CRISPR delivery. In medicine, nanomaterials enhance targeted drug delivery, cancer therapy, regenerative tissue repair, diagnostics, and vaccine efficiency due to their tunable size and high reactivity. Environmental nanotechnology plays a central role in pollutant remediation, removing heavy metals, organic contaminants, and microbial threats using metal-based, carbon-based, and polymer-based nanomaterials. In the food sector, nanoscale materials support smart packaging, quality preservation, contaminant sensing, and controlled release of nutrients or bio actives. The article also discusses challenges surrounding nano toxicity, stability, large-scale production, and the need for eco-friendly materials. Overall, the review highlights nanotechnology's expanding emphasizing its potential to address global challenges through precise nanoscale engineering.

Keywords: Nanotechnology, Nanomaterials, Drug Delivery, Cancer Therapy, Environmental Remediation, Green Nanotechnology, CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)–Cas (CRISPR-associated protein) Delivery, Regenerative Medicine, Food Nanotechnology, Nano-Biosensors

Comprehensive Review of Nanotechnology: Innovations and Multidisciplinary Applications

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diagnostics, and vaccine efficiency due to their tunable size and high reactivity. Environmental nanotechnology plays a central role in pollutant remediation, removing heavy metals, organic contaminants, and microbial threats using metal-based, carbon-based, and polymer-based nanomaterials. In the food sector, nanoscale materials support smart packaging, quality preservation, contaminant sensing, and controlled release of nutrients or bio actives. The article also discusses challenges surrounding nano toxicity, stability, large-scale production, and the need for eco-friendly materials. Overall, the review highlights nanotechnology's expanding impact across healthcare, agriculture, environmental management, and food science, emphasizing its potential to address global challenges through precise nanoscale engineering.

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Next Generation Cancer Theragnostic and Drug Delivery via Image Guided Carbon Quantum Dots

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This work deals with the next generation cancer theragnostic and drug delivery via image guided Carbon quantum dots. Carbon quantum dots (CQDs) have some unique properties like fluorescence, surface chemistry, nanoscale size, low toxicity, and high photo stability, which make them applicable for various applications like bio-imaging and photoacoustic imaging, enabling early tumor detection, drug delivery, and bio sensing. CQDs are functional with different groups like Hydroxyl (-OH), Carboxyl (-COOH), Carbonyl (-CO), Amino (-NH₂) and targeting ligands for specific tumor identification and surveillance. They also generate reactive oxygen species upon light irradiation, making them suitable for photodynamic therapy, a noninvasive cancer treatment. Additionally, CQDs can be encapsulated with therapeutic agents for targeted delivery to tumors, reducing off-target effects and enhancing treatment efficacy serving as biosensors for detecting cancer biomarkers, aiding early diagnosis and personalized treatment also CQDs can be combined with other nanomaterials to create multifunctional imaging, therapeutic, and drug-delivery platforms. Future research will focus on developing smart, responsive CQDs and integrating them with artificial intelligence for improved cancer management.

Keywords: Next generation, Cancer theragnostic, Drug delivery, Nanoparticles, Carbon Quantum dots.

Electrostatically engineered Ni₄POM/Mn_{0.2}Cd_{0.8}S through 1, 4-benzene dicarboxylic acid for efficient photocatalytic hydrogen production

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Leveraging solar energy for the generation of hydrogen fuel via photocatalytic water splitting marks a significant advancement toward achieving sustainable energy solutions. In this research, we present an innovative photo-catalyst developed through the chemical integration of tetra nickel polyoxometalate (Ni₄P₂POM) with 1, 4-benzene dicarboxylic acid (1, 4- BDCA) attached to Mn_{0.2}Cd_{0.8}S, demonstrating a marked improvement in the efficiency of photocatalytic hydrogen production. In this composite photo catalyst, the 1, 4-BDCA-Mn_{0.2}Cd_{0.8}S contributes as a light-harvesting semiconductor, and Ni₄P₂POM acts as a co- catalyst and electron enrichment center. The ternary Ni₄P₂POM-(1,4-BDCA)-Mn_{0.2}Cd_{0.8}S composite photo catalyst exhibits hydrogen evolution activity up to 13.3 mmol-g⁻¹-h⁻¹ with turn over number (TON) of 3718 under 420 nm wavelength LED light irradiation. The composite Photo catalyst system achieved an apparent quantum yield (AQY) of 16.5 % and a solar-to-hydrogen (STH) conversion efficiency of 1.3 % under the specified experimental conditions. Charge density difference and Bader charge analysis show that the 1,4-BDCA share charges to the Mn_{0.2}Cd_{0.8}S and there exist shared-electron interactions between 1,4- BDCA ions and unsaturated Cd and Mn ions at the surface, indicating covalent bond properties. Our technique to design composite photo catalysts will open new pathways towards development and design catalysts for sufficient photocatalytic hydrogen evolution

Keywords: Photocatalytic water splitting, nickel polyoxometalate (Ni₄P₂POM), 1, 4-benzene dicarboxylic acid (1,4-BDCA), manganese–cadmium sulfide semiconductor (Mn_{0.2}Cd_{0.8}S), hydrogen evolution rate (HER), turn-over number (TON), apparent quantum yield (AQY), solar-to-hydrogen efficiency (STH).

The Role of Forensic Chemistry in Criminal Justice System: Case Study of Apex Court's Decision

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This study investigates the effectiveness of forensic chemistry within Pakistan's criminal justice system, with a specific focus on the operational condition of chemical testing laboratories in Sindh. Using documented apex court judgments and interviews with senior legal practitioners, the research evaluates how forensic chemical analyses are actually performed, reported, and admitted as evidence. Although forensic chemistry supports critical investigations involving narcotics, toxicology, food adulteration, and drug-related offences, the findings reveal that many laboratories operate with outdated infrastructure, inconsistent testing protocols, and limited quality assurance mechanisms. These deficiencies directly affect the reliability of Chemical Examiner and Serologist reports, which courts often accept without requiring expert testimony, creating potential risks of evidentiary misuse. The study identifies clear gaps between statutory expectations, scientific standards, and laboratory practice, emphasizing the urgent need for legislative reform, accreditation requirements, and standardized analytical procedures. Overall, the research demonstrates that strengthening forensic chemistry capabilities is essential for

improving evidentiary accuracy, safeguarding due process, and enhancing the credibility of Pakistan's criminal justice system.

Keywords: Forensic chemistry, criminal justice system, chemical testing laboratories, evidence admissibility, legislative reform.

Human Insight, Machine Precision: Integration of AI in Contemporary Journalism

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AI continues to penetrate all disciplines, including journalism. This investigation seeks the possibilities and potentials for the integration of AI into journalism in Pakistani setting. An online survey from the students of media studies has been conducted to get insight about the awareness and usage of artificial intelligence in the field of journalism. The researchers adopted Technology Acceptance Model of Davis as the theoretical framework for this study. Discoveries of the analysis indicated that media students are well aware of use of AI in journalism. There is a positive relationship between level of awareness and implication of AI in the field. Findings showed that respondents believe that the contemporary journalistic content is the amalgamation of machine precision and human insight. They advocated the ethical use of artificial intelligence to ensure efficiency in the field of journalism.

Keywords: Artificial Intelligence, Journalism, Integration, Pakistani Media

Exploring Anti-Microbial Activity Of Bottle Gourd Peel Extract Mediated Binary Metallic Copper Oxide-Nickel Oxide Nanoparticles

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With a vast range of applications in nanotechnology, agriculture, environmental-science and health, nanotechnology has become a groundbreaking field in contemporary science.

Among the various nanoparticles explored, copper oxide and nickel oxide nanoparticles have attracted considerable interest due to their unique physicochemical properties, high surface area-to-volume ratio, cost-effectiveness, and broad-spectrum antimicrobial potential. CuO and NiO nanoparticles have attracted significant attention due to their enhanced physicochemical properties arising from the synergistic interaction of metal oxides. These bimetallic nanoparticles exhibit excellent antimicrobial, antioxidant, catalytic, and electrochemical activities, making them suitable for diverse applications in biomedical, environmental, and material science etc. In this research work we will synthesize CuO-NiO NPs from *Lagenaria siceraria* peel extract by using green synthesis route. The structural, surface morphology, and vibrational of synthesized samples were analyzed by using X-ray diffraction (XRD), scanning electron microscopy (SEM), and Fourier transform infrared spectroscopy (FT-IR) respectively, while for antimicrobial activity ac

impedance spectroscopy will be used. The overall obtained results will be published in HEC recognized international journals.

Synthesis And Characterization Of Copper Oxide Nanaoparticles Using Eucalyptus Microtheca Leaf Extract And Their Antidepressant Activities

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Copper oxide nanoparticles (CuO-NPs) were synthesized through green method using Eucalyptus microtheca leaf extract, which acted as a natural reducing and stabilizing agent. UV-Vis spectroscopy confirmed nanoparticle formation through a characteristic absorption band, while X-ray diffraction (XRD) analysis verified the crystalline monoclinic phase of CuO. FT-IR spectra indicated the presence of plant-derived phenolic and terpenoid functional groups capping the nanoparticle surface. SEM analysis showed predominantly spherical to slightly irregular nanoparticles within the nanoscale range, further confirming successful synthesis and uniform morphology. The antidepressant potential of the biosynthesized CuO-NPs was evaluated in mice using standard behavioral models. Mice treated with CuO-NPs exhibited a significant reduction in immobility time in both the Forced Swim Test (FST) and the Tail Suspension Test (TST), indicating notable antidepressant-like activity compared to controls. In the Sucrose Preference Test (SPT), treated mice demonstrated increased sucrose intake, suggesting attenuation of anhedonia-like behavior. Preliminary biochemical assessments showed that CuO-NPs modulated oxidative stress markers and supported neurochemical balance in brain tissue, which may underlie the observed behavioral improvements. No acute toxic behavioral effects were observed at the administered doses, supporting the preliminary safety of the synthesized CuO-NPs.

Keywords: Copper oxide nanoparticles; Eucalyptus microtheca, Forced Swim Test, Behavioral studies.

Synthesis And Characterization Of Cobalt Oxide/Graphene Oxide Nanocomposite For Photocatalytic Degradation Of Rhodamine B And Congo Red

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Synthetic dyes such as Rhodamine B and Congo red are major water pollutants due to their high stability, toxicity, and resistance to normal wastewater treatment. Photo catalysis offers a promising and eco-friendly method for degrading these dyes, but traditional photo catalysts often face limitations such as low surface area and fast electron-hole recombination. In this

study, a cobalt oxide/graphene oxide ($\text{Co}_3\text{O}_4/\text{GO}$) nanocomposite was synthesized using a hydrothermal method to enhance photocatalytic performance under visible light. Graphene oxide was produced through the Hummers' method, while Co_3O_4 nanoparticles were prepared by co-precipitation. The resulting materials were characterized using XRD, FTIR, SEM-EDS, and photoluminescence spectroscopy to determine their structural, functional, and optical properties. The photocatalytic activity of GO, Co_3O_4 , and the $\text{Co}_3\text{O}_4/\text{GO}$ composite was evaluated by degrading Rhodamine B and Congo Red solutions under visible light at different pH levels, catalyst dosages, and exposure times. The $\text{Co}_3\text{O}_4/\text{GO}$ nanocomposite showed significantly higher degradation efficiency compared to the individual components due to improved charge separation, greater surface area, and enhanced dye interaction. These results demonstrate that $\text{Co}_3\text{O}_4/\text{GO}$ nanocomposites are effective and sustainable photo catalysts for the treatment of dye contaminated wastewater.

Keywords: $\text{Co}_3\text{O}_4/\text{GO}$ nanocomposite, photocatalysis, Rhodamine B, Congo Red, dye degradation, visible light, wastewater treatment, graphene oxide, cobalt oxide.

Development Of Polysaccharide-Nanoparticle Embedded Filter Paper For Efficient Wastewater Remediation Using Nano Scale Zero Valent Iron Nanoparticles

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Water pollution caused by heavy metals such as lead (Pb^{2+}), cadmium (Cd^{2+}), chromium (Cr^{6+}), and arsenic (As^{3+}) has emerged as a major global environmental concern due to their toxicity, persistence, and bioaccumulation. Conventional treatment methods, including precipitation, coagulation, and reverse osmosis, often face limitations such as high operational costs and the generation of secondary pollutants. To overcome these challenges, the present study focuses on developing an eco-friendly and cost-effective polysaccharide-nanoparticle embedded filter paper for efficient wastewater remediation. In this research, bacterial polysaccharides such as chitosan, alginate, and cellulose derivatives were isolated, screened, and evaluated for their adsorption potential toward heavy metals. The most efficient polysaccharide was then used to coat filter paper, followed by immobilization of pre-synthesized nanoscale zero-valent iron (nZVI) nanoparticles to enhance adsorption and reduction efficiency. The fabricated composite filter paper was characterized and tested for its heavy metal removal performance under varying parameters, including pH, contact time, and metal concentration. This study aims to establish a sustainable biopolymer-based filtration approach capable of significantly reducing toxic metal contaminants from industrial wastewater. The developed filter paper offers a promising, reusable, and environmentally safe alternative for wastewater treatment, addressing Pakistan's urgent need for low-cost remediation technologies.

Antifungal Activity Of Bee Propolis Against Fusarium Species Isolated From The Comb Of Apis Florea

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This study evaluated the antifungal activity of bee propolis against *Fusarium* species isolated from the comb of *Apis florea*. Propolis is a resinous material collected by honeybees and is well known for its diverse biological properties. In this research, propolis samples were collected from the Kohat University apiary, and ethanolic extracts were prepared for antifungal testing. The isolated *Fusarium* species were initially confirmed through microscopic examination. The antifungal activity of propolis was assessed at four different concentrations (undiluted extract [100%], 75%, 50%, and 25%). A trend of dose-dependent inhibition was observed. The highest antifungal activity was recorded at the 100% concentration, showing a mean zone of inhibition of 28 ± 2.65 mm. The 75% extract produced an inhibition zone of 24 ± 2.00 mm, the 50% extract showed 19 ± 1.00 mm, while the lowest activity was observed at 25%, with a mean inhibition zone of 16.33 ± 3.21 mm. Although statistical analysis revealed a non-significant difference among concentrations ($p = 0.6217$), the consistent biological activity across treatments suggests that propolis contains effective antifungal compounds capable of suppressing *Fusarium* growth. Chemical characterization of the propolis extract using GC–MS confirmed the presence of several bioactive compounds associated with antimicrobial activity. These findings highlight propolis as a natural and safe alternative for controlling *Fusarium* contamination in bee products and hive structures. The study supports the potential application of propolis in apiculture as an eco-friendly approach to managing fungal infections. The results provide a foundation for future research, including molecular identification of fungal isolates, minimum inhibitory concentration assays, and in vivo evaluation within bee colonies to better understand the practical effectiveness of propolis against *Fusarium* species.

Keywords: Bee Propolis, *Fusarium* Species, Antifungal Activity, Ethanolic Extract, GC-MS Analysis, *Apis florea*.

Impacts of Mental Health on Mindfulness and Quality of Life among Diabetic Patients.

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An individual's general well-being is greatly impacted by their mental health, especially for individuals who are managing long-term conditions like diabetes. This study looks into how mental health affects diabetic patients' quality of life and mindfulness. Data from 200 participants 100 males and 100 women were gathered using a survey research methodology. Mental health was assessed using the Depression, Anxiety, and Stress Scale (DASS-21), mindfulness was assessed using the Mindful Attention Awareness Scale (MAAS), and quality of life was assessed using the World Health Organization Quality of Life (WHOQOL) instrument. Descriptive statistics, linear regression, correlation analysis, and t-tests were all used in the data analysis process to check our study's hypothesis. The results showed a strong positive

relationship between mindfulness and mental health, suggesting that those who are more mentally healthy have better emotional control and present-moment awareness. Additionally, there was a significant correlation between mental health and quality of life, indicating that better mental health supports better social interactions, day-to-day functioning, and general life satisfaction. These findings highlight the value of mental health therapies in enhancing diabetic patients' quality of life and mindfulness. The study emphasizes the necessity of integrated healthcare approaches for diabetes management that take into account both physical and mental health. In order to improve mental resilience in diabetic populations, future studies should investigate intervention-based strategies and long-term effects.

Keywords: Mental Health, Mindfulness, Quality of Life.

Green Synthesis Of Carbon Dots From *Vitis Vinifera* Leaves For Antioxidant And Their Activity Against Drug-Resistant Bacteria

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Carbon dots (CDs) are an emerging class of fluorescent nanomaterials characterized by particle sizes below 10 nm and a broad range of applications, including drug delivery, metal ion sensing, disease diagnostics, synthetic chemistry, and biosensing. In this study, CDs were synthesized from *vitis vinifera* leaves using a hydrothermal approach. Successful formation of CDs was confirmed by UV–visible spectroscopy, while their structural and morphological features were characterized through X-ray diffraction (XRD), transmission electron microscopy (TEM), and Fourier-transform infrared spectroscopy (FTIR). The synthesized CDs demonstrated notable antimicrobial activity. Against the gram-negative strains *Pseudomonas brenneri* and *Pseudomonas aeruginosa*, zones of inhibition ranged from 7.0 mm to 10.0 mm across concentrations of 100–500 µg/mL. The gram positive strains *Bacillus velezensis* and *Bacillus subtilis* showed inhibition zones ranging from 8.0 mm to 12.0 mm. In antioxidant assays (DPPH, ABTS, and FRAP), the CDs exhibited strong radical scavenging activity with IC₅₀ values of 42.3 µg/mL and 61.3 µg/mL, respectively, compared with an ascorbic acid IC₅₀ of 25.35 µg/mL. These findings indicate that *vitis vinifera* derived CDs possess promising antimicrobial and antioxidant properties with potential for biological and biomedical applications.

Keywords: phytochemical, antioxidant, antibacterial, drug resistant.

Phytochemical, Elemental And Antibacterial Analysis Of Selected Varieties Of *Allium Sativum* L.

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The present study was conducted to evaluate the phytochemical composition, elemental profile, and antibacterial potential of two locally cultivated varieties of *Allium sativum* L. (Chinese and Desi) from District Kohat. Fresh bulbs were collected, grown under controlled conditions, and mature leaves were processed for analysis. Phytochemical identification was carried out using GC–MS, which revealed the presence of diverse bioactive compounds including organosulfur constituents, phenolics, flavonoids, and other secondary metabolites contributing to the

medicinal value of garlic. Elemental analysis performed through atomic absorption spectrophotometry and flame photometry indicated considerable variation in the concentrations of essential macro- and microelements such as Ca, K, Mg, and Fe between the two varieties. Antibacterial activity was assessed using agar disc diffusion, MIC, and MBC assays against *Staphylococcus aureus* and *Escherichia coli*, where both varieties exhibited inhibitory effects, though with differing levels of potency. Statistical analysis confirmed significant differences among varieties in their phytochemical constituents, elemental levels, and antibacterial performance. Overall, the study demonstrated that garlic varieties grown in Kohat possess valuable therapeutic and nutritional potential, with notable varietal differences that may guide future utilization in food, health, and pharmaceutical applications.

Keywords: Phytochemical, spectrophotometry, MIC, therapeutic, pharmaceutical

Assessment Of Hexavalent Chromium (Cr (Vi)) Phytotoxicity In Spinach (*Spinacia Oleracea* L.) Through Morpho-Physiological, Biochemical, And Bioaccumulation Endpoints

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Heavy metal pollution in agricultural soils had become a major constraint to crop productivity and food safety, particularly in leafy vegetables that readily accumulated toxic elements. Spinach (*Spinacia oleracea* L.), a nutritionally important leafy vegetable, remained highly susceptible to chromium uptake. Therefore, the present study assessed the phytotoxic effects of potassium dichromate ($K_2Cr_2O_7$), a prominent source of Cr^{6+} , on spinach through morpho-physiological, biochemical, and bioaccumulation endpoints during the vegetative growth stage. Physiological parameters such as total chlorophyll and carotenoid contents were quantified spectrophotometrically. Biochemical assessments showed oxidative damage through increased malondialdehyde (MDA) and hydrogen peroxide (H_2O_2) levels, while alterations in antioxidant defense mechanisms were determined by measuring the activities of superoxide dismutase (SOD), catalase (CAT), and peroxidase (POD). Chromium accumulation in roots and shoots was quantified using Atomic Absorption Spectrophotometry (AAS), and the Bio concentration Factor (BCF) and Translocation Factor (TF) were calculated. Overall, Cr^{6+} exposure significantly reduced spinach growth, impaired physiological functioning, enhanced oxidative stress, and increased antioxidant enzyme activities. The plant accumulated substantial chromium, particularly in roots, with limited translocation to shoots. These findings provided critical insights into the sensitivity of spinach to chromium contamination and highlighted its potential role as an indicator species for monitoring Cr-polluted environments.

Keywords: Spinach, Hexavalent chromium; Potassium dichromate, Morphological traits;

Mitigating Iron Stress In Mung Bean (*Vigna Radiata*) Seedlings Using Ascorbic Acid Seed Priming

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Mung bean (*Vigna radiata* L.) is an economically important pulse crop widely cultivated across Asia; however, its productivity is frequently limited by abiotic stresses such as iron (Fe) deficiency

and Fe toxicity. This study was conducted to investigate the morphological, physiological, and biochemical responses of mung bean (cv. NIAB-Mung-21) seedlings to Fe deficiency and Fe toxicity, and to evaluate the potential of ascorbic acid (AsA) seed priming in mitigating these stresses. Mung bean seeds were surface sterilized and primed with 1 mM AsA for 24 hours before sowing. Seed germination was assessed in Petri plates, whereas sand-culture experiments were performed under controlled conditions. Fifteen-day-old seedlings were subjected to three Fe treatments: control, Fe-deficient, and Fe-toxic conditions, each with five replicates. Morphological parameters (root–shoot length, fresh and dry biomass), physiological traits (germination percentage and rate), and biochemical indicators (chlorophyll a, chlorophyll b, carotenoids, proline, MDA, H₂O₂, POD, and SOD activities) were quantified using standard protocols. Additionally, Fe accumulation in leaves was analyzed through atomic absorption spectroscopy. The results revealed that Fe deficiency caused severe chlorosis, reduced biomass, and decreased photosynthetic pigment contents, while Fe toxicity induced oxidative stress, necrosis, and growth inhibition. Ascorbic acid priming significantly improved seedling performance under both stress conditions by enhancing chlorophyll synthesis, reducing oxidative damage, increasing antioxidant enzyme activities, and improving Fe homeostasis. Primed seedlings exhibited superior growth and physiological stability compared to unprimed seedlings. Overall, AsA seed priming proved to be an effective, low-cost, and eco-friendly strategy to alleviate Fe-induced stress in mung bean seedlings. The findings provided important insights into Fe stress responses and highlighted the potential of AsA priming as a practical tool for improving mung bean production in Fe-affected soils.

Keywords: Biochemical, spectroscopy, chlorophyll, eco-friendly

Phytotoxic Effects Of Bisphenol A (Bpa) On Morphological And Biochemical Responses Of Mung Bean

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Bisphenol A (BPA), a high-production industrial chemical widely used in plastic and resin manufacturing, had become a persistent environmental contaminant in soil and water. The present study evaluated the phytotoxic effects of BPA on mung bean (*Vigna radiata* L.) by examining morphological and biochemical responses at both the vegetative and pod-filling stages. A pot experiment was conducted under controlled greenhouse conditions following a Completely Randomized Design (CRD). The results showed that BPA induced significant growth inhibition in mung bean, with reductions observed in root and shoot elongation, leaf size, and biomass accumulation. Photosynthetic pigments, including total chlorophyll and carotenoids, decreased markedly with increasing BPA concentration, confirming impairment in photosynthetic performance. Oxidative stress was evident through elevated levels of malondialdehyde (MDA) and hydrogen peroxide (H₂O₂), indicating lipid peroxidation and cellular damage. In response, antioxidant enzymes such as superoxide dismutase (SOD), catalase (CAT), and peroxidase (POD) exhibited enhanced activity; however, this increase was insufficient to fully mitigate BPA-induced oxidative injury. The severity of BPA toxicity was dose-dependent and varied between developmental stages, with stronger effects observed at higher concentrations.

This study demonstrated that BPA acted as a potent phytotoxic agent that adversely affected growth, photosynthesis, and metabolic homeostasis in mung bean. The findings provided important insights into BPA's risk to food legumes and contributed valuable baseline data for environmental monitoring and Eco toxicological assessments in contaminated agroecosystems.

Keywords: BPA, agroecosystems, malondialdehyde, Morphological traits, Completely Randomized Design

Antimicrobial Properties Of Silver Nanoparticles Synthesized From Polyherbal Formulation Used To Treat Typhoid

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Typhoid fever, caused by *Salmonella typhi*, remains a major global health concern, particularly in developing regions with poor sanitation and limited access to clean water. The emergence of multidrug-resistant (MDR) strains has necessitated the development of alternative therapeutic strategies. In this study, silver nanoparticles (AgNPs) were synthesized using a polyherbal formulation comprising *Azadirachta indica*, *Harunganmadagascariensis*, *Psidiumguajava*, and *Celtisaustralis*, traditionally used for treating typhoid. The green synthesis approach involved reducing silver nitrate with the polyherbal extract under controlled conditions. The synthesized AgNPs were characterized using UV-Vis spectrophotometry, scanning electron microscopy (SEM), and other analytical techniques to determine their morphology, size, and surface properties. Antimicrobial activity was evaluated against *S. typhi* using the agar well diffusion method, minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC) assays. The results demonstrated significant antibacterial efficacy of polyherbal-derived AgNPs, highlighting their potential as eco-friendly and effective alternatives to conventional antibiotics. This study provides a promising foundation for the development of plant-based nano therapeutics against MDR typhoid infections.

Keywords: Silver nanoparticles, Polyherbal formulation, green synthesis, *Salmonella typhi*, antimicrobial activity, multidrug resistance

In Vitro Assessment Of Different *Dodonaea Viscosa* Extract On Hydatid Cysts Protoscoleces

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The larval stage of *Echinococcus granulosus* is the source of hydatid cyst disease (HCD), which is still a major global public health concern, especially in developing nations. The need for efficient natural substitutes is highlighted by the drawbacks of the current chemotherapeutic medicines, such as drug resistance and unfavorable side effects. The current investigation sought to determine the phytochemical components that might be in charge of the protoscolicidal activity of *Dodonaea viscosa* methanolic and ethanolic extracts against hydatid cyst protoscolices in vitro.

Methanol and ethanol maceration was used to recover fresh aerial portions of *D. viscosa* from District Kohat, Pakistan. A complex mixture of bioactive substances, including flavonoids, terpenoids, fatty acids, and phenolic derivatives, was discovered by phytochemical profiling using GC-MS. The eosin dye exclusion method was used to measure the vitality of protoscolices recovered from infected animals after they were subjected to serial concentrations (200–1.56 mg/ml) of plant extracts for 24–72 hours. Both extracts showed protoscolicidal activity that was dependent on both concentration and time, but the methanolic extract was more effective and on par with albendazole. The results show that *Dodonaea viscosa* has considerable protoscolicidal capability and could be a good natural option for the creation of safer and more efficacious hydatid disease treatments.

Keywords: *Dodonaea viscosa*, hydatid cyst, *Echinococcus granulosus*, protoscolicidal activity, GC–MS analysis.

Protoscolicidal Effect Of *Fagonia Indica* Extract On *Echinococcus Granulosus* Cyst

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Cystic echinococcosis (CE), caused by the larval stage of *Echinococcus granulosus*, is a significant zoonotic disease globally and poses major public health and economic challenges in livestock-rearing regions such as Pakistan. Surgical intervention remains the primary treatment option; however, the rupture of hydatid cysts during surgery may release viable protoscolices, leading to secondary echinococcosis and severe anaphylactic reactions. Currently used chemical scolical agents, including hypertonic saline, ethanol, and formalin, are associated with toxicity and tissue damage, creating an urgent need for safer natural alternatives. This study investigated the in vitro protoscolicidal activity of *Fagonia indica*, a medicinal plant widely used in traditional medicine and known for its antimicrobial and anti-inflammatory properties. Methanolic, and ethanolic, of *F. indica* were prepared using cold maceration, and protoscolices were isolated from hydatid cysts collected from slaughtered livestock in District Kohat. Viability was assessed using the eosin exclusion test, and different concentrations of extracts (1.56–200 mg/mL) were tested at incubation periods of 24, 48, and 72 hours. Results revealed that *F. indica* exhibited strong dose- and time-dependent protoscolicidal activity, with the methanolic extract showing the highest mortality rate and achieving complete protoscolicidal effect at higher concentrations. GC–MS analysis identified numerous bioactive compounds, including phytol, neophytadiene, linoleyl methyl ketone, 2,4-di-tert-butylphenol, terpenoids, fatty acids, and sulfur-containing heterocycles, which are known for antimicrobial and antiparasitic properties and may contribute to the observed efficacy. The findings suggest that *Fagonia indica* is a promising natural source of scolical agents, offering a safer alternative to conventional chemicals for hydatid cyst

management, although further in vivo, toxicity, and mechanistic studies are required to validate its therapeutic application.

keywords: Fagonia indica, Protoscolicidal activity, Echinococcus granulosus, Hydatid cyst, Plant extract, GC–MS analysis, In vitro study

Saccharum Officinarum Husk Mediated Green Synthesis Of Copper Oxide Nanoparticles Capped With Acetic Acid For Colorimetric Sensing Of Lactic Acid

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Lactic acid is a crucial biomarker for managing cardiovascular diseases because its levels can reflect a disease condition and the severity of patients. The synthesized CuO NPs will be characterized using various techniques. UV–Visible spectrophotometry will confirm nanoparticle formation at a required wavelength due to surface plasmon resonance and detection color changes upon lactic acid addition. X-ray diffraction will identify the crystalline structure and assess phase purity. Scanning electron microscopy will provide insights into surface morphology and particle size. Fourier transform infrared spectroscopy will identify functional groups. The surface-functionalized CuO NPs will first be dispersed uniformly in distilled water to form a stable colloidal suspension. The lactic acid will be introduced into the nanoparticle suspension in varying concentrations, and a visible color change will occur due to the interaction between lactic acid molecules and the surface of the CuO NPs. The color change will be observed visually, offering a quick and straightforward indication of lactic acid. The samples will be examined using UV-Visible spectroscopy. The variation in absorbance intensity at certain wavelengths will reflect the concentration of lactic acid present in the solution. The quantification will be performed by measuring the change in absorbance of the CuO NPs suspension upon the addition of lactic acid. In addition, a calibration curve will be constructed using standard lactic acid solutions with absorbance measured via UV-Vis spectroscopy at a specific wavelength. The linear relationship between absorbance and concentration will allow the determination of lactic acid levels.

Phytochemical and antimicrobial investigation of selected medicinal plant combinations against Urinary tract infection

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Medicinal plants typically contain active compounds that combat harmful pathogens. These active compounds possess therapeutic properties. Urinary tract infections (UTIs) remain one of the most common microbial diseases worldwide, and increasing antibiotic resistance has intensified the need for alternative therapeutic strategies. The present study was designed to investigate the phytochemical screening using GCMS technique and antimicrobial potentials of selected medicinal plant combinations including Terminalia chebula, Taraxacum officinale and

Asparagus officinalis traditionally used for UTI management. Qualitative phytochemical screening was conducted to identify major bioactive constituents such as alkaloids, flavonoids, tannins, saponins, glycosides, and phenolics. Antimicrobial activity of plant extracts—individually and in combination—was evaluated against common UTI-causing pathogens, including *Escherichia coli*, *Klebsiella pneumoniae*, and *Staphylococcus aureus*, using disc diffusion and minimum inhibitory concentration (MIC) assays. Results from GCMS analysis indicated that the tested plant contain a variety of phytochemicals. The combinations of plants extracts exhibited significantly higher inhibitory effects the tested bacterial and fungal stains as compared to individual extracts, suggesting synergistic interactions among phytochemicals. The combination of all three plants showed maximum zone of inhibition 24 mm (± 0.18) against *E. coli* than rest of combinations. This study highlights the potential of selected medicinal plant combinations as natural, cost-effective alternatives for managing UTIs, especially in the context of rising antimicrobial resistance. Further research, particularly in vivo evaluations and formulation development, is recommended to validate their therapeutic applicability.

Keywords: Phytochemical, Antimicrobial, MIC, Therapeutic, Pharmaceutical

Luffa Acutangula Peel Extract Mediated Synthesis Of Bimetallic Mgo-Zno Nanoparticles And Their Anti-Microbial Activity

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Nanotechnology has gained considerable attention due to the remarkable properties of nanoparticles and their extensive applications in biomedical, environmental, and industrial sectors. However, conventional physical and chemical synthesis methods often involve toxic chemicals and high energy consumption, raising environmental and health concerns. In response to these challenges, green synthesis approaches using plant-based materials have emerged as sustainable and eco-friendly alternatives. The present study reports the green synthesis of bimetallic magnesium oxide–zinc oxide (MgO–ZnO) nanoparticles using peel extract of *Luffa acutangula*, an agriculturally abundant plant with well-documented medicinal properties. The peel extract of *Luffa acutangula* contains bioactive phytochemicals such as phenolics, flavonoids, and saponins, which act as natural reducing and stabilizing agents during nanoparticle formation. Bimetallic MgO–ZnO nanoparticles are synthesized using equal molar concentrations of magnesium sulphate and zinc sulphate through a simple, cost-effective, and environmentally benign process. The synthesized nanocomposites are characterized using UV–Visible spectroscopy, Fourier Transform Infrared (FT-IR) spectroscopy, X-ray Diffraction (XRD), and Scanning Electron Microscopy (SEM) to evaluate their optical behavior, functional groups, crystalline nature, and surface morphology. The antimicrobial efficacy of the synthesized MgO–ZnO nanoparticles is assessed against selected Gram-negative bacterial strains (*Escherichia coli* and *Klebsiella aerogenes*) and the fungal strain *Candida albicans* using standard in vitro methods. The bimetallic nanocomposites are expected to exhibit enhanced antimicrobial activity due to

the synergistic interaction between magnesium oxide and zinc oxide. This study demonstrates the effective utilization of *Luffa acutangula* peel as an agricultural waste material for green nanoparticle synthesis and highlights the potential application of MgO–ZnO nanocomposites in biomedical and environmental remediation field.

Artificial Intelligence–Enabled Identification of Emotional and Stress Response Patterns & Psychometric Screening Model for Emotional Detachment and Stress Evaluation

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Background: The rapid integration of digital technologies and lifestyle transitions has significantly influenced human emotional processing and mental health. Emotional detachment and stress, often subtle and under-diagnosed, have become prevalent across populations exposed to prolonged screen time, workplace strain, and social isolation. Traditional psychological screening tools, while valuable, are limited by subjectivity and time constraints. The current study aims to develop and evaluate an Artificial Intelligence (AI)–assisted model capable of identifying emotional detachment and stress patterns with improved accuracy, efficiency, and early intervention potential.

Objective: To design and validate an AI-based screening framework capable of detecting emotional detachment and stress levels from behavioral, linguistic, and physiological data patterns.

Methodology: This cross-sectional, data-driven study employed a mixed-method approach integrating self-reported psychometric scales and AI-assisted data analysis. A total of 300 participants aged 18–45 were recruited from academic and corporate institutions through stratified random sampling. Participants completed standardized tools including the Perceived Stress Scale (PSS) and the Emotional Detachment Inventory (EDI). Behavioral data, such as facial micro-expressions, speech tone variation, and keystroke dynamics, were captured through consent-based digital monitoring. Collected data were processed using Natural Language Processing (NLP) to identify predictive features correlating with stress and detachment scores. Ethical approval was obtained from the institutional review board, ensuring participant anonymity and data confidentiality.

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through consent-based digital monitoring. Collected data were processed using Natural Language Processing (NLP) to identify predictive features correlating with stress and detachment scores. Ethical approval was obtained from the institutional review board, ensuring participant anonymity and data confidentiality.

Results: Preliminary findings revealed strong correlations between linguistic sentiment polarity, reduced facial expressiveness, and elevated stress indicators ($r = 0.79$, $p < 0.001$). The Random Forest classifier demonstrated the highest predictive accuracy (91.6%) for differentiating between low, moderate, and high emotional detachment levels. The integrated AI-assisted screening system outperformed traditional self-report methods in both detection speed and reliability.

Conclusion: AI-assisted screening represents a promising advancement for early identification of emotional detachment and stress. Further refinement and longitudinal validation are recommended to enhance predictive generalization across diverse populations.

Keywords: Artificial Intelligence, Emotional Detachment, Stress Screening, Psychometrics, Mental Health.

A Hybrid Fuzzy Neural Reinforcement Learning Framework for Fault Detection and Cyber-Attack Protection in Multi-Agent Networked Control Systems

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The field of control engineering has experienced a progressive shift from centralized to decentralized control methodologies, seeking to achieve stability, scalability, and seamless interconnection among heterogeneous technologies. A major advantage of decentralized control is that it enhances independent and autonomous decision-making among multiple agents. The autonomous nature of decentralized control is highly valuable in fuzzy logic-based decision-making, such as security root functioning in dynamic environments with multiple objectives, including patrolling, object detection, intruder tracking, and area protection. Similarly, autonomous vehicles and drones are transmitted by integrating intelligent decision-making mechanisms. As a computational approach, fuzzy logic enhances system flexibility by executing uncertain information and enabling adaptive, context-based control responses. This study introduces a hybrid decision-making framework that merges fuzzy neural reinforcement learning with the best–worst method to enhance precision and resilience in decision processes. The proposed framework focuses on fault detection, fault estimation, and cyber-attack protection to ensure the dependable operation of multi-agent systems. Furthermore, integrating fuzzy logic with multi-agent control strategies enhances system stability and coordination, even in the presence of false data injections. Networked Control Systems (NCS) serve as the communication backbone of decentralized architectures, enabling seamless integration in autonomous vehicles, robotic systems, agent coordination, and industrial automation applications.

Keywords: Fuzzy Logic, Neural Network, Multi-agent Systems, Cyber-Attack, Hybrid Decision making.

Extraction of snail slime and its application in pharmaceuticals and cosmetics

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Scientifically, snail slime is referred to as snail mucus or snail excretion—a self-generated mucus secreted by snails for defense and movement. The slime is characterized by high protein content along with a significant aqueous content, hyaluronic acid, an exfoliating acid, and essential nutrients. Factors such as thermal state, relative humidity, adrenal hormone levels, metabolic intake, and surrounding environmental conditions affect the composition of slime. *Cornu aspersum* Müller snail species have been identified for producing premium-quality slime under favorable conditions. The latest study has focused on harmless slime extraction techniques: the hand incentive technique, the hydro stimulation technique, electrotherapy, the hormone ejaculation method, drug-induced stimulation, non-fluid extraction, and the abdominal massage method. These different methods are used to force the snails to release slime, which is then collected. The purpose of this technique is to maintain snail survivability. Snail slime is processed before use, and in pharmaceuticals, it is formulated into supplements, lotions, and ointments that support bone mineralization, tissue regeneration, and stimulate collagen and elastin production. It also has protective compounds against oxidation and antiphlogistic agents that treat skin diseases. To enhance beauty, slime is used in the form of hydrating cream, anti-wrinkle serum, UV protector, and sebum control cream. The demand for snail slime is increasing daily in the pharmaceutical and cosmetics industry. Breeders can cultivate snails commercially to meet this growing market demand.

Keywords: Snail slime, Slime extraction, Snail farming, Cosmetics formulation, Pharmaceutical Applications.

Molecular Analysis Of Retinitis Pigmentosa-Associated Variants In A Pakistani Family From Bhoragarhi, Kohat.

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Retinitis Pigmentosa (RP) is a severe inherited retinal disorder characterized by gradual loss of vision, affecting approximately 1 in 3,000 to 7,000 people worldwide. In Pakistan, the high rate of marriages between close relatives raises the likelihood of recessive genetic conditions such as RP. RP arises from mutations in more than 60 different genes involved in retinal structure and function. These genetic changes produce varied clinical features, with differences in onset, progression rate, and severity among patients. While most cases stem from mutations in a single gene, the condition genetic diversity explains the wide range of symptoms and outcomes seen in

individuals with RP. This research sought to determine the genetic basis of RP in a family with consanguineous parents. In this study, we investigated a family from Bhoragarhi, District Kohat of Khyber Pakhtunkhwa, Pakistan, with three individuals exhibiting symptoms of Retinitis Pigmentosa (RP). Thorough clinical assessments and pedigree studies were carried out to validate the diagnosis and identify the inheritance pattern in the families. Genomic DNA was obtained from blood samples collected from affected individuals, unaffected siblings, and their parents. To identify the underlying genetic causes, different microsatellite markers were utilized to amplify the known genetic variants. To screen for potential gene loci and exclude previously known variants, a panel of diverse microsatellite markers was employed. No evidence of linkage was observed, suggesting that the causal variant may reside within this locus or in a closely linked genomic region that is not captured by the current markers. To comprehensively investigate and identify the underlying variant, whole exome sequencing (WES) will be conducted, enabling high-resolution analysis of all coding regions.

Keywords: Retinitis Pigmentosa, WES, Insilico tools, Sanger Sequencing.

Hematological And Biochemical Response To Fascioliasis And Associated Parasitic Density In Sheep Of District Kohat

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Background and Aim: Fascioliasis, caused by *Fasciola hepatica*, is an economically important zoonotic disease that poses significant threats to livestock. Migration of the parasite causes severe disruption of liver tissues, resulting in hematological and biochemical alterations and often leading to liver condemnation. Evaluation of blood parameters aids in disease assessment in sheep. Hence, this study was conducted to detect *Fasciola hepatica* eggs in sheep feces, evaluate hematological and biochemical parameters, and assess gross pathological alterations in the liver associated with the infection.

Method: A total of 100 sheep were examined at a local abattoir to determine the presence or absence of *Fasciola hepatica*. Blood and fecal samples were collected from each animal and their livers were examined at the slaughterhouse. Fecal samples were examined for *F. hepatica* eggs using sedimentation technique. Hematological and biochemical parameters were analyzed and livers were assessed for gross pathological changes.

Result: Out of 100 sheep, 18% were infected based on the presence of *Fasciola hepatica* eggs detected by microscopic examination. The infected group showed noticeable reduction in RBC count, hemoglobin concentration, Mean corpuscular volume and mean corpuscular hemoglobin, while WBC count was significantly higher compared to the non-infected group. Biochemical analysis revealed elevated level of alanine aminotransferase (ALT), alkaline phosphatase (ALP), while creatinine, glucose levels are reduced in the infected group. Gross examination revealed severe hepatic damage characterized by pallor, enlargement, and friability. Most areas exhibited hemorrhagic patches and dilated bile ducts were also observed in the sheep.

Conclusion: This study provides valuable insight into early understanding of hematological and biochemical alterations that correlate with gross pathological changes, highlighting the importance of monitoring and control measures to reduce disease in sheep production.

Keywords: Fasciola hepatica, Sheep, Sedimentation, hematobiochemical alterations, Gross pathology

Molecular Detection And Phylogenetic Analysis Of Echinococcus Granulosus Based On Cox-1 Gene Isolated From Dogs

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Background and Aim: Cystic echinococcosis is a neglected zoonotic helminthiasis caused by Echinococcus granulosus. Dogs act as definitive hosts, driving transmission to humans and livestock and posing substantial global public health and veterinary challenges. Molecular characterization in dogs is essential for understanding genetic diversity and transmission dynamics. Therefore, this study aimed to identify E. granulosus strains in dogs and determine their phylogenetic relationships based on the cox1 gene in district Kohat, Khyber Pakhtunkhwa.

Methodology: A total of 150 fecal samples from stray, household, and farm dogs were microscopically examined for E. granulosus eggs using the formalin–ethyl acetate sedimentation technique. DNA extracted from positive samples was used to amplify a 444 bp fragment of the COX-1 gene. The PCR products were then sequenced and subjected to phylogenetic analysis using the Maximum Likelihood method in MEGA 11.

Results: Microscopic examination revealed that 18% (27/150) of dogs were infected with Echinococcus granulosus, with the highest prevalence observed in farm dogs 32% (16/50), followed by stray dogs 16% (8/50), and household dogs 6% (3/50). PCR-based molecular analysis confirmed E. granulosus DNA in 10 of the 27 microscopy-positive samples, corresponding to an overall molecular prevalence of 6.6%. Phylogenetic analysis indicated that the sequences clustered within E. granulosus sensu stricto (G1–G3 complex) and exhibited high genetic similarity to isolates from Pakistan and other endemic regions.

Conclusion: These findings confirm that E. granulosus strains in the study area belong to the G1–G3 complex and indicate the active circulation of a highly zoonotic genotype in the dog population. This emphasizes their relevance for guiding targeted control strategies against cystic echinococcosis

Keywords: E. granulosus, Dogs, COX-1 gene, Molecular detection, Phylogenetic analysis

Molecular Detection Of Toxocara Canis And Its Phylogenetic Analysis Based On Cox-1 Gene Isolated From Dogs

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Background and Aims: *Toxocara canis*, a globally distributed zoonotic nematode, presents a persistent public health challenge, particularly in regions with substantial free-roaming dog populations. This study investigated the prevalence and molecular confirmation of *T. canis* in the selected districts of Khyber Pakhtunkhwa, Pakistan, and conducted the first phylogenetic analysis of isolates from this region based on the mitochondrial *cox1* gene.

Methodology: A cross-sectional study was conducted on 150 dogs (stray 50, farm 50, household 50). Fecal samples were screened microscopically using formalin-ethyl acetate sedimentation. DNA from positive samples was extracted, and a 426-bp fragment of the *Cox-1* gene was amplified via PCR and sequenced. Phylogenetic analysis was performed using the Maximum Likelihood method.

Results: Microscopy revealed an overall prevalence of 16.7% (25/150), with the highest infection rate in stray dogs (24.0%), followed by farm dogs (18.0%) and household dogs (8.0%). Molecular analysis confirmed *T. canis* DNA in 14 of the 25 microscopy-positive samples. Phylogenetic reconstruction placed the Pakistani isolates in a distinct cluster but showed close genetic homology with sequences from Asia and Europe.

Conclusion: This study confirms that *Toxocara canis* is endemic in the region, with stray dogs posing the greatest risk. The observed diagnostic discrepancy between microscopy and PCR highlights the importance of molecular confirmation for accurate surveillance. The phylogenetic data generated from the *Cox-1* gene establishes an essential genetic baseline, reinforcing the need for integrated One Health approaches to control this zoonotic threat.

Keywords: *Toxocara canis*, Dogs, COX-1 gene, molecular detection, phylogenetic analysis, Pakistan

Effects of Dietary Probiotics On Growth And Hematological Indices Of Common Carp (*CYPRINUS CARPIO*)

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This study evaluated the effects of two probiotic strains lyophilized *Saccharomyces boulardii* (Probiotic A) and *Shewanella putrefaciens* (Probiotic B), individually and in combination (A + B), on the growth performance and hematological responses of common carp (*CYPRINUS CARPIO*). A total of 60 juvenile fish were randomly divided into four groups: Control, Probiotic A, Probiotic B, and the combined A + B group, and were fed experimental diets for the duration of the trial. Growth performance parameters showed clear enhancement in groups fed single probiotics, with significant improvements in weight gain, specific growth rate (SGR). In contrast, the combined A + B group showed moderate or inconsistent growth improvements. Hematological analysis revealed that Probiotic A and Probiotic B significantly increased hemoglobin concentration, red blood cell count, and related erythrocyte indices compared to the control. White blood cell counts also increased in the single-probiotic groups, indicating strengthened immune activation. However, the A + B combination group showed higher variability and no

consistent improvement in most hematological parameters. Overall, the results demonstrate that individual probiotic supplementation enhances both growth performance and fish immune health, whereas combining probiotics A and B does not produce additive or synergistic benefits. These findings support the use of single probiotic strains as effective dietary supplements for improving the physiological condition of common carp in aquaculture systems.

Keywords: Common carp, *Saccharomyces boulardii*, *Shewanella putrefaciens*, probiotics, growth Performance, hematology, immune response, aquaculture nutrition

Antimicrobial Efficacy Of *Calotropis Procera* Against *Aeromonas Hydrophila* Isolated From Cyprinid Fish

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Fish is an important source of high-quality nutrition and is essential to the world food security, but bacterial infections and the growing threat of antimicrobial resistance (AMR) have slowed aquaculture's rapid growth. One of the most common and dangerous bacterial infections affecting freshwater cyprinid fish, *Aeromonas hydrophila* is the cause of motile *Aeromonas* septicemia, which can result in significant financial losses and public health issues. In order to assess the antibacterial effectiveness of ethanolic and methanolic leaf extracts of *Calotropis procera* as a natural substitute for traditional antibiotics, the current study set out to isolate and identify *A. hydrophila* from cyprinid fish collected in District Kohat, Pakistan. A total of 100 samples of cyprinid fish were taken from freshwater dams in District Kohat and tested for infection-related symptoms. Using selective and differential media, bacteria were isolated from gill, intestinal, and skin tissues before being biochemically characterized. While *A. hydrophila* was confirmed in 54% of the fish investigated, *Aeromonas* species were isolated from 67% of the samples, suggesting a significant prevalence of this disease in the research area. The disk diffusion method was used in triplicate to evaluate the antibacterial activity of *C. procera* leaf extracts, both ethanolic and methanolic, against the isolated *A. hydrophila* at different doses. Significant, concentration-dependent bactericidal activity against *A. hydrophila* was shown by both ethanolic and methanolic extracts. The ethanolic extract produced zones of inhibition of 14.67 ± 0.58 mm, 18.33 ± 0.58 mm, and 21.67 ± 0.58 mm at concentrations of 25, 50, and 100 mg/mL, respectively, with statistically significant differences among concentrations ($p < 0.05$). Similarly, the methanolic extract exhibited inhibition zones of 13.67 ± 0.47 mm, 16.67 ± 0.47 mm, and 20.67 ± 0.47 mm at the same concentrations, also showing significant antibacterial activity ($p < 0.05$). The positive control (standard antibiotic) produced the largest inhibition zones (28.0 ± 1.0 mm for ethanolic comparison and 28.0 ± 0.82 mm for methanolic comparison), whereas the negative control showed no antibacterial activity. The results obtained indicate that *Calotropis procera* has strong antibacterial action against cyprinid fish-derived *Aeromonas hydrophila*. This study is the first from District Kohat to assess *C. procera* as an economical, natural, and environmentally benign antibacterial agent for controlling bacterial infections in aquaculture.

The findings show that plant-based treatments have the potential to be sustainable substitutes for synthetic antibiotics, improving fish health management, ensuring safer fish production, and reducing antimicrobial resistance in aquaculture systems.

Keywords: *Aeromonas hydrophila*, *Calotropis procera*, Cyprinid fish, Antibacterial activity, Ethanolic, methanolic extracts.



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