Advances in Multidisciplinary Health Research (AMHR)

Advancing Integrated Healthcare Research & Innovation

Volume 1 | Issue 2 | May 2026

SPECIAL ISSUE

International Conference on Advancing Pharmaceutical Sciences in the Era of AI, Innovation, Global Health & Career Transformation

(ICAPS 2026)

📅 **Dates:** 29–30 April 2026 (Wednesday & Thursday)

📍 **Venue:** Sultan-ul-Uloom College of Pharmacy, Banjara Hills, Hyderabad

Editor-in-Chief

Dr. Anupama Koneru

Principal, Sultan-ul-Uloom College of Pharmacy, Hyderabad, Telangana

Open Access
Peer-Reviewed
DOI Enabled

www.amhrjournal.com | info@amhrjournal.com

Publisher:

AMHR Publication House
(A constituent unit of CliMed Research Solutions, India)

52/7 Anjana Colony
Sector 37, Gurugram 122001
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Publication Year: ***2026***
Issue: *Volume 1 | Issue 2*
Month of Publication: *May 2026*

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From Editor-in-Chief's Desk

Dr. Anupama Koneru

Principal, Sultan-ul-Uloom College of Pharmacy, Hyderabad, Telangana

It gives me immense pleasure to present the inaugural issue of **Advances in Multidisciplinary Health Research**, a platform envisioned to foster high-quality, multidisciplinary research in healthcare. In an era where healthcare challenges are increasingly complex, the integration of knowledge across disciplines is not just beneficial but essential. AMHR aims to serve as a bridge connecting diverse domains such as medicine, pharmacy, nursing, dental sciences, biotechnology, and allied health fields.

This journal has been established with a strong commitment to scientific integrity, rigorous peer review, and global accessibility through its open-access model. We strive to provide researchers, clinicians, academicians, and students with an inclusive platform to share innovative ideas, evidence-based findings, and meaningful insights that can contribute to improved healthcare outcomes.

I am particularly proud to introduce the Young Researcher's Column, an initiative designed to encourage undergraduate and internship students to engage in scientific writing and research early in their careers. By nurturing curiosity and critical thinking at the foundational level, we hope to shape the next generation of researchers and healthcare leaders.

As we launch this first issue, I extend my sincere gratitude to the editorial board, reviewers, authors, and all contributors who have supported this initiative. I also invite researchers from across the globe to contribute to upcoming issues and be a part of this growing scientific community.

Together, let us advance knowledge, inspire innovation, and strengthen evidence-based healthcare.

Dr. Anupama Koneru
Editor-in-Chief
Advances in Multidisciplinary Health Research (AMHR)

Chief Guest's Address

Dr. Pramod Kumar Rajput

Chief Guest, ICAPS 2026

Senior Vice President (F),
Cadila Pharmaceuticals, India

Director of Board,
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It is an honor to be part of the **International Conference on Advancing Pharmaceutical Sciences in the Era of AI, Innovation, Global Health & Career Transformation (ICAPS 2026)**, a conference that truly reflects the future direction of pharmaceutical sciences and healthcare innovation.

The healthcare sector is undergoing rapid transformation driven by advancements in artificial intelligence, data science, and digital health technologies. In such a scenario, platforms like ICAPS play a vital role in fostering research, encouraging collaboration, and bridging the gap between academia and industry.

I am particularly impressed by the conference's focus on innovation, career transformation, and multidisciplinary integration. Encouraging participation from students and young researchers is a significant step towards building a strong and sustainable research culture.

This abstract compendium showcases the diversity of ideas and the depth of scientific engagement among participants. I congratulate all authors for their contributions and encourage them to continue pursuing impactful and meaningful research.

I extend my best wishes to the organizers, editorial team, and participants for their continued success in advancing healthcare research and innovation.

Dr. Pramod Kumar Rajput
Chief Guest, ICAPS 2026

From Convener's Desk

Dr. Ajit Singh

Convener, ICAPS 2026

Founder & CEO, CliMed & Curio, India

It gives me immense pleasure to welcome you to the **International Conference on Advancing Pharmaceutical Sciences in the Era of AI, Innovation, Global Health & Career Transformation (ICAPS 2026)**, a platform envisioned to bridge the gap between academia, industry, and clinical practice.

The theme of this conference reflects the dynamic transformation our field is undergoing. As healthcare continues to evolve with the integration of artificial intelligence, digital health, and global collaboration, there is a growing need to equip students and professionals with future-ready skills and interdisciplinary expertise.

ICAPS 2026 has been designed not just as a conference, but as a **career acceleration and research empowerment platform**, bringing together experts from academia, industry leaders, clinicians, and young researchers. The overwhelming response in terms of abstract submissions and participation highlights the enthusiasm for research and innovation within the healthcare community.

This abstract special issue stands as a testament to the hard work, creativity, and scientific curiosity of all participants. I congratulate each author for their valuable contributions.

I extend my heartfelt gratitude to our organizing team, collaborators, speakers, and partners for their support in making ICAPS 2026 a success.

Let us continue to build a strong ecosystem of research, learning, & innovation.

Dr. Ajit Singh
Convener, ICAPS 2026

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Contents

CEU-e-001

Quercetin-loaded invasomal gel for effective management of skin cancer in vitro and cell line efficacy studies

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Purpose - Skin cancer is the most commonly diagnosed cancer worldwide, with rising incidence and mortality posing a serious public health concern. Quercetin clinical application is hampered by low water solubility, poor skin permeability, and rapid metabolism, necessitating the development of efficient delivery systems.

Method - Quercetin-loaded invasomes (QUR-INV) were formulated via the thin film hydration method followed by sonication. Quality by Design (QbD)-Optimization employed a full factorial design, characterization involve vesicles size, polydispersity index, zeta potential, and entrapment efficiency (EE%). Evaluations included in vitro release, ex vivo skin permeation, der matokinetics, antioxidant activity, and cytotoxicity against A431 human epidermoid carcinoma cells.

Result - The optimized quercetin-loaded invasomes (QUR-INV) exhibited a vesicle size of 211.5 nm, low polydispersity index of 0.219, high negative zeta potential of -37.1 mV, and entrapment efficiency of 89.5%. In vitro release showed an initial burst at 4 h followed by sustained controlled release over 24 h. Ex vivo skin permeation studies demonstrated ≈2-fold higher QUR permeation from QUR-INV gel compared to QUR-conventional gel, with dermatokinetic analysis confirming enhanced penetration to deeper skin layers. Antioxidant activity was 1.09-fold higher than pure QUR, while cytotoxicity against A431 epidermoid carcinoma cells revealed significantly lower IC for QUR-INV gel (27.96 µM) versus QUR-conventional gel (52.02 µM) and pure QUR (297.36 µM).

Conclusion - QUR-INV has significantly targeted the deeper layers of skin and can be regarded as a promising carrier for topical application of QUR or other lipophilic drugs for the management of skin cancers.

Keywords: *Quercetin, Invasomes, Skin cancer, Cytotoxicity, Drug delivery*

CEU-e-002

Development and characterization of Crocus Sativus solid lipid nanoparticle nasal spray for depression

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Depression affects millions globally, and conventional treatments often include psychotherapy and medication. Crocus sativus (saffron) has shown potential in treating mildto- moderate depression due to its active components, crocin, picrocrocin, and safranal, which regulate brain serotonin levels. This research evaluates Solid Lipid Nanoparticles (SLNs) as a novel approach to circumvent the blood-brain barrier and deliver saffron-based antidepressants, offering a potential solution for treatment-resistant depression. This study involves qualitative phytochemical screening of Crocus sativus extract, antioxidant studies, formulation and characterization of SLN-based nasal spray, and an in vivo antidepressant study using a Drosophila melanogaster model.

The phenolic content ranged from 11 to 36 µg GAE/mg of extract, flavonoid content from 43 to 56 µg QE/mg, and carotene content from 1.9 to 30 µg βC/mg. HPLC analysis confirmed the presence of picrocrocin at 257 nm, and IC50 values were determined through antioxidant assays. The Crocus sativus SLN had a zeta potential of -1 to -0.8 mV, with a PDI of 1. TEM analysis showed particle sizes ranging from 110 to 225 nm. Drug entrapment efficiency reached 99.76%, and in vitro drug diffusion was 37% over 270 minutes. The nasal spray had a pH of 5.8 and a viscosity of 23.1 Cp. Stability studies over 4 weeks showed no significant changes. In vivo, the Drosophila melanogaster climbing assay demonstrated improved locomotor activity, suggesting antidepressant potential.

Keywords: *Antidepressant, Saffron, Solid lipid nanoparticle, Nasal spray, Drosophila*

CEU-001

AI in Preformulation, Formulation and Manufacturing

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The integration of artificial intelligence (AI) and machine learning (ML) into pharmaceutical sciences has significantly transformed traditional approaches in preformulation and stability assessment. pharmaceutical development is now benefitting from data driven models that accelerate formulation design, improve precision, and reduce development time. This review explores critical innovations including solubility prediction using machine learning algorithms, AI-supported polymorph identification, and computational modeling for drug stability. The pharmaceutical business is undergoing a transformation thanks to formulation design and the incorporation of artificial intelligence (AI) into drug development. Drug research, formulation development, manufacturing, quality control, and post-market surveillance are just a few of the areas in the pharmaceutical business that have seen a paradigm shift as a result of the introduction of artificial intelligence (AI). By evaluating large datasets to improve formulations and forecast patients behaviour .These technologies make precision medicine accessible. AIpowered models improve the stability, bioavailability, and pinpoint precision of therapeutic agents based on nanoparticles. next-generation manufacturing, driving productivity, efficiency, and innovation. This review focuses on AI applications across key domains, including predictive maintenance, quality control, robotics and automation, supply chain management, energy optimization, and additive manufacturing. AI enables real-time equipment monitoring to reduce downtime, enhances defect detection through machine learning and image recognition, and improves flexibility via intelligent robotics. Additive manufacturing benefits from AI-driven design and defect control, improving product quality and reducing waste. Despite these advances, challenges such as implementation costs, legacy system integration, and cybersecurity risks remain critical considerations for Industry.

Keywords: *Bioavailability, Nanoparticles, Automation, Preformulation, Cybersecurity*

CEU-002

Formulation and in vitro evaluation of sustained release tablet of Indepamide using various polymers

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Controlled-release drug delivery systems (CRDDS) provide drug release at a predetermined, predictable, and controlled rate. Controlled-release drug delivery system is capable of achieving the benefits like maintenance of optimum therapeutic drug concentration in blood with predictable and reproducible release rates for extended time period; enhancement of activity of duration for short half-life drugs; elimination of side effects; reducing frequency of dosing and wastage of drugs; optimized therapy and better patient compliances.100mg of Indepamide pure drug was dissolved in 100ml of 0.1N HCl (stock solution)10ml of solution was taken and make up with100ml of 0.1N HCl (100µg/ml).From this 10ml was taken and make up with 100 ml of 0.1N HCl (10µg/ml). The above solution was subsequently diluted with 0.1N HCl to obtain series of dilutions Containing 1,2,3,4 and 5µg/ml of Indepamide per ml of solution. The absorbance of the above dilutions was measured at 266 nm by using UV-Spectrophotometer taking 0.1N HCl as blank. Whereas the formulations prepared with HPMCK4M retarded the drug release in the concentration of 25 mg showed required release pattern i.e., retarded the drug release up to 12 hours and showed maximum of 97.63 % in 12 hours.

Keywords: *Controlled release, Indepamide, Polymers, Drug delivery, Sustained release*

CEU-e-003

Comprehensive in vivo validation and mechanistic insights into precision guided stimuli responsive Rutin nanosponges evaluating bio distribution therapeutic efficacy and safety in parkinson disease management

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Parkinson disease (PD) is characterized by progressive loss of dopaminergic neurons and increased oxidative stress. Rutin, a natural flavonoid with strong antioxidant and anti-inflammatory activity, shows neuroprotective potential but suffers from poor solubility, low oral bioavailability, and limited brain delivery. This study proposes precision-guided, stimuli-responsive rutin nanosponges prepared using ethylcellulose (for sustained release) and Eudragit (for pH-responsive behavior) as distinct nano-carriers for PD management by comprehensive in vivo validation in a rodent PD model to evaluate bio-distribution, therapeutic efficacy, and safety.

***Keywords*:** *Rutin, Nanosponges, Parkinson disease, Biodistribution, Neuroprotection*

CEU-e-004

Oxidized regenerated cellulose: an innovative approach for the treatment of wound healing

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Oxidized regenerated cellulose (ORC) is a biodegradable plant based substance that is utilized as a hemostatic agent in surgery. It is a chemically altered type of cellulose that is particularly effective in controlling diffuse bleeding from large surfaces. It acts by inactivating matrix metalloproteinases in wounds, allowing growth factors to bind and be protected. It is the most commonly used cellulose based hemostatic agent. It causes clotting by contact activation and can be used to place free flap pedicles. On the other hand, collagen biomaterial degrades slowly making it suitable biotemplate for cell adhesion, migration & proliferation as well as quick wound maturation. Furthermore, collagen can reduce scar thickness by regulating collagenase activity and extracellular matrix deconstruction via keratinocyte differentiation. As a result, collagen is thought to be responsible for reducing scar size and shortening the time required for re-epithelialization When ORC and collagen are combined together, it reduces bacterial invasion at the wound site, enhances rapid granulation tissue formation and thereby improvement in wound ulceration area. The major innovations in ORC-Collagen formulation is dual action therapy and the utilization of biocompatible materials for effective wound healing and minimizing adverse reactions thereby enhancing patient safety and comfort.

Keywords: *Oxidized Regenerated Cellulose, Collagen, Wound healing, Dual action therapy.*

CEU-e-005

Digital twin based clinical decision support system for personalized drug therapy using pharmacokinetic modelling

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The growing demand for personalized medicine highlights the limitations of conventional “one-dose-fits-all” approach, often resulting in suboptimal efficacy and increased risk of adverse effects. This study presents the development of a digital twin based clinical decision support prototype designed to simulate patient specific drug responses and assist in dose optimization. A computational pharmacokinetic model based on a two-compartment system was implemented to simulate drug distribution and elimination. The model incorporates patient-specific parameters, including age, body weight, gender, and clinical conditions such as hepatic and renal impairment, to account for inter-individual variability. An interactive interface enables real-time simulation, allowing users to input patient data and visualize drug concentration–time profiles. A rule based decision system was integrated to evaluate therapeutic outcomes by comparing simulated drug concentrations with predefined therapeutic ranges. The system identifies sub-therapeutic and potentially toxic exposures and provides preliminary dose adjustment recommendations.

The developed prototype demonstrates the feasibility of integrating pharmacokinetic modelling

with digital twin concepts for personalized drug therapy. Preliminary simulations indicate improved dose individualization and reduced risk of sub-therapeutic and toxic exposures. Designed with accessibility in mind, the system can be implemented in clinical and community pharmacy settings, particularly in resource limited environments, to support rapid, data-driven therapeutic decisions. The framework is scalable for future integration of comprehensive clinical data and artificial intelligence to further enhance precision medicine.

Keywords: *Dose optimization; Drug concentration profiling; Inter-individual variability; Therapeutic range monitoring; Real-time simulation.*

CEU-e-006

Next-generation injectable thermosensitive *in-situ* nanogel system for osteoarthritis: silymarin-loaded bovine serum albumin nanoparticles for sustained joint targeting

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Background: Osteoarthritis (OA) is a progressive degenerative joint disorder characterized by inflammation, cartilage degradation, and reduced mobility, significantly impacting patient quality of life. Silymarin, a natural flavonolignan complex, possesses potent antioxidant, anti-inflammatory, and chondroprotective properties; however, its poor aqueous solubility and limited bioavailability restrict its clinical application.
Purpose: The present study aims to develop a novel intra-articular drug delivery system by integrating silymarin-loaded bovine serum albumin (BSA) nanoparticles into a thermoresponsive in situ gel to achieve localized and sustained drug delivery for osteoarthritis management.
Methodology: Silymarin-loaded BSA nanoparticles were prepared using the coacervation technique and stabilized via crosslinking. The nanoparticles were incorporated into a thermosensitive gel matrix composed of Poloxamer 407 and sodium alginate, enabling sol-to-gel transition at physiological temperature. The formulation was evaluated for key physicochemical and functional parameters, including particle size, drug loading, entrapment efficiency, gelation behavior, viscosity, pH, and syringeability.
Results: The optimized formulation exhibited nanoscale particle size with high drug encapsulation efficiency and suitable physicochemical properties for intra-articular administration. The system demonstrated controlled and sustained drug release behavior, indicating prolonged therapeutic action. Microbiological studies confirmed sterility, while in vivo evaluation in an OA-induced model suggested improved therapeutic outcomes, including reduced inflammation and enhanced joint tissue integrity.
Conclusion: The developed nanoparticle-integrated thermosensitive in situ gel represents a promising and innovative platform for targeted and sustained osteoarthritis therapy. This system has the potential to minimize systemic side effects, enhance therapeutic efficacy, and improve patient compliance.

Keywords: *Silymarin; Osteoarthritis; Bovine Serum Albumin; Nanoparticles; In Situ Gel; Intra-articular Delivery; Sustained Release; Targeted Drug Delivery*

CEU-003

Hybrid DoE–Machine Learning Approach for Optimization of Berberine-Loaded Transdermal Drug Delivery Systems in Antidiabetic Therapy

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Transdermal drug delivery systems (TDDS) offer a non-invasive approach to enhance therapeutic efficacy and patient compliance in diabetes management. Berberine is a bioactive alkaloid that has been shown to have antidiabetic properties, although its quick metabolism and low oral bioavailability limit it. The aim of this project was to create and improve transdermal patches loaded with berberine utilizing a hybrid Design of Experiments (DoE) and Machine Learning (ML) framework. A Box–Behnken design was employed to evaluate the effects of key formulation variables, including polymer ratio (HPMC:Eudragit), plasticizer concentration, and permeation enhancer levels. Response parameters such as cumulative drug release (%), transdermal flux (μg/cm²/h), and mechanical strength were analyzed. The experimental dataset was further utilized to train supervised ML models, including Random Forest and Artificial Neural Networks, to capture nonlinear relationships between formulation variables and performance outcomes. The hybrid DoE–ML approach demonstrated superior predictive performance compared to conventional statistical models, with high correlation coefficients ($R^2 > 0.95$) and reduced prediction error. The optimized formulation achieved sustained drug release over 24 h (~92%) and enhanced permeation (≈28 μg/cm²/h), while reducing experimental runs by approximately 40–50%. This study establishes a datadriven framework for precise formulation optimization, highlighting the potential of AIintegrated strategies to improve bioavailability, glycemic control, and patient adherence in antidiabetic therapy.

Keywords: *Berberine, Transdermal drug delivery, Design of Experiments, Machine learning, Optimization, Controlled release*

CEU-e-007

Artificial intelligence in drug formulation optimization: transforming Pharmaceutical research

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Drug formulation development is an important aspect of pharmaceutical research that determines the safety, efficacy, stability, and acceptability of a medicine for patients. Traditional formulation methods often use trial-and-error techniques that require considerable time, money, and resources. As the need for quick innovation and accurate treatments grows, Artificial Intelligence (AI) has become a game-changing tool in modern pharmaceutical sciences. This study aims to elucidate the role of AI in enhancing drug formulation processes and its ability to expedite pharmaceutical research and development. A thorough examination of contemporary scientific literature, industrial reports, and digital health innovations was performed to assess the utilization of AI technology in formulation science. The main topics that were examined were machine learning algorithms, predictive analytics, neural networks, quality by design (QbD), process optimization, excipient compatibility prediction, dissolution modeling, and stability forecasting. AI-based systems have shown great promise in accelerating the process of developing formulations and

making decisions more accurately. Researchers have found that machine learning models can accurately predict the best combinations of excipients, improve drug release profiles, and reduce the number of failed batches. AI-assisted stability prediction makes it easier to estimate the shelf life of a product, and intelligent process control makes manufacturing more consistent. The combination of AI with QbD principles strengthens formulation design and regulatory readiness. Artificial Intelligence is changing the way pharmaceutical formulation research is conducted by replacing traditional trial-and-error methods with data-based strategies. The use of AI can make things run more smoothly, lower development costs, and help get high-quality medicines to people all over the world more quickly. To maximize the benefits of AI in drug development, pharmaceutical scientists, data experts, and regulators must continue to collaborate.

Keywords: *Artificial Intelligence, Drug Formulation, Machine Learning, Pharmaceutical Innovation, Quality by Design, Predictive Modeling.*

CEU-004

Microengineered biochip systems in pharmaceutical development: predictive toxicology and implantable pharmacotherapy

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To reduce the costs and timescales of drug discovery and improve delivery of therapeutic agents, novel microengineered biochip technologies that bypass fundamental deficiencies of existing preclinical techniques and therapies are under development. Due to insufficient simulation of human efficacy and toxicity in animal studies and static culture cell models, many drug candidates fail during clinical evaluation leading to expensive long time scales and high attrition rates in the traditional drug discovery pipeline. Through the utilization of human cells, microfluidic manipulation, and biomimetic architectures for multiple organ structures, organ-on-a-chip technologies have proven to be capable of replicating key physiological functions that mimic a live human, allowing the accurate assessment of toxic injury, metabolism, and pharmacological activity. Integration of multi-organ chip systems facilitates understanding of systemic absorption, distribution, metabolism, and excretion pathways and significantly enhances the translatability and reduces animal reliance of preclinical testing models. Furthermore, in vivo delivery by implantable microchips have reached clinical proof of concept in a trial demonstrating controlled delivery of therapeutic agents such as teriparatide to treat osteoporosis for weeks or months, which can significantly overcome the challenges with existing oral and parenteral drug administration. These platforms are capable of timed dosing and improving patient compliance, while a closed loop delivery systems will eventually combine biosensors to perform pharmacokinetic studies in situ and to respond to variations. The most recent advances in biochip technologies such as microfabrication, biomaterials, additive manufacturing and data analytic modeling are continuously improving scalability, biomaterial compatibility and patient specificity of these systems. However, regulatory standardization, demonstration of long-term safety and manufacturing at a cost-effective scale remain critical obstacles to clinical translation.

Keywords: *Micro-engineered biochip, chip systems, implantable microchips*

CEU-e-008

First-of-its-kind polyherbal gel for urticaria management

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Urticaria affects over one billion people worldwide, significantly lowering quality of life through persistent itching, inflammation, and stress-related flare-ups linked to elevated cortisol levels. Despite its high prevalence,effective long-term management remains challenging, highlighting the need for safer and more sustainabletherapeutic alternatives. Conventional treatments, including antihistamines and corticosteroids, primarilyprovide symptomatic relief and are associated with adverse effects during prolonged use. Despite its highprevalence, there is a lack of targeted, plant-based topical formulations for urticaria management. This has ledto increasing interest in plant-based therapeutics rich in bioactive phytoconstituents with anti-inflammatory andanti-pruritic potential. The present study focuses on the formulation of a novel, first-of-its-kind polyherbal gel using medicinal plants sourced from Tamil Nadu and across India. These plants are rich in diverse phytoconstituents such as flavonoids, alkaloids, tannins, and phenolic compounds, which contribute to theirtherapeutic efficacy. The formulation integrates pharmacognostic principles with modern pharmaceuticaltechniques to ensure safety, stability, and enhanced patient compliance. This innovative approach offers a costeffective,sustainable, and side-effect–minimizing alternative, addressing a critical unmet need indermatological care while establishing strong potential for future phytopharmaceutical development and market translation.

Keywords: *Urticaria, Phytoconstituents, Novel gel, Phytopharmaceutical, Herbal*

CEU-005

AI-driven smart nanotherapeutics for precision medicine: transforming global Healthcare and pharmaceutical careers

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The rapid convergence of Artificial Intelligence (AI) with pharmaceutical sciences is revolutionizing drug discovery, delivery, and patient care, marking a transformative era in global healthcare. This study explores the development of AI-driven smart nanotherapeutic systems designed for precision medicine, focusing on enhanced therapeutic efficacy, reduced toxicity, and personalized treatment strategies. By integrating machine learning algorithms with nanotechnology-based drug delivery platforms, it becomes possible to predict drug–target interactions, optimize formulation parameters, and enable real-time therapeutic monitoring. The proposed approach utilizes AI models to design nanocarriers such as liposomes, polymeric nanoparticles, and nanoemulsions with improved targeting efficiency and controlled drug release profiles. These intelligent systems can adapt to patient-specific biological data, thereby advancing personalized medicine and minimizing adverse drug reactions. Furthermore, AI-enabled predictive analytics can significantly reduce drug development timelines and costs, addressing critical global health challenges, especially in resource-limited settings. This research also highlights the impact of AI integration on pharmaceutical career transformation, emphasizing the need for interdisciplinary skills combining pharmaceutical knowledge with data science and

computational modeling. As the pharmaceutical industry evolves, professionals must adapt to emerging roles such as AI-specialized formulation scientists and digital health experts. In conclusion, AI-driven smart nanotherapeutics represents a paradigm shift in pharmaceutical sciences, offering innovative solutions to complex healthcare challenges while reshaping the future workforce. This aligns with the vision of ICAPS 2026 in advancing innovation, improving global health outcomes, and fostering nextgeneration pharmaceutical careers.

Keywords: *Artificial Intelligence (AI), Nanotherapeutics, Precision Medicine, Drug Delivery Systems Machine Learning, Global Health*

CEU-006

Artificial intelligence-driven smart liposomal and nanosomal drug delivery systems for precision oncology: advancing targeted therapy and therapeutic outcomes

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Artificial Intelligence (AI)-integrated smart drug delivery systems are transforming precision oncology by enabling highly targeted, controlled, and patient-specific therapeutic strategies. Conventional chemotherapy is often limited by non-specific distribution, systemic toxicity, and multidrug resistance. To address these challenges, AI-driven design of advanced nanocarriers, particularly liposomal and nanosomal delivery systems, has emerged as a promising approach for improving therapeutic efficacy and safety. AI techniques, including deep learning and predictive modeling, facilitate the optimization of nanocarrier characteristics such as particle size, surface charge, drug encapsulation efficiency, and release kinetics. Liposomal and nanosomal systems can be engineered to respond to tumor-specific stimuli such as acidic pH, hypoxic conditions, and enzymatic activity, enabling site-specific drug release. AI also enhances pharmacokinetic and pharmacodynamic (PK/PD) modeling, allowing accurate prediction of drug distribution and individualized dose optimization for cancer patients. Furthermore, integration with biosensors and real-time monitoring systems supports adaptive drug delivery, improving treatment precision and patient compliance. AIdriven platforms can also identify biomarkers and predict therapeutic response, thereby supporting personalized cancer therapy. This approach significantly reduces off-target effects while enhancing drug bioavailability and therapeutic index. However, challenges related to data reliability, regulatory approval, and ethical considerations remain critical for clinical translation. Despite these limitations, AIpowered smart liposomal and nanosomal drug delivery systems represent a nextgeneration paradigm in precision oncology, offering innovative solutions to improve global cancer treatment outcomes and advance pharmaceutical sciences.

Keywords: *Artificial Intelligence, Liposomes, Nanosomes, Precision Oncology, Targeted Drug Delivery, Nanotechnology*

CEU-e-009

Bilosomal gel: a next-generation vesicular system for enhanced topical and transdermal drug delivery"

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Bilosomal gel is a cutting-edge, next-generation topical and transdermal drug delivery Method that combines the advantages of bile salt-stabilized nanovesicles with a semisolid gel Matrix. Poor stratum corneum penetration and inconsistent medication absorption are two Disadvantages of traditional gel composition. Traditional vesicular systems, like niosomes And liposomes, may have some drawbacks, such as poor skin penetration, drug leakage, or Instability. Phospholipids, cholesterol, and physiological bile salts make up bilosomes, which Have improved vesicle stability, increased membrane flexibility, and stronger penetrating Capabilities because of the bile salts' surfactant-like characteristics. Because of their Nongreasy texture, ease of application, and extended retention on the skin's surface, the Vesicles maintain their integrity after being trapped in the gel foundation, facilitating Controlled and sustained drug release and patient compliance. Vesicle-skin lipid contact, Temporary disruption of intercellular lipid packing, and increased penetration via Transcellular, intercellular, and follicular pathways are all part of the bilosomal gel drug Delivery process. For a variety of medicinal uses, such as anti-inflammatory medications, Antifungal agents, analgesics, peptides, antioxidants, genetic material, and cosmeceutical Actives, it has shown great promise. In comparison to the standard gel, liposomal gel, and Transfersomal gels, several investigations have shown better penetration, higher entrapment Efficiency, higher deposition at the target region, and superior therapeutic effect. The Formulation and assessment of bilosomal gels include characterization of surface structure, Viscosity behaviour, entrapment capacity, particle size, polydispersity index, zeta potential, And spreadability, in-vitro release, ex vivo penetration of the skin, and stability profiling. Bilosomal gels provide several benefits, but there are still issues with long-term stability, Scalability, potential discomfort from bile salts, and little clinical validation. However, Ongoing research indicates interesting future paths, such as microneedle-assisted delivery, Smart responsive gels, and nano-bilosomal systems. All things considered, the bilosomal gel Is a versatile, biocompatible, and extremely efficient platform with a growing number of uses In dermatology, pharmaceuticals, and cosmeceuticals. It has enormous potential for both Topical and systemic drug administration.

Keywords: *Bilosomel gel, Permeability, Encapsulation efficiency, Optimization*

CEU-007

Digital twin-guided nanoparticle drug delivery for personalized therapy

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Background: Variability in how patients respond to drug treatment is a significant barrier to achieving the best clinical results. While nanoparticle-based drug delivery systems improve targeted delivery and lower overall toxicity, they often lack customization for individual patients.

Digital twin technology creates a dynamic virtual model of a person using real-time physiological, genetic, and pharmacokinetic data. This approach provides a patient-specific predictive platform to improve precision medicine outcomes.

Objective: To investigate how integrating digital twin technology with nanoparticle drug delivery systems can improve personalized treatment strategies.

Methodology: We developed a conceptual framework that includes patient-specific data—such as genetic profile, disease characteristics, and pharmacokinetic parameters—into an AI-driven digital twin model. This model simulates nanoparticle distribution, drug release, and target-site accumulation. We optimized formulation variables like particle size, surface features, and drug loading based on predictions from the digital twin system. Case scenarios such as cancer therapy were used to demonstrate applicability

Results: This integrated approach can predict patient-specific drug responses, improve targeting efficiency, and reduce adverse drug reactions. Digital twin-guided optimization allows for real-time adjustments to nanoparticle characteristics, leading to better therapeutic precision and less trial-and-error in developing formulations.

Conclusion: Digital twin-guided nanoparticle drug delivery offers a new way to personalize drug treatment. By merging innovative nanotechnology with AI-driven modeling, this strategy could transform drug development and clinical practice, ultimately enhancing patient outcomes and pushing forward precision medicine

Keywords: *Digital twin, Nanoparticles, Personalized therapy, Artificial intelligence, Precision medicine, Drug delivery.*

CEU-008

Nanotechnology in drug delivery systems

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Nanotechnology involves the engineering of materials at the nanoscale, typically between 1 and 100 nanometers. In the Pharmaceutical domain, this technology unlocks groundbreaking potential by enabling the development of nanoparticles tailored for specific drug delivery purposes. Nanotechnology has emerged as a revolutionary approach in modern pharmaceutical sciences, offering innovative solutions to overcome the limitations of conventional drug delivery systems. Traditional drug delivery often faces challenges such as poor bioavailability, lack of target specificity, rapid drug degradation, and systemic side effects.

Real-Life Application in Medicine: Nanotechnology's practical solutions are already evident. Liposomal formulations, such as doxorubicin for cancer therapy, have reduced toxicity while improving patient outcomes. In chronic disease management, nanoparticles deliver anti-inflammatory drugs directly to affected joints, increasing efficacy and reducing systemic side effects. This abstract highlights the recent advances, applications, benefits, and challenges of nanotechnology in drug delivery. The integration of nanotechnology with pharmaceutical research is expected to transform healthcare by improving therapeutic outcomes, reducing adverse effects, and enhancing patient compliance. Continued research and

Keywords: *Nanotechnology, Targeted drug delivery, Nanocarriers, Controlled release, Personalized Medicine*

CEU-009

Targeted gene therapy in oncology: a pharmaceutical approach to precision cancer treatment

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Cancer continues to be a major health challenge worldwide, affecting not only patients but also their families and quality of life. Traditional treatments like chemotherapy, although effective, often harm healthy cells and lead to significant side effects. In recent years, targeted gene therapy has emerged as a more precise and patient-friendly approach to cancer treatment. Targeted gene therapy works by identifying and correcting the specific genetic changes that cause cancer. Instead of attacking all rapidly dividing cells, this approach focuses only on cancer cells. It uses specially designed delivery systems, known as vectors, to introduce or modify genetic material within these cells. Techniques such as gene addition, gene silencing, and gene editing help in stopping cancer growth or even destroying cancer cells. Advanced therapies like CAR-T cell therapy further enhance the body's natural ability to fight cancer. From a pharmaceutical perspective, careful attention is given to how these therapies are designed, delivered, and monitored. Factors such as stability of the genetic material, accurate targeting, and minimizing unwanted effects are crucial. Continuous monitoring through pharmacovigilance is also important to ensure long-term safety. Although targeted gene therapy offers many benefits, challenges such as high cost, limited accessibility, and complex regulatory requirements still exist. However, ongoing research and innovation continue to improve its effectiveness and availability. In conclusion, targeted gene therapy represents a hopeful step forward in oncology, combining scientific advancement with a more compassionate approach to treatment, aiming to improve both survival and quality of life for cancer patients.

Keywords: Gene therapy, Targeted drug delivery, CAR-T cell therapy, Pharmacovigilance, Oncology

CEU-e-010

Next-generation nanosponge-loaded xerogels for topical delivery: A quality by design–enabled smart drug delivery system

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This study describes an innovative topical drug delivery patch that uses a tiny, porous sponge-like structure called nanosponges, trapped inside a specialized dried gel matrix known as a xerogel. These nanosponges are capable of encapsulating poorly water-soluble drugs, a limitation commonly observed with many analgesics and anti-inflammatory drugs. When the dry gel comes in contact with the skin or a small amount of moisture, it slowly rehydrates and facilitates controlled release of the drug directly at the application site, such as on painful joints or inflamed skin, instead of spreading it all over the body. This minimizes side effects and improves therapeutic efficacy and patient comfort. The development of this system follows a careful planning approach called "Quality by Design," ensuring that each material and processing parameter is selected based on scientific reasoning and experiments rather than empirical methods. Through systematic characterization, the formulation was evaluated for drug-polymer

compatibility, surface morphology and swelling behaviour to ensure optimal performance. Critical variables, including nanosponges concentration, types of gelling materials, and drying conditions, were optimized to achieve the desirable properties such as high drug content, good skin attachment, controlled release, and acceptable strength of the patch. Experimental evaluations demonstrated that the patch can slowly release the medicine over several hours, keeps most of the drug at the site of application, and exhibits stability under storage condition. This delivery system shows potentiality in managing localized conditions such as skin infections, joint pain, wound healing etc with reduced dosing frequency. Its simplicity and cost effectiveness makes it suitable for rural or homebased care settings. Overall, this approach represents a rational integration of smart material design with modern formulation science to develop an efficient and patient-friendly drug delivery system.

Keywords: *Nanosponges, xerogel, topical drug delivery, Quality by Design, controlled drug delivery system.*

CEU-010

Nanotechnology-based targeted drug delivery system

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Cancer remains one of the leading causes of mortality worldwide, with conventional therapeutic strategies often limited by systemic toxicity, poor bioavailability, and non-specific drug distribution. Nanotechnology-based targeted drug delivery systems have emerged as a transformative approach to overcome these challenges, offering precision medicine solutions at the molecular level. This review explores the application of various nanocarriers — including liposomes, polymeric nanoparticles, dendrimers, gold nanoparticles, and carbon nanotubes — as vehicles for anticancer drug delivery. These systems exploit the enhanced permeability and retention (EPR) effect and surface functionalization strategies using ligands, antibodies, and aptamers to achieve selective tumor targeting. Key advantages include controlled drug release, reduced off-target effects, improved therapeutic index, and the ability to co-deliver multiple agents simultaneously. Recent advances in stimuli-responsive nanocarriers that respond to pH, temperature, redox potential, and enzymatic activity further enhance site-specific delivery. Clinical translations of several nanotechnology-based formulations, such as liposomal doxorubicin and albumin-bound paclitaxel, demonstrate the real-world applicability of these platforms. Despite promising outcomes, challenges related to large-scale manufacturing, regulatory approval, and long-term safety remain. Future research should focus on personalized nanoformulations and integration with immunotherapy to maximize therapeutic efficacy.

Keywords: *Nanotechnology, targeted drug delivery, nanoparticles, cancer therapy, EPR effect*

CEU-e-011

A novel liquid crystalline nanoparticle system for BCS class II anticancer drug delivery

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Cancer ranks among the leading causes of mortality globally, driven by late diagnosis and the

drawbacks of traditional chemotherapy. BCS Class II anticancer drugs, such as tyrosine kinase inhibitors, offer great therapeutic promise, but their poor aqueous solubility and erratic absorption patterns frequently limit their clinical success. The current work focuses on development and characterization of drug-loaded liquid crystalline nanoparticles (LCNs) as a highly advanced nanocarrier system. Pre-formulation studies confirmed the identity and purity of IBR through melting point (156), FTIR and XRD analysis indicating crystalline nature. LCNs were prepared by top-down technique employing 200 mg of lipid (glyceryl monooleate) and 50 mg of stabilizer (poloxamer 407). A Box-Behnken design was employed to optimize the formulation by varying the concentration of independent variable such as lipid and stabilizer, along with the number of probe sonication cycles, aiming to maximize entrapment efficiency and minimize particle size. The optimized batch (S5) achieved %EE of 84.25 % and a particle size of 88.3 nm. ANOVA showed significant effects of GMO and poloxamer 407 on %EE ($F = 27.16$, $p = 0.0007$) and particle size ($F = 13.02$, $p = 0.0078$). Characterization of optimized formulation showed a zeta potential of 23.8 mV, indicating colloidal stability.

Keywords: *Liquid crystalline nanoparticles, IBR, Nano carrier, GMO, anticancer*

CEU-e-012

Development and evaluation of a co-trimoxazole polycaprolactone nanoparticle-loaded in Situ gel for sustained intravesical treatment of urinary tract infections

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Urinary tract infections (UTIs) are among the most common bacterial infections worldwide, posing significant clinical and economic challenges due to their high incidence and recurrence rates, as well as the growing problem of antimicrobial resistance. Bacteria such as Escherichia coli, Klebsiella pneumoniae, and Proteus mirabilis can invade the urinary bladder, leading to persistent infections that are often difficult to treat with standard systemic antibiotics. Oral or injectable treatments often fall short because rapid urinary dilution and frequent bladder emptying reduce drug concentrations at the infection site, lowering the chances of successful treatment and increasing recurrence risk. As a result, there is increasing interest in localized intravesical drug delivery systems that provide sustained therapeutic levels directly within the bladder. The main aim of this project is to develop and assess an in-situ gel system containing biodegradable polymeric nanoparticles for extended medication delivery in the bladder. These biodegradable nanoparticles act as carriers for the selected antimicrobial agent, improving drug stability, enhancing penetration into infected urothelial tissues, and enabling controlled release. The nanoparticles were made from biodegradable, biocompatible polymers that degrade under controlled conditions. They were then integrated into a thermosensitive in situ gel matrix that transforms from a solution to a gel at body temperature within the bladder.

Keywords: *Intravesical Drug Delivery; Urinary Tract Infection; Polymeric Nanoparticles; In Situ Gel; Sustained Drug Release; Biodegradable Polymer; Nanoparticle-Based Drug Delivery System.*

ANA-001

Development and Validation of UV-Derivative Spectroscopic and RP-HPLC Methods for the Determination of Amlodipine Besylate and Valsartan in Tablet Dosage Form

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Abstract:

Introduction: Hypertension is directly responsible for 51% of all stroke deaths and 45% of all coronary heart diseases worldwide. Amlodipine besylate is a calcium channel blocker used as an anti-hypertensive agent. Valsartan is an angiotensin II receptor blocker used in the treatment of hypertension. **Objective:** To develop and validate UV derivative spectrophotometric and RP-HPLC methods for the simultaneous determination of Amlodipine besylate and Valsartan in tablet dosage form. To compare the developed methods using the Student's t-test for their suitability and sensitivity in routine quality control. **Methods:** For the simultaneous estimation of Amlodipine besylate and Valsartan, first, second, and third order Derivatization was carried out in an Agilent Cary 60 UV/Vis double beam spectrophotometer. HPLC method was carried out by using Agilent 1220 Infinity LC equipped with Eclipse XDB plus C18 Column (4.6 × 150 mm, 5 µm) with a mobile phase consisting of a mixture of Methanol and Acetonitrile in the ratio of 70:30 % v/v at a flow rate of 1 ml/min. **Results:** The developed methods were validated as per ICH guidelines in terms of accuracy, precision, LOD, and LOQ. The proposed methods were found to be suitable for the simultaneous determination of Amlodipine Besylate and Valsartan in bulk and in pharmaceutical dosage forms. The results of the developed methods were then compared by a Student's t-test.

Keywords: *Amlodipine, Valsartan, Derivative Spectroscopy, RP-HPLC.*

ANA-002

Development and Validation of a Rapid, Green RP-UPLC Method of estimation of Fexuprazan in bulk and Tablet dosage forms

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Abstract:

RP-UPLC Method Development and Validation for Estimation of Fexuprazan in Bulk and Pharmaceutical Dosage Form. A new, simple, rapid, precise, accurate, and reproducible RP- UPLC method was developed and validated for the estimation of Fexuprazan in bulk form and marketed formulation. The chromatographic separation was successfully achieved on an HSS 130Å (100 x 2.1 mm, 1.7 µm) column in isocratic mode using a mobile phase consisting of Acetonitrile and 0.01 N Potassium Dihydrogen Phosphate buffer in the ratio of 40:60 %v/v at a flow rate of 1.0 mL/min. The detection wavelength was set at 224 nm with the column oven temperature maintained at 30°C. The total run time was 3.0 min, and the retention time of Fexuprazan was found to be 1.314 min using Water and Acetonitrile (50:50 %v/v) as diluent. The developed method was validated according to ICH Q2(R1) guidelines for system suitability, specificity, linearity, accuracy, precision, LOD, LOQ, and robustness. The LOD and LOQ were found to be within acceptable limits. The %RSD values for precision and accuracy studies were found to be less than 2.0%, indicating high reproducibility and accuracy of the method. The proposed RP-UPLC method is simple, rapid, economical, and suitable for routine quality control analysis of Fexuprazan in bulk drug and tablet dosage forms.

Keywords: *Fexuprazan, RP-UPLC, Method Development, Validation, ICH Guidelines.*

ANA-e-001

Data Integrity Challenges in the Digital Era of the Pharmaceutical Industry: Role of AI in Ensuring Compliance

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Abstract:
Data Integrity is an important requirement in the pharmaceutical industry that ensures accuracy, consistency, & reliability of data throughout its lifecycle. Regulatory Agencies such as the US Food & Drug Administration (FDA) and World Health Organization (WHO) emphasize strict adherence to data integrity principles to safeguard product quality & patient safety. However, increasing cases of data manipulation, poor documentation & inadequate control over electronic systems continue to pose challenges to the pharmaceutical industry. This study aims to evaluate the key data integrity issues in pharmaceutical systems & explore the role of AI in enhancing compliance with regulatory standards. A comprehensive review of recent literature, regulatory guidelines & industry reports was conducted. Findings indicate that common data integrity challenges include data falsification, backdating of records, lack of audit trials & unreliable third-party data. These issues are often driven by inadequate training, weak quality culture & increasing pressure to comply with the regulatory requirements and production targets. The ALCOA+ principles – Attributable, Legible, Contemporaneous, Original, Accurate, with Complete, Consistent, Enduring & Available – are crucial for ensuring data integrity. Integration of AI-based systems offers promising solutions by providing real-time monitoring, anomaly detection, predictive analysis & automated data trials. These technologies enhance data traceability, reduce personnel errors & support compliance with regulatory requirements under the 21 CFR Part 11. It is concluded that data integrity challenges persist in the pharmaceutical industry. AI integration, along with ALCOA+ principles, provides a robust approach to improving data reliability and ensuring regulatory compliance.

Key Words: *Data Integrity, ALCOA+ principles, Compliance*

CHEM-001

Rational Design of VEGFR2 Inhibitors: A Computational Approach to Retinal Protection

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Abstract
Current anti-VEGF treatments are frequently constrained by invasive delivery and related side effects, and diabetic retinopathy (DR) is still a major cause of vision impairment globally. In this work, we used a thorough in silico drug discovery workflow to find new VEGFR2 inhibitors from a sizable library of phytoconstituents produced from plants. 57 molecules with binding affinities better or on par with the clinical reference drug, ruboxistaurin, were identified

by molecular docking research. Among these, the catalytic domain of VEGFR2 showed robust and consistent interactions with Rubranine, Boesenbergin B, and β-bisabolene. These ligand-receptor complexes' structural stability was validated by later molecular dynamics simulations, and ADMET profiling revealed advantageous pharmacokinetic characteristics with low anticipated toxicity. All of these results point to carbazole and polyphenolic derivatives as possible scaffolds for the creation of effective, noninvasive oral treatments for diabetic retinopathy. To confirm their therapeutic potential, more in vitro and in vivo research is necessary.

Keywords: *Diabetic retinopathy, VEGFR2, diabetes mellitus,ADME(T) analysis*

CHEM-002

From Flora to Routes: Multi Target Computational Identification of New Anti-Diabetic Leads

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Abstract

Chronic hyperglycemia and related consequences like retinopathy, neuropathy, and nephropathy are hallmarks of diabetes mellitus, a complicated metabolic disease. Even while oral hypoglycemic medications are readily available, their high cost, side effects, and the limitations of traditional drug production call for the investigation of safer and more efficient treatment alternatives. The current study used a multitarget in silico approach to assess the antidiabetic potential of a wide library of phytoconstituents against important therapeutic targets, such as PPAR-γ, α-amylase, α-glucosidase, SGLT2, and DPP-4, in order to address the multifactorial character of diabetes. With binding energies ranging from -12.5 to -9.8 kcal/mol, molecular docking research revealed over 15 phytoconstituents with strong and similar binding affinities across all five targets. These results were on par with or better than those o f common medications including sitagliptin, pioglitazone, voglibose, and dapagliflozin. The top-ranked compounds had excellent pharmacokinetic profiles and promising druggable properties, according to further ADMET and drug-likeness assessments. All of these results point to specific phytoconstituents as high-priority lead compounds that can simultaneously affect renal glucose reabsorption, carbohydrate digestion, and insulin sensitivity. To confirm their therapeutic potential, more in vitro and in vivo research is necessary.

Keywords: *Insilico docking, diabetes mellitus, alpha amylase and glucosidase, PPARγ, phytoconstituents*

CHEM-e-001

Computational Elucidation of Bioactive Compounds from Leucas longifolia Targeting Key Disease Pathways

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Abstract:

Leucas longifolia, a member of the Lamiaceae family, has been widely utilized in traditional medicine for its anti-inflammatory, antimicrobial, antioxidant etc. however, its molecular mechanisms remain inadequately elucidated. The present study integrates phytochemical profiling, ADME-toxicity screening, network pharmacology, and molecular docking to systematically investigate the multi-target therapeutic potential of Leucas longifolia. Phytoconstituents were extracted using different solvents, followed by LC–MS analysis, yielding more than 100 compounds with ≥80% spectral confidence. After stringent filtering and duplicate removal, 53 unique candidates were subjected to ADME evaluation using SwissADME. Compounds satisfying at least 2/5 drug-likeness criteria (Lipinski, Ghose, Veber, Egan, and Muegge) along with a bioavailability score of 0.55 were retained, resulting in 45 candidates. Toxicity screening using ProTox-3 identified key bioactive compounds, among which genistein, cuminaldehyde, and mosloflavone were prioritized for further investigation. Target prediction using Swiss Target Prediction revealed approximately 100 potential targets per compound. Disease-associated targets were retrieved from GeneCards for diabetes (20,039 genes), cardioprotection (1,160 genes), oxidative stress/DPPH (22,558 genes), and cytotoxicity/apoptosis (33,769 genes). Intersection analysis identified 212, 90, 212, and 134 common targets, respectively. Protein–protein interaction networks constructed using STRING (confidence ≥0.700) highlighted critical hub genes including ALOX5, ALOX12, ALOX15, PTGS1, and PTGS2 across anti-diabetic, cardioprotective, and antioxidant activities, while EGFR, STAT3, JAK1, JAK2, and PIK3R1 were dominant in cytotoxic pathways. Pathway enrichment further indicated involvement of PI3K-Akt, MAPK, and NF-κB signaling pathways.

Molecular docking studies using Molsoft ICM Pro demonstrated strong binding affinities of the selected compounds with hub proteins. genistein exhibited superior binding with PTGS2, EGFR, and JAK1, followed by mosloflavone and cuminaldehyde, indicating modulation of inflammatory, oxidative stress, and apoptotic pathways, consistent with the multi-targeted nature of herbal therapeutics. Overall, this integrative approach reveals that Leucas longifolia phytoconstituents possess significant multi-target therapeutic potential against diabetes, cardiovascular disorders, oxidative stress, and cancer. The findings provide a strong computational basis for further experimental validation and drug development.

Keywords: *Leucas longifolia, phytoconstituents, network pharmacology, molecular docking, multi-target drug discovery.*

COL-001

Comparative evaluation of renal outcomes with ARNI alone, SGLT2 inhibitors alone, and combination in non-ischemic cardiomyopathy heart failure patients

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Abstract

Heart failure (HF) secondary to non-ischemic cardiomyopathy (NICM) is frequently associated with progressive renal dysfunction due to complex cardiorenal interactions. Recent therapeutic advancements, including angiotensin receptor-neprilysin inhibitors (ARNI) and sodium-glucose cotransporter-2 inhibitors (SGLT2i), have demonstrated significant cardiovascular and renoprotective benefits. However, comparative evidence evaluating the effectiveness of these agents as monotherapy versus combination therapy in NICM patients irrespective of diabetic status remains limited. This prospective, comparative, multi-arm observational study was conducted over a period of 6 months in a tertiary care hospital, including 60 patients diagnosed with NICM and HF (HFrEF/HFmrEF). Patients were categorized into three groups (n=20 each): ARNI monotherapy, SGLT2 inhibitor monotherapy, and combination therapy. Renal outcomes were assessed using estimated glomerular filtration rate (eGFR), serum creatinine levels, and incidence of acute kidney injury (AKI) at baseline, 3 months, and 6 months. The results demonstrated that combination therapy was associated with a significantly lesser decline in eGFR (−2.3 ± 1.4 ml/min/1.73m²) compared to ARNI (−5.8 ± 2.1) and SGLT2i (−3.6 ± 1.7) monotherapy groups ($p<0.05$). Additionally, the incidence of AKI was lowest in the combination group (5%) compared to SGLT2i (10%) and ARNI (20%) groups. These findings were consistent irrespective of diabetic status. In conclusion, combination therapy with ARNI and SGLT2 inhibitors provides superior renoprotection compared to monotherapy in NICM heart failure patients and may be considered a preferred therapeutic strategy to improve cardiorenal outcomes.

Keywords*: ARNI, SGLT2 inhibitors, renal outcomes, heart failure, non-ischemic cardiomyopathy, eGFR, acute kidney injury, combination therapy*

COL-002

Assessment of the anti-diabetic effects of a complementary formulation in rats with nicotinamide–streptozotocin-induced diabetes

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Abstract

Background: Diabetes mellitus (DM) is one of the most common non-communicable diseases impacting millions worldwide. There is immense need for cost effective and safer alternative therapies for diabetes for developing countries like India where majority of population rely on traditional medicine for their healthcare needs.

Objectives: Present study was conducted to evaluate the antidiabetic effects of a compound Unani formulation (CUF) in animal models.

Materials and methods: Test formulation (CUF) was prepared as per traditional method. Oral glucose tolerance test (OGTT) was performed in euglycemic normal rats to assess peripheral utilization of glucose. Nicotinamide Streptozotocin-induced Non-Insulin Dependent Diabetes Mellitus (NIDDM) model was used for evaluating anti-diabetic effect in Wistar rats. CUF (600 and 1200 mg/kg) and positive control glibenclamide (10 mg/kg) was administered orally for 28-days and blood glucose level was analyzed on 14th and 28th day. Anti-oxidant potential of CUF was also conducted using DDPH, ABTS and FRAP scavenging assay.

Results: CUF markedly reduced glucose levels in OGTT in normal rats for up to 60 minutes at both dose levels. In NIDDM model, CUF demonstrated a significant reduction in fasting blood glucose level on 14th and 28th days of treatment. The formulation has shown promising antioxidant results. The results are in agreement with the ethnopharmacological use of the formulation.

Conclusion: Findings of present study advocate antidiabetic potential of CUF and it may be a cost-effective and safe anti-diabetic formulation for developing world.

COL-003

Revolutionizing cancer treatment with senotherapeutics: a current perspective

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Abstract:

Cellular senescence is a double-edged sword in cancer biology, initially acting as a tumor-suppressive mechanism but later contributing to cancer progression and therapy resistance. Senescent cells, characterized by stable cell cycle arrest, secrete a complex array of bioactive molecules known as the senescence-associated secretory phenotype (SASP), which fosters chronic inflammation, disrupts tissue architecture, and promotes tumorigenesis through paracrine signaling. Accumulation of these cells in the tumor microenvironment can enhance malignancy, drive metastasis, and impair treatment outcomes. Senotherapeutics, have emerged as promising strategies for targeting senescent cells in cancer therapy. These agents selectively induce apoptosis in senescent cells while preserving normal tissues, representing a paradigm shift in oncology. Senotherapeutics can function as standalone treatments by clearing senescent tumor cells or as adjuvants to chemotherapy and radiotherapy, effectively eliminating residual therapy-induced senescent cells that may contribute to relapse. This dual approach allows for reduced treatment toxicity, improved therapeutic efficacy, and decreased tumor recurrence. Furthermore, targeting non-cancerous senescent cells may help suppress inflammation-driven tumorigenesis, slow disease progression, and enhance patient outcomes. Despite their promise, challenges remain in optimizing senotherapeutic strategies, identifying precise biomarkers, and minimizing off-target effects.

Keywords: *Senescence-associated heterochromatin foci (SAHF); Senescence-associated secretory phenotype (SASP); Senescent cells (SC); Senolytic therapy; Senomorphics; Therapy-induced senescence (TIS); Tumor microenvironment (TME).*

COL-004

Preclinical Safety Evaluation of Unani Formulations UNIM-401 and UNIM-403: Acute and Repeated-Dose Toxicity Studies in Rats

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Abstract

Background: UNIM-401 and UNIM-403 are coded Unani formulation developed and studied by the Central Council for Research in Unani Medicine, New Delhi. Specifically, UNIM-401, along with other topical combinations like UNIM-402 and UNIM-403, has shown promising results in clinical trials for conditions like *Nar-e-Farsi* (eczema) and *Daus Sadaf* (psoriasis). UNIM-401 in an oral formulation containing a combination of *Fumaria parviflora* (*Barg-e-shahtra*), *Swertia chirata* (*Charata talegh*), *Psoralea corylifolia (Babchi)* and *Terminalia chebula* (*Halela siyah*), while UNIM-403, contains inner part of bark of *Azadirachta indica* (*neem*) and *Cinnamomum camphora* (*kafoor*) dispensed in sesame oil.

Aim: In view of limited safety data, acute and repeated-dose toxicity profile of UNIM-401 (oral) and UNIM-403 (dermal) in rats.

Methods: The present study evaluated the acute oral (OECD#425), acute dermal (OECD#402), repeated dose 90-day oral (OECD#408) and 28-day dermal (OECD #411)] toxicity of UNIM- 401 & UNIM-403, in rats. Parameters evaluated included mortality, clinical signs, body weight, feed intake, haematology, biochemical indices, organ weights, and gross pathology.

Results: No mortality or treatment-related clinical signs were observed in acute or repeated-dose studies. The acute oral LD of UNIM-401 was determined to be >10,000 mg/kg body weight, while the dermal LD of UNIM-403 exceeded the tested limit dose (10X). Repeated administration did not produce significant changes in body weight, feed intake, or behavioural parameters. Haematological and biochemical profiles remained within normal limits. No treatment-related gross pathological findings or alterations in relative organ weights were observed.

Conclusion: UNIM-401 and UNIM-403 were found to be safe and well tolerated in rats, with no evidence of systemic and dermal toxicity under the study conditions. These findings support their safety at therapeutic doses, justifying continued clinical application under evidence-based practice.

Unani; UNIM 401, UNIM 403; OECD 425; OECD 411

COL-005

Integrative preventive cardiology: bridging contemporary pharmacotherapy with unani murakkab as emerging multitarget therapeutics

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Abstract:

Background: Cardiovascular diseases (CVDs) remain the leading cause of global morbidity and mortality. Modern cardioprotective drugs- statins, β-blockers, antiplatelets, and ACE inhibitors reduce risk via lipid lowering, RAAS modulation, and anti-inflammatory effects. However, long-term use often leads to adverse effects (e.g., myopathy, hepatotoxicity, fatigue, bradycardia, cough, hyperkalaemia, bleeding), and residual cardiovascular risk persists. These limitations highlight the need for safer, multi-target therapies. Traditional systems like Unani medicine, particularly compound formulations (Murakkab), offer a holistic alternative.

Objective: To examine the correlation between preventive cardiology and Unani principles, and assess Advia Murakkabah as a safe, multi-component therapy for long-term cardiovascular protection.

Methodology: A narrative integrative review of pharmacological data, clinical studies, and classical Unani literature was conducted. Mechanisms of modern drugs were compared with the pharmacodynamic properties of unani Murakkab drugs, incorporating systems biology and network pharmacology perspectives.

Discussion: While modern drugs are often target-specific and associated with cumulative side effects, Murakkab are inherently polyherbal and multitarget, aiming to restore systemic balance (Tadeel-e-Mizaj). Unani concepts—Sue Mizaj-e-Qalb, Ghalba-e-Akhlat, and Insidad- e-Urooq—parallel endothelial dysfunction, dyslipidaemia, and atherosclerosis. Preventive principles like Hifz-e-Sehat and Asbab-e-Sitta Zarooriya align with modern lifestyle-based risk reduction.unani Murakkab drugs contain phytoconstituents (flavonoids, tannins, phenolics) with antioxidant, anti-inflammatory, lipid-lowering, and vasodilatory effects. Their synergistic actions align with network pharmacology. Evidence suggests good tolerability and fewer severe adverse effects with long-term use, though standardization and large clinical trials remain limited.

Conclusion: Unani Murakkab drugs offer a promising, multi-target cardioprotective approach with potential advantages in safety and chronic disease management. Integration with modern medicine may address residual risk, but rigorous validation and standardization are essential.

Keywords: *Preventive Cardiology, Unani, Murakkab drugs, Multitarget Therapy*

COL-006

Antimicrobial resistance: an emerging threat to public health systems

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Abstract:
Antimicrobial resistance is becoming a bigger issue around the world. It happens when bacteria, viruses, fungi, and parasites stop responding to the medicines used to treat them. Because of this, infections are harder to treat, which can lead to longer hospital stays, higher medical bills, and more deaths. AMR can affect many diseases, including those caused by bacteria like methicillin-resistant Staphylococcus aureus (MRSA) and Escherichia coli; viruses like human immunodeficiency virus (HIV) and the flu; fungi like Candida; and parasites like malaria. These resistant germs can cause serious illnesses such as pneumonia, urinary tract infections, sepsis, and meningitis. The main reasons for antimicrobial resistance (AMR) are the overuse and misuse of antibiotics in hospitals, in farming, and in the environment. In hospitals, antibiotics are sometimes given when they are not needed, or patients may not complete their full course of treatment. In farming, antibiotics are used to help animals grow, which can spread resistant bacteria. Global travel allows resistant germs to spread from one country to another, and antibiotics can end up in the environment through waste from hospitals or farms. To tackle AMR, we need to use antibiotics more carefully, improve infection control in hospitals, and raise awareness about the dangers of overusing antibiotics. We also need to invest in developing new antibiotics. Everyone, including doctors, governments, industries, and the public, must work together to slow down the spread of AMR and make sure antibiotics remain effective in the future.

Keywords: *Antimicrobial Resistance, AMR, Bacterial Infections, Antibiotics, Public Health, Infection Control, Global Health.*

COL-007

AI in pharmacology, pharmacovigilance and smart QA

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Abstract
Artificial Intelligence (AI) is playing an increasingly important role in modern healthcare, especially in pharmacology, pharmacovigilance, and smart quality assurance (Smart QA). In pharmacology, Al helps in drug discovery, drug design, and development by analyzing large amounts of data quickly and accurately. Machine learning and deep learning techniques are used to identify drug targets, predict drug behavior, optimize dosages, and reduce the time and cost involved in traditional drug development. Al also supports personalized medicine by helping healthcare professionals choose the most effective treatment for individual patients.In pharmacovigilance, Al improves drug safety monitoring by detecting, analyzing, and predicting adverse drug reactions (ADRs). Al tools such as natural language processing and automated data mining can process information from clinical reports, electronic health records,

medical literature, and social media. This allows faster identification of safety signals, reduces underreporting, and minimizes manual workload. As a result, Al enhances patient safety and supports timely regulatory decision-making. Smart Quality Assurance uses Al and automation to improve quality control processes in pharmaceutical and healthcare systems. Al-driven Smart QA enables real-time monitoring, accurate documentation, error detection, and compliance with regulatory standards. It reduces human error, improves efficiency, and ensures consistent product and service quality. Overall, the integration of Al in pharmacology, pharmacovigilance, and smart QA enhances efficiency, accuracy, and safety across the healthcare sector. Although challenges such as data quality, ethical concerns, and system validation remain, Al has strong potential to improve healthcare outcomes and ensure safer and more effective medicines.

Keywords: *Pharmacology ,pharmacovigilance , smart QA , Adverse drug reaction , Health care*

COL-008

Artificial intelligence–integrated CRISPR genome editing for precision leukemia therapy

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Abstract

Leukemia remains a major hematologic malignancy with limited curative options, underscoring the need for innovative therapeutic strategies. CRISPR-Cas systems provide unmatched possibilities for precise genome editing, allowing for the correction of cancer-related mutations like FLT3-ITD, NPM1, and TP53. However, clinical translation faces limitations due to off-target effects, the complexity of guide RNA design, and inconsistent editing efficiency. Artificial Intelligence (AI) offers a computatio nal structure to tackle these issues by combining predictive modeling, machine learning, and extensive genomic datasets. In this research, algorithms powered by AI were used to enhance the design of CRISPR guide RNAs for targets related to leukemia. Models trained on over 200,000 validated CRISPR edits reached up to 92% accuracy in predicting on-target efficiency, while conventional scoring methods achieved around 65%. Off-target cleavage decreased by 45%, as verified by GUIDE-seq analysis in leukemia cell lines. Furthermore, in FLT3-mutant acute myeloid leukemia (AML) models, CRISPR interventions directed by AI maintained >90% cell survival while achieving editorial efficiency above 80%. The incorporation of deep learning frameworks facilitated real-time observation of editing results, permitting ongoing improvement of therapeutic approaches. These results emphasize the collaborative potential of AI and CRISPR in enhancing precision treatment for leukemia. AI-enhanced CRISPR platforms showcase a next-generation model in hematologic oncology by lowering error rates, speeding up target prioritization, and improving editing precision. Future avenues involve validation in patient-derived xenografts, integration of single-cell transcriptomic data, and creation of clinical-grade AI-CRISPR workflows.

Keywords*: Artificial Intelligence, CRISPR-Cas9, Genome Editing, Leukemia Therapy, Precision Medicine, Guide RNA Optimization, Off-Target Prediction, Machine Learning, Hematologic Malignancies.*

COL-009

Decoding the vine: an analytical review of vitis vinifera l. Bioactives from unani origins to recent discoveries.

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Abstract

Vitis vinifera L., commonly known as grape and designated as *Angūr, Mavis*, *Anabalis*, or *Zabīb* in Unani medicine, is a woody vine of the Vitaceae family with significant nutraceutical and therapeutic value. Beyond its dietary use as fresh fruit, dried fruit, wine, and juice, it has been extensively utilised in Unani formulations for managing a wide spectrum of ailments. Classical Unani literature documents its application in gastrointestinal disorders *(Amraaz-e-Meda,* dyspepsia), piles *(Bawasir),* chronic bronchitis *(Iltahab al-Shu'ab Muzmin)*, hepatopathy, anaemia *(Faqr al-Dam)*, epilepsy *(Sara)*, chronic leucorrhoea *(Sayalan al-Rahim Muzmin),* intestinal ulcers *(Quruh al-Ama),* and various skin and scalp diseases. Phytochemically, V.vinifera is rich in bioactive constituents, inc luding phenols, anthocyanins, organic acids, volatile aromatics, vitamins, and potent antioxidants. Contemporary pharmacological studies corroborate its antioxidant, antimicrobial, analgesic, antidiabetic, and anti-inflammatory activities. This review integrates historical Unani descriptions with current scientific evidence to provide a comprehensive account of the ethnomedicinal uses, bioactive phytochemicals, and validated pharmacological properties of Vitis vinifera.

Keywords: *Vitis vinifera; Unani medicine; Polyphenols; Antioxidants; Phytotherapy; Ethnopharmacology.*

COL-010

Unani Perspectives On Myocardial Infarction (Al-Tanakhkhur Al-Insidadi Adal Al-Qalb): From Classical Theory to Modern Understanding

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Abstract

Cardiovascular diseases are the most common cause of the death in today's world. Smoking, diabetes mellitus, hypertension, hyperlipidemia are modifiable risk factors for MI. The biggest contributing risk factors for increasing these cases is sedentary and modern life style. It also may be due to atherosclerosis, deep vein thrombosis. Coronary artery disease (CAD) is the commonest cause of myocardial infarction (MI). It is caused by atherosclerosis. This typically happens due to an imbalance between myocardial oxygen supply and demand. The myocardium relies on oxygen-rich blood to prevent under perfusion of myocytes and the subsequent development of ischemia and infarction. Atherosclerotic obstruction that may be

worsen by sudden blood clots or vessel spasm. The patients may experience intense crushing sub sternal chest pain that can radiate to neck, jaw, epigastrium, or left arm. In unani system of medicine the heart is viewed as the source of Ḥarārat Gharīziyya (innate heat), supplying ghiza (nutrition) and Arwāḥ/ Rūḥ (pneuma) to all organs. According to unani physicians, suddah (blockages) can form in the heart that are harmful to the heart. According to Canon of Avicenna obstruction could be caused by a limited buildup of abnormal humors in arteries or other areas leads to obstruction and Sū'-i-Mizāj (dystemperament) to the heart which causes disease in it.

Keywords: *Myocardial infraction, suddah, Sū'-i-Mizāj, unani medicine*

COL-011

Cognitive enhancers in unani medicine for the management of *nisyan* (dementia): A Review

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Abstract

Nisyan (Dementia) is described in the Unani system of medicine as a disorder characterised by impairment of *Quwwat-e-Hafiza* (memory), *Quwwat-e-Mufakkira* (thinking faculty), and *Quwwat-e-Mutakhayyila* (imaginative faculty), resulting from derangement of the brain temperament, particularly excess coldness and moisture, along with the accumulation of morbid humours that affect cerebral functions. Classical Unani scholars, including *Ibn Sina*, *Zakariya al-Razi*, and *Ali Ibn Abbas al-Majusi*, attributed *Nisyan* to an altered cerebral temperament, especially the predominance of phlegm (Balgham), excess coldness (Burudat), abnormal moisture *(Ratubat),* and weakness of memory and cognitive faculties. With the rising global prevalence of dementia and other cognitive disorders, there is growing interest in traditional systems of medicine for safer, holistic therapeutic approaches. Unani medicine offers a comprehensive strategy for managing *Nisyan* through *Taqwiyat-e-Dimagh* (brain strengthening), *Tanqiya-e-Dimagh* (elimination of morbid matter), and the use of cognitive enhancers known as *Muqawwi-e-Dimagh* and *Muqawwi-e-Hafiza.*

This review explores the concept of *Nisyan* in classical Unani literature. It highlights the role of single and compound Unani drugs used as cognitive enhancers, including *Zanjabeel (Zingiber officinale), Vaj Turki (Acorus calamus Linn.), Brahmi (Bacopa monnieri), Baladur (Semecarpus anacardium), and Kundur (Boswellia serrata),* as well as classical formulations such as *Itrifal Ustukhuddus, Majun Falasfa, Majun-e-Baladur, Roghan-e-Malkangni, Majun-e-Vaj, Majun-e-Zabeeb, Sufoof-e-Hifz,* and *Jawarish Shoneez*. These drugs are traditionally believed to enhance memory, improve mental performance, strengthen nervous functions, and provide neuroprotection. Contemporary evidence also supports the antioxidant, anti-inflammatory, and nootropic properties of many of these agents.

Keywords: *Nisyan, Dementia, cognitive enhancers, Muqawwi-e-Hafiza, Muqawwi-e- Dimagh.*

COL-012

Concept of Nutraceuticals in Unani Medicine: Rediscovering the importance of ghidha dawai and dawa ghidai

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Abstract:

Ancient Unani physicians placed significant emphasis on dietary regulation for both disease prevention and therapeutic management. *Makoolat wa Mashroobat* (foods and drinks) is an important factor among the *Asbab-e-Sitta Daruriya,* the six essential prerequisites for human life. Good nutrition is a major factor in both physical and mental health. The term "diet" derives from the Latin dieta, originating from the Greek word meaning "way of living". Diet is recognised not only for its nutritional value but also for its pharmacological properties, such as laxative, diuretic, and diaphoretic effects. Ilaj bil ghiza (Dietotherapy) is a unique non-drug therapy that treats illness by changing dietary habits. Demographic shifts, socioeconomic changes, increased longevity, and rising healthcare costs have driven research into cost-effective management strategies utilising diet as a functional intervention rather than a pharmacological agent. Functional foods and nutraceuticals are now a primary focus of R&D in this area. Nutraceuticals are food-derived substances or purified food components, not typically sold as medicines, that provide physiological benefits and disease protection beyond basic nutrition. Unani medicine distinguishes two dietary categories: Ghidha dawai, referring to the substances that are primarily used as a diet but have some therapeutic properties, and Dawa ghidhai, referring to a substance that consists of both medicinal and nutritional content, but the former predominates over the latter. Dietotherapy refers to the therapeutic use of food as an intervention to facilitate recovery from disease. According to Unani Physicians, the core principles emphasise the principles of moderation, balanced nutrition, proper meal timing, and personalisation of diet, and also describe the temperament- based diet. This paper systematically elucidates the concept, significance, classifications, terminology, and therapeutic benefits of Dietary Therapy (Ilaj bil Ghiza) within the Unani system of medicine. This paper aims to systematically review and consolidate classical Unani texts concerning the use of dietotherapy.

Keywords: *Asbab-e-Sitta Daruriya, Makoolat wa Mashroobat, Ghidha dawai, Dawa ghidhai*

COL-013

Comparative Evaluation of SGLT-2 and DPP-4 Inhibitors in Type 2 Diabetes: A 12-Month Longitudinal Analysis of Lipid and Cardiometabolic Outcomes Informing AI-Driven Precision Therapeutic Strategies

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Abstract:

Background: Dyslipidaemia significantly contributes to cardiovascular risk in Type 2 Diabetes Mellitus (T2DM). While Sodium-glucose cotransporter-2 (SGLT-2) inhibitors and Dipeptidyl Peptidase-4 (DPP-4) inhibitors are widely used, their comparative long-term effects on lipid and cardiometabolic outcomes in real-world settings remain insufficiently defined. In the era of artificial intelligence (AI), longitudinal clinical data are increasingly valuable for enabling precision therapeutics.

Objectives: To compare the 12-month effects of SGLT-2 and DPP-4 inhibitors on lipid profile and cardiometabolic outcomes in patients with T2DM.

Materials and Methods: This prospective observational study included 252 T2DM patients, of whom 200 completed 12 months of follow-up. Patients were equally assigned to SGLT-2 or DPP-4 inhibitor groups. Lipid parameters (total cholesterol, triglycerides, LDL-C, HDL-C, VLDL-C) and cardiometabolic indices were assessed at baseline, 3, 6, 9, and 12 months. Statistical analyses were performed using paired t-tests, repeated measures ANOVA, and post hoc tests ($p<0.05$).

Results: SGLT-2 inhibitors showed greater improvements than DPP-4 inhibitors, with reductions in total cholesterol (-20 mg/dL), triglycerides (-19.95 mg/dL), LDL-C (-20.98 mg/dL), and VLDL-C (-8.04 mg/dL), alongside increased HDL-C (+8.02 mg/dL vs. +2.00 mg/dL). Favourable changes in anthropometric measures suggested improved cardiometabolic risk profiles.

Conclusion: SGLT-2 inhibitors demonstrated superior cardiometabolic benefits compared to DPP-4 inhibitors. These real-world findings provide a valuable dataset for AI-driven precision therapeutics, supporting the development of predictive models and clinical decision support systems for individualized diabetes management.

Keywords: *Type 2 Diabetes Mellitus, SGLT-2 Inhibitors, DPP-4 Inhibitors, Lipid Profile, Cardiometabolic Outcomes, Real-World Evidence, Artificial Intelligence, Precision Therapeutics.*

COL-014

Pharmacological Interventions in Polycystic Ovary Syndrome: A Clinical and Epidemiological Perspective

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Abstract

Polycystic Ovary Syndrome (PCOD) is a prevalent endocrine disorder affecting women of reproductive age. It is characterized by hyperandrogenism, chronic anovulation, and polycystic ovarian morphology. The disorder is often associated with insulin resistance, obesity, and metabolic complications, necessitating comprehensive management. To review and summarize the pharmacological approaches used in the management of PCOD, focusing on symptom control, metabolic correction, and fertility enhancement. Insulin-sensitizing agents such as Metformin play a central role in improving insulin resistance and restoring menstrual regularity. Combined oral contraceptives are commonly prescribed to regulate menstrual

cycles and reduce androgen levels, thereby improving clinical manifestations like acne and hirsutism. Anti-androgen agents, including Spironolactone, are effective in managing excess androgen symptoms.

For infertility management, ovulation induction agents such as Clomiphene Citrate and letrozole are widely used, with letrozole increasingly preferred due to better ovulatory outcomes. In selected cases, lipid-lowering drugs and anti-obesity medications may be incorporated to address metabolic abnormalities.

Pharmacotherapy should be individualized based on patient presentation, reproductive goals, and metabolic profile. Regular monitoring is essential to assess therapeutic response and minimize adverseeffects.

Effective pharmacological management of PCOD requires a multidisciplinary and patient-centred approach. When combined with lifestyle interventions, drug therapy significantly improves reproductive, metabolic, and psychological outcomes in affected individuals.

Keywords: *PCOD, pharmacological management, insulin resistance, ovulation induction, hyperandrogenism*

COL-015

Digital Phenotyping for Early Detection of Mental Health Disorders: A Public Health Approach

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Abstract:

Background: Mental health disorders affect 970 million people globally (WHO, 2022), with 75% untreated in low/middle-income countries due to stigma, access barriers, and subtle early symptoms. Major depressive disorder (MDD) and generalized anxiety disorder (GAD) evade traditional subjective assessments. Digital phenotyping passively captures smartphone and wearable data including sleep patterns, physical activity, screen time, geolocation, and social interactions via machine learning algorithms to detect pre-clinical behavioral deviations 2–4 weeks before clinical onset, enabling scalable population-level screening.

Methodology: A narrative literature search was conducted across PubMed, Google Scholar, and PsycINFO, focusing on studies published between 2014 and 2024. The search yielded approximately 120 relevant articles, of which around 52 were selected based on relevance to digital phenotyping and mental health monitoring in adults.

Results: Reviewed literature suggests that digital phenotyping shows strong potential for early detection of mental health deterioration. Studies report MDD detection with AUC values of 0.82–0.91, 78% sensitivity, and 85% specificity, with sleep irregularity predicting depressive episodes up to 21 days before clinical presentation. For GAD, AUC values of 0.79–0.88 and 81% sensitivity were reported based on texting and social interaction patterns. Schizophrenia relapse detection achieved 89% sensitivity and 75% specificity. Population-level screening reduced diagnostic delays by 30–50%. These findings from heterogeneous

studies are promising but should be interpreted with caution due to variability in methodology and sample population.

Conclusion: Digital phenotyping represents a clinically meaningful advance in the early detection of MDD, GAD, and schizophrenia. Clinical pharmacists can contribute by optimizing SSRI/SNRI dosing through activity and sleep trend analysis, deploying digital adherence interventions, monitoring QTc prolongation via heart rate variability, and supporting multidisciplinary care teams. However, significant challenges remain including data privacy, algorithmic bias, lack of standardized protocols, and limited regulatory guidance.

Keywords: *Digital Phenotyping, Major Depressive Disorder, Anxiety, Schizophrenia, Clinical Pharmacy*

COL-016

SALIVA-SEPSIS: A rapid, multi-biomarker panel for early sepsis triage

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Abstract:

Sepsis remains a leading cause of morbidity and mortality worldwide, primarily due to delayed diagnosis and dependence on invasive, time-intensive blood-based investigations. Early identification during the initial stages is critical for timely intervention and improved clinical outcomes. This study proposes SALIVA-SEPSIS, a rapid, non-invasive multi- biomarker approach utilizing saliva as an alternative diagnostic medium for early sepsis triage in emergency care settings. The proposed framework integrates three key biomarker domains: inflammatory cytokines (interleukin-6 and tumor necrosis factor-alpha), metabolic stress indicators correlated with lactate levels, and regulatory microRNAs associated with immune dysregulation. The combination of these biomarkers aims to enhance diagnostic sensitivity and specificity by capturing multiple physiological pathways involved in sepsis progression. The study design involves comparative analysis between salivary and conventional blood-based biomarkers in patients presenting with suspected sepsis, evaluating diagnostic accuracy, turnaround time, and feasibility. A major focus of this work is its translational potential. The concept extends toward the development of a point-of-care diagnostic platform, such as a lateral flow-based saliva strip, capable of delivering rapid and actionable results within minutes. This approach has the potential to reduce diagnostic delays, minimize patient discomfort, and improve accessibility, particularly in resource-limited and high-patient-load environments. This research reflects a strong interest in bridging laboratory innovation with clinical application by emphasizing scalability, practicality, and patient- centered design. With further validation, saliva-based multi-biomarker diagnostics may offer a promising direction for early sepsis detection and broader infectious disease screening, supporting more efficient and responsive healthcare delivery systems.

Keywords: *Sepsis, Saliva diagnostics, Biomarkers, Point-of-care testing, Early detection*

COL-017

Incidence of trastuzumab induced cardiotoxicity in indian breast cancer patients

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Abstract

Background: Breast cancer is the most common malignancy among women in India, with a high proportion of cases presenting at advanced stages. HER2-positive breast cancer is associated with aggressive tumor behavior and poorer prognosis. Trastuzumab, a targeted anti-HER2 monoclonal antibody, has significantly improved survival outcomes; however, its use is associated with cardiotoxicity.

Objective: To evaluate the incidence of trastuzumab induced cardiotoxicity and identify associated risk factors in Indian breast cancer patients.

Methods: A prospective observational study was conducted in a tertiary cancer care hospital (MNJIORCC) including 200 HER2 positive breast cancer patients receiving trastuzumab. Cardiac function was assessed using echocardiography, with left ventricular ejection fraction (LVEF) measured at baseline and at regular intervals. Cardiotoxicity was defined as a relative drop of ≥ 10% in LVEF or a drop below 50% according to ESC criteria. Clinical and treatment related variables were collected, and logistic regression analysis was performed to identify predictors of cardiotoxicity.

Results: A considerable proportion of patients (12%) developed cardiotoxicity, predominantly as asymptomatic declines in LVEF. The median time to onset of cardiotoxicity was 17 weeks. Hypertension and higher comorbidity scores were found to be significant predictors ($p < 0.05$), whereas treatment related factors showed limited association. Most cases were mild and manageable with appropriate monitoring.

Conclusion: Trastuzumab induced cardiotoxicity is relatively frequent in the form of subclinical cardiac changes but rarely progresses to severe dysfunction. Regular cardiac monitoring is essential for early detection and management. Patient related factors, particularly hypertension and comorbidity burden, are key determinants of cardiotoxicity risk and should be considered in individualized treatment planning.

Keywords: *Breast cancer, Trastuzumab, Cardiotoxicity, LVEF, Risk factors*

COL-018

Pharmacological and public health potential of chicory roots (Cichorium intybus) as a Nutraceutical in Non-Communicable diseases

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Abstract:

Chronic non-communicable diseases (NCDs) including diabetes mellitus, cardiovascular diseases, obesity, and inflammatory disorders continue to pose a major global health burden. Growing evidence suggests that alterations in gut microbiota composition are closely

associated with the development and progression of these conditions. This has led to increasing interest in prebiotic nutraceuticals as preventive and supportive agents in chronic disease management. The present review highlights the pharmacological and pharmaceutics relevance of prebiotic Nutraceuticals with a focus on chicory root (Cichorium intybus), a natural source of inulin- type fructans. Inulin acts as a fermentable dietary fibre that selectively promotes the growth of beneficial intestinal microorganisms, thereby improving gut microbial balance. Fermentation of inulin results in the production of short-chain fatty acids, which play a key role in regulating glucose and lipid metabolism, maintaining intestinal barrier function, and modulating inflammatory responses. These effects are associated with improved metabolic outcomes and reduced risk factors for chronic diseases. From a pharmaceutics perspective, inulin also has applications as a formulation excipient and functional ingredient in the development of nutraceutical and pharmaceutical dosage forms aimed at improving metabolic health. Its physicochemical properties support its incorporation into oral formulations and functional food systems. In addition, prebiotic-based interventions offer a practical and cost-effective strategy for addressing the rising burden of NCDs, particularly in low-resource settings. However, further well-designed clinical studies and standardized formulation approaches are required to fully establish their therapeutic potential.

In conclusion, prebiotic nutraceuticals, particularly chicory root-derived inulin, represent a promising interface between nutrition science, pharmacology, and pharmaceutics, with significant potential in chronic disease prevention and integrative healthcare approaches.

Keywords: Prebiotic nutraceuticals; Chicory root; Inulin; Gut microbiota; Chronic diseases; Pharmaceutics; Pharmacology; Non-communicable diseases; Functional foods; Integrative medicine.

COL-019

The role of artificial intelligence in addressing antibiotic resistance

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Abstract:

In global health, antibiotic resistance(AMR) results in increasing illness, mortality, and the cost of healthcare. The misuse and overuse of antibiotics, combined with poor diagnostic practices and limited awareness among people, lead to AMR. As microbial resistance is rapidly increasing, traditional treatments are becoming less effective, creating an urgent need for new solutions. Artificial intelligence(AI) is becoming a valuable tool in addressing antibiotic resistance. This study examines how AI can contribute to controlling AMR and improving public health. A literature review was carried out using sources like PubMed, Google Scholar, and international health reports in order to understand recent advancements in AI applications for antibiotic resistance. Machine learning and predictive analytics are AI techniques that help in the early detection of resistant pathogens by analysing large amounts of clinical and genomic data. AI helps healthcare professionals to choose the right and appropriate antibiotics through clinical decision support systems, which reduces wrong prescriptions. AI also aids

antimicrobial surveillance by tracking resistance patterns and monitoring disease trends in real time. Furthermore, in order to develop and discover new antibiotics and overcome the problem of reduced drug effectiveness, AI plays a major role. its integration into antimicrobial management programs can improve treatment accuracy and support evidence-based decisions. In conclusion, AI provides innovative and effective ways to combat antibiotic resistance and improve the public health system. It supports better diagnosis, treatment, and monitoring, however, further research and increased awareness are needed for its proper use in health care.

Keywords: Antibiotic resistance(AMR), Artificial intelligence(AI), Machine learning, Surveillance

COL-020

Cost Comparison of Branded and Generic Medicines in India: A Pharmacoeconomic Perspective

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Abstract:

Background: The increasing cost of healthcare is a major challenge, particularly in developing countries like India. One of the key contributors is the widespread use of branded medicines, which are often significantly more expensive than their generic counterparts. Despite being therapeutically equivalent, generic medicines remain underutilized due to lack of awareness and misconceptions regarding their safety and effectiveness.

Methods: This poster presents a comparative overview of the cost differences between branded and generic medicines based on available literature, standard price references, and government-supported sources.

Results: The comparison highlights a substantial price variation, with generic medicines being considerably more affordable than branded drugs. High dependence on branded medications increases the financial burden on patients and may lead to poor medication adherence. Factors such as aggressive marketing, prescribing habits, and limited awareness influence the preference for branded drugs.

Conclusion: Encouraging the use of generic medicines can play a crucial role in reducing healthcare costs and improving access to treatment. Greater awareness, rational prescribing practices, and supportive regulatory measures are essential to promote their acceptance.

Keywords: *Generic Medicines, Branded Drugs, Pharmacoeconomics, Healthcare Cost, India*

COL-021

Antibiotic Resistance: Causes, Impact, and the Need for Rational Drug Use

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Abstract:

Background: Antibiotic resistance is a growing global public health concern that reduces the effectiveness of antimicrobial therapy. It is primarily driven by irrational practices such as self-

medication, incomplete treatment courses, and overuse of antibiotics. In countries like India, easy accessibility and lack of awareness further contribute to this issue.

Methods: This poster adopts a descriptive review-based approach, analyzing published literature and reports on antibiotic usage patterns and resistance trends to identify key contributing factors.

Results: The findings indicate that misuse and overuse of antibiotics are major contributors to resistance. Practices such as self-medication and early discontinuation of therapy lead to reduced drug efficacy, prolonged illness, and increased healthcare costs. Lack of awareness and weak regulatory control further aggravate the problem.

Conclusion: Antibiotic resistance can be controlled through strict regulation of antibiotic use, promotion of rational prescribing, and increased public awareness. Educational interventions and active involvement of pharmacists are essential to ensure responsible antibiotic use.

Keywords: *Antibiotic Resistance, Irrational Drug Use, Antimicrobial Misuse, Public Health, India*

COL-022

Therapeutic Potential of Unani Medicine in Inflammatory Bowel Disease: A Comprehensive Literature Review

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Abstract

In the Unani system of medicine, Inflammatory Bowel Disease, comprising Crohn's disease and ulcerative colitis, is termed *Dhusantariya miwiyya*. Conventional therapies, including 5-aminosalicylates (sulfasalazine), corticosteroids (prednisolone), immunomodulators (methotrexate), anti-TNF-α monoclonal antibodies (infliximab), and antibiotics (metronidazole, ciprofloxacin), show variable patient response and prolonged use is associated with adverse effects such as immunosuppression, osteoporosis, and hepatotoxicity. These limitations have increased patient interest in traditional systems of medicine. Unani medicine approaches *Dhusantariya miwiyya* through distinct therapeutic principles aimed at restoring physiological homeostasis (*tabi'yat mudabira i badan*) by rebalancing temperament (mizaj) and humours (*akhlat*). Eminent Unani physicians, including *Buqrāt* (Hippocrates), *Jalīnoos* (Galen), *Ibn Sīnā* (Avicenna), *Dawud Antaki* and *Ismail Jurjānī*, described this core principle.

Objective: This literature review evaluates Unani single and compound formulations historically used for gastrointestinal disorders and assesses their relevance to disease management.

Methods: High-quality sources were analysed: peer-reviewed articles from PubMed and Scopus, Classical Unani textbooks, Unani pharmacopoeias, and relevant clinical and preclinical studies.

Results: Several Unani drugs exhibit pharmacological actions relevant to IBD pathophysiology, including anti-inflammatory (*muhallil*), tissue repair (*mundamil*), mucosal

protection, haemostatic (*habid*), intestinal astringent (*qabid i ama*), gastrointestinal tonic *(Muqawi-i-med a wa ama'*), and hepatoprotective (*muqawi-i-jigar*) actions, as well as immunomodulatory properties. Key examples include Aegle marmelos L. (*Belgiri*), Plantago lanceolata L. *(Aab-i-Bartang)*, Berberis vulgaris L. (*Zarishk*), Polygonum bistorta L. (*Bekh*-i-*Anjabar*), Rheum emodi Wall. (*Rewand Chini)*, and compounds such as *Sharbat-i-Belgiri*, *Sharbat -i-habbul aas* and *Aqras-Rewand.*

Conclusion: Unani formulations possess multi-targeted actions aligned with IBD therapeutic needs and warrant further rigorous, well-defined clinical validation as adjunctive or alternative options.

KeyWords*: Inflammatory Bowel Disease, Dhusantariya miwiyya, Unani medicine, Berberis vulgaris*

COL-023

Real-World Evidence in Pharmacoepidemiology: Critical Case Studies Shaping Drug Safety and Public Health

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Abstract:

Pharmacoepidemiology has emerged as a cornerstone of modern public health, bridging clinical pharmacology with epidemiology to evaluate the real-world safety, effectiveness, and utilization of medicines. Recent years have witnessed a surge in high-impact case studies that highlight both transformative therapeutic benefits and persistent risks across diverse populations. During the COVID-19 pandemic, pharmacoepidemiology became critically visible. Large-scale vaccine surveillance identified rare adverse events, including myocarditis associated with Pfizer-BioNTech COVID-19 vaccine (Comirnaty) and thrombotic thrombocytopenia linked to AstraZeneca COVID-19 vaccine (Vaxzevria). These findings, derived from real-world data, enabled rapid regulatory adaptations and strengthened public trust through transparent risk–benefit communication. Equally critical is the rising misuse of ADHD medications such as Methylphenidate (Ritalin) and amphetamine derivatives (Adderall). Case-based analyses reveal increasing non-medical use among young adults, resulting in cardiovascular complications, dependence, and diversion networks, exposing gaps in prescription monitoring systems. A notable and controversial case involves Metamizole (Novalgin), widely used in several regions yet restricted elsewhere due to its association with Agranulocytosis. Additionally, large cohort studies indicate that SSRIs such as Paroxetine (Paxil) are linked to increased fall-related injuries in older adults, underscoring the importance of age-specific prescribing. Furthermore, GLP-1 receptor agonists including Semaglutide (Ozempic/Wegovy), Liraglutide (Victoza/Saxenda), and Tirzepatide (Mounjaro) demonstrate substantial benefits in Type 2 Diabetes Mellitus and obesity management. However, concerns regarding Gastroparesis, Pancreatitis, and inequitable access remain significant. Collectively, these case studies exemplify the indispensable role of pharmacoepidemiology in identifying emerging risks, optimizing therapeutic outcomes, and informing evidence-based regulatory decisions. As healthcare increasingly integrates real-world data and advanced analytics, pharmacoepidemiology will continue to evolve as a critical discipline—ensuring that medical innovation is not only effective but also safe, equitable, and aligned with the broader goals of global public health.

Keywords: *Pharmacoepidemiology, Real-world evidence, Drug safety surveillance*

COL-024

Pulmonary Delivery of Insulin: Innovations, Clinical Benefits, and Challenges in Diabetes Management.

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Abstract

Background: Diabetes mellitus is a major chronic health concern, particularly in countries like India, where long-term insulin therapy is often required. Conventional subcutaneous insulin administration is associated with poor patient adherence due to needle-related discomfort. Inhalation insulin has emerged as a novel, non-invasive alternative aimed at improving patient compliance and glycemic control.

Objectives: To evaluate the clinical benefits, patient adherence, and challenges associated with inhalation insulin therapy in the management of diabetes mellitus.

Methodology: A narrative review of recent clinical studies and published literature was conducted, focusing on the pharmacokinetics, efficacy, safety, and patient acceptance of inhaled insulin formulations. Comparative analysis with subcutaneous insulin therapy was also performed.

Results: Previous studies have demonstrated that inhalation insulin is rapidly absorbed through the pulmonary route, resulting in a faster onset of action compared to subcutaneous insulin. Published evidence indicates improved postprandial glucose control and higher patient satisfaction due to its non-invasive nature. Several studies have also reported better adherence among patients who transitioned from injectable to inhaled insulin formulations. However, literature highlights certain limitations, including variability in drug absorption, contraindications in patients with underlying pulmonary conditions, and higher treatment costs. Mild respiratory adverse effects, such as cough, have been reported but are generally well tolerated.

Conclusion: Inhalation insulin represents a promising advancement in diabetes management by improving patient compliance and providing effective glycemic control. Despite its advantages, challenges related to cost, long-term pulmonary safety, and patient selection must be addressed. Further research and clinical evaluation are necessary to optimize its role in routine clinical practice.

Keywords: *Diabetes Mellitus, Inhalation Insulin, Pulmonary Drug Delivery, Medication Adherence, Glycemic Control.*

COL-025

Gene Therapy Approaches in Solid Tumours versus Haematological Cancers: Current Advances and Challenges

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Abstract

Background: Gene therapy has emerged as a promising strategy in oncology, targeting the genetic basis of cancer. However, its application varies significantly between solid tumors and

hematological malignancies due to differences in tumor biology, microenvironment, and accessibility.

Objectives: To comparatively evaluate current gene therapy approaches in solid tumors and hematological cancers, highlighting recent advances and associated challenges.

Methodology: A narrative review of recent literature was conducted using peer-reviewed journals and clinical studies. Focus was placed on gene editing technologies, immune-based therapies, and delivery systems used in both solid and hematological cancers.

Results: Gene therapy has demonstrated notable success in hematological cancers, particularly with chimeric antigen receptor T-cell (CAR-T) therapy, which enables targeted immune-mediated destruction of malignant cells. In contrast, the effectiveness of gene therapy in solid tumors is limited by challenges such as poor vector penetration, tumor heterogeneity, and an immunosuppressive microenvironment. Emerging strategies, including oncolytic viral therapy, nanoparticle-based delivery systems, and CRISPR-Cas9 gene editing, are being developed to overcome these limitations. While clinical outcomes are promising in blood cancers, translation into solid tumors remains an area of active research.

Conclusion: Gene therapy has achieved greater clinical success in hematological malignancies compared to solid tumors, primarily due to biological and delivery-related factors. Continued innovation in gene delivery systems and tumor targeting strategies is essential to enhance its efficacy in solid tumors and broaden its clinical applicability.

Keywords: *Gene Therapy, Solid Tumors, Hematological Malignancies, CAR-T Cell Therapy, CRISPR-Cas9, Oncolytic Viral Therapy, Targeted Cancer Therapy*

COL-026

Circulating MicroRNAs as Diagnostic Biomarkers in Breast Cancer: A Systematic Review of Translational Evidence.

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Abstract:

Background: Breast cancer remains the most common malignancy among women worldwide, where early and accurate diagnosis is crucial for improving survival outcomes. Conventional diagnostic methods such as mammography and biopsy have limitations, necessitating the exploration of novel, non-invasive biomarkers. MicroRNAs (miRNAs), small non-coding RNA molecules regulating gene expression, have emerged as promising diagnostic tools in translational cancer research.

Objective: This systematic review aims to evaluate the diagnostic potential of circulating miRNAs as biomarkers for breast cancer and to assess their translational applicability from bench to bedside.

Methods: A systematic search of electronic databases including PubMed and Scopus was conducted to identify relevant studies assessing miRNAs in breast cancer diagnosis. Eligible studies included clinical and meta-analytical research reporting sensitivity, specificity, and area under the curve (AUC). Data were extracted and synthesized qualitatively.

Results: Multiple studies demonstrated that specific miRNAs exhibit high diagnostic accuracy. miR-155 showed the highest performance with pooled sensitivity of 93%, specificity of 85%, and AUC of 0.95, which increased to 0.97 in serum-based analyses. miR-21 demonstrated moderate accuracy with sensitivity ranging from 72% to 79% and AUC between 0.85 and 0.89. Importantly, combined miRNA panels significantly enhanced diagnostic performance, achieving AUC values greater than 0.90. However, variability across studies was observed due to differences in sample types and detection methods.

Conclusion: Circulating miRNAs, particularly miR-155 and multi-miRNA panels, represent highly promising non-invasive diagnostic biomarkers for breast cancer. Despite strong translational potential and successful clinical validation, their routine clinical implementation remains limited due to lack of standardization and large-scale validation.

Keywords: *Breast Neoplasms; MicroRNAs; Biomarkers, Early Detection of Cancer; Sensitivity and Specificity*

COL-027

Microbiome-Driven Approaches in Oncology: From Bench to Bedside

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Abstract:

Background: The human microbiome plays a crucial role in immune regulation, metabolism, and gut homeostasis, with growing evidence linking it to cancer development and progression. Dysbiosis contributes to inflammation, DNA damage, and tumor growth, while beneficial microbes can enhance anti-tumor immunity and improve therapeutic response.

Objectives: This review aims to elucidate the role of the microbiome in oncology, summarize mechanisms influencing tumor progression and treatment response, and evaluate emerging microbiome-based therapeutic strategies along with their translational potential.

Methods: A structured review of recent peer-reviewed literature was conducted, focusing on microbiome interactions with cancer therapies, including immunotherapy, chemotherapy, and radiotherapy, as well as interventions such as probiotics, dietary modulation, fecal microbiota transplantation (FMT), and engineered bacteria.

Results: The microbiome significantly modulates treatment outcomes. Beneficial bacteria such as Akkermansia and Bifidobacterium enhance immunotherapy by activating T-cell responses. Microbial composition can influence chemotherapy efficacy and toxicity by altering drug metabolism. Additionally, the microbiome reduces radiotherapy-induced side effects by decreasing inflammation and oxidative stress. Translational strategies like probiotics and microbiome profiling show promise in improving therapeutic precision.

Conclusion: Microbiome-based approaches represent a promising frontier in oncology, offering opportunities for personalized and more effective cancer treatment. However, challenges such as safety concerns, variability, and lack of standardization must be addressed. Further research is essential for successful clinical integration and improved patient outcomes.

Keywords: Microbiome; Cancer; Immunotherapy; Dysbiosis; Probiotics.

COL-028

Microbiome-driven inflammation in heart failure: emerging insights

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Abstract:

Background: Heart failure(HF) is a complex clinical syndrome characterized by impaired cardiac function and progressive structural remodeling. Emerging evidence highlights the significant role of the gut microbiota, a diverse community of microorganisms including bacteria, fungi, viruses, and archaea in the development and progression of HF. The gut microbiota contributes to essential physiological processes such as digestion, nutrient-absorption, immune regulation, and maintaining intestinal barrier integrity.

Objective: Alterations in gut microbiota composition, known as dysbiosis, is strongly associated with HF. Dysbiosis leads to increased intestinal permeability, allowing translocation of bacteria and their metabolites into the bloodstream. Key microbial metabolites, such as trimethylamine N-oxide (TMAO), lipopolysaccharides(LPS), and short-chain fatty acids (SCFAs), play critical roles in modulating cardiovascular health. Elevated TMAO levels promote atherosclerosis by enhancing endothelial dysfunction and inflammatory signaling pathways. Similarly, LPS activates immune responses through toll-like receptors, triggering the release of pro-inflammatory cytokines (TNF- α, IL-1&6), which contribute to myocardial inflammation, fibrosis, and adverse cardiac remodeling.

Methods: Conversely, beneficial metabolites like SCFAs help maintain gut barrier integrity and regulate immune responses, thereby protecting against HF progression. The bidirectional interaction between the gut and heart is often referred to as the "gut-heart axis" which creates a vicious cycle where inflammation exacerbates both gut dysfunction and cardiac impairment.

Results: Although preclinical studies suggest that modulation of gut microbiota may improve cardiac outcomes, clinical evidence remains limited. Understanding the molecular mechanisms linking gut microbiota and HF could pave the way for innovative therapeutic strategies targeting microbiome restoration.

Conclusion: The gut microbiota represents a promising target in HF management, offering new avenues for prevention and treatment through microbiome based interventions

Keywords: *Microbiome, heart failure(HF), Gut-heart axis*

COL-029

Worldwide patterns and social differences in gastroesophageal reflux disease among teenagers and young adults

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Abstract:

This study reviewed global incidence and temporary trends of gastroesophageal reflux disease in individuals age of 10–24 years. GERD incidence data were taken out from the Global Burden of Disease Study across 204 countries. Time-related trends were assessed using

estimated annual percentage change (EAPC)with incidence Classified by age, sex, region and socio-demographic index. Spearman correlation examined associations between EAPC and baseline incidence or SDI. worldwide, GERD incidence in youth rose from 30.07 million cases in 1990 to 40.36 million in 2021 with rates keep on increasing from 1943.27 to 2137.83 per 100,000 population (EAPC: 0.36). The highest burden occurred in the 20–24 age group, and females regularly showed higher rates than males. Low and low-middle SDI regions proved the greatest increase in case numbers with over 140% growth in the low SDI group. By 2021 the highest country- specific rates were in Colombia and Costa Rica while Japan, Norway and China had the lowest. EAPC was increases along with the starting rate in 1990 (\rho = 0.209, P = 0.003) suggesting greater increases in countries with an beginning high burden. No significant association was found between EAPC and SDI (\rho = -0.024, P = 0.732). In conclusion GERD is increasingly common among adolescents and young adults particularly in low- and middle-income regions. These trends show the strong need for early diagnosis and customized public health actions. Further research should focus on identifying modifiable lifestyle and Food-related causes, improving awareness among young populations, and strengthening healthcare systems to manage the rising burden effectively across diverse global settings.

Keywords: *Adolescents; Gastroesophageal reflux disease; Global Burden of Disease; Incidence trends; Socio-demographic disparities.*

COL-030

Tissue Nanotransfection in Non-Viral in Vivo Gene Delivery and Cellular Reprogramming

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Abstract:
Tissue nanotransfection (TNT) represents a breakthrough non-viral nanotechnology platform enabling direct, localized in vivo gene delivery and cellular reprogramming without the limitations of viral vectors. Utilizing nanoelectroporation through a silicon-based nanochannel or microneedle chip, TNT transiently permeabilizes cell membranes, facilitating the targeted delivery of genetic cargo such as plasmid DNA, mRNA, and CRISPR/Cas systems into intact tissues with high specificity and minimal cytotoxicity. This approach overcomes key challenges of conventional gene therapy, including immunogenicity, off- target integration, and scalability, positioning TNT as a safer and more controllable alternative for clinical translation. Mechanistically, TNT-mediated cellular reprogramming is driven by coordinated transcriptional activation, epigenetic remodeling, and metabolic reconfiguration. Delivered reprogramming factors initiate lineage-specific gene expression, while epigenetic modulators alter chromatin accessibility and DNA methylation states, enabling stable phenotype conversion. Concurrent metabolic shifts support bioenergetic demands and reinforce reprogramming toward induced pluripotency, direct lineage conversion, or partial cellular rejuvenation. Preclinical studies demonstrate TNT's capacity to convert resident somatic cells into functional neuronal and vascular phenotypes, promoting tissue regeneration, ischemic

recovery, and wound healing. Its ability to perform in situ reprogramming eliminates the need for ex vivo manipulation or stem cell transplantation, advancing the paradigm of regenerative medicine toward minimally invasive, patient-specific therapies. Importantly, TNT offers a versatile platform for personalized therapy by enabling optimized, tissue-specific delivery of genetic cargo tailored to individual disease profiles. Its adaptability for multiplexed gene delivery and precision targeting highlights its potential in next- generation therapeutics, including immunomodulation, antimicrobial strategies, and precision oncology.

In conclusion, TNT stands at the forefront of non-viral nanomedicine, integrating bioengineering and molecular reprogramming to redefine in vivo gene therapy and accelerate the evolution of personalized and regenerative healthcare.

COL-031

Pharmacoeconomics of Cancer Treatment: Is It Affordable? Chemotherapy VS Targeted Therapy

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Abstract:

Cancer treatment has undergone a significant transformation with the advent of targeted therapies, which offer better clinical outcomes and less toxicity than traditional chemotherapy, However, these advancements have raised critical concerns regarding affordability, particularly in low- and middle- income nations like India. By contrasting the cost-effectiveness of conventional chemotherapy and more recent targeted medicines, this study investigates the pharmacoeconomic aspects of cancer treatment.

Despite being comparatively less costly, chemotherapy is frequently linked to increased toxicity, hospital stays, and supportive care expenses, all of which can put a strain on patients. Targeted medicines, on the other hand, have significantly higher direct drug prices but are more effective and have fewer side effects since they are made to act on particular biochemical pathways. This study looks at factors such treatment costs, survival benefits, and quality-adjusted life years (QALYs) using pharmacoeconomic evaluation techniques like cost-effectiveness and cost-utility analysis.

The results show that while targeted medicines may provide longer survival and better quality of life, many patients cannot afford them, which results in unequal treatment outcomes. Out-of-pocket costs continue to be a significant obstacle, frequently causing families to experience financial hardship or stop receiving treatment. The problem is further compounded by the absence of full insurance coverage and the restricted inclusion of costly treatments in public health programs.

In conclusion, although targeted medicines are a potential development in cancer, their cost is still a major obstacle. To guarantee fair access to efficient cancer therapies, policy changes, price controls, and a broader use of pharmacoeconomic assessments in decision-making are urgently needed.

Keywords: *Pharmacoeconomics, Chemotherapy, Targeted Therapy, Cost-Effectiveness Analysis, Quality-Adjusted Life Years (QALY).*

COL-032

Mitigating viral hazards in renal care: a comprehensive framework for hepatitis B and C prevention in haemodialysis settings

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Abstract

Viral hepatitis remains a critical complication for patients undergoing maintenance haemodialysis (HD). Despite advances in medical technology, the nosocomial transmission of Hepatitis B (HBV) and Hepatitis C (HCV) persists as a significant global health challenge, particularly in high-endemicity regions like South-east Asia. Haemodialysis patients are uniquely vulnerable due to frequent vascular access, shared treatment environments, and prolonged exposure to potentially contaminated equipment. This abstract evaluates the multifaceted strategies required to eliminate bloodborne virus (BBV) transmission within the dialysis circuit. Transmission primarily occurs through cross-contamination of external machine surfaces, contaminated healthcare worker hands, and the sharing of multi-dose medication vials. While HBV prevalence has stabilized due to mandatory vaccination and patient segregation, HCV continues to pose a threat due to its environmental stability and the lack of a preventative vaccine. A robust preventive framework must prioritize four pillars: rigorous screening, aggressive immunization, physical segregation of infected patients, and strict adherence to universal precautions. Effective diagnosis relies on the timely detection of specific biological markers. For HBV, the primary markers include Hepatitis B Surface Antigen (HBsAg) for active infection, Anti-HBs to confirm immunity, and HBV DNA via Real-Time PCR for occult infections. For HCV, screening involves Anti-HCV antibodies, supplemented by HCV RNA (nucleic acid testing) to differentiate between past exposure and active viremia, especially in patients with unexplained elevations in aminotransferase (ALT/AST) levels. In conclusion, reducing the burden of viral hepatitis in HD units requires a shift toward "zero- tolerance" for cross-contamination. By integrating frequent diagnostic surveillance (every 6 months) with stringent environmental hygiene and patient education, clinical outcomes and long-term survival for renal replacement therapy patients can be significantly improved.

Keywords: *Haemodialysis, Infection Control, Biological Markers, Nosocomial Transmission, Viral Surveillance*

COL-033

Semaglutide: From Therapy to Trend — A Pharmacological Revolution or Risk?

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Abstract:

Semaglutide is a glucagon-like peptide-1 (GLP-1) receptor agonist that was originally developed for the treatment of type 2 diabetes, but in recent years it has gained significant attention for its role in weight loss. It works by increasing insulin secretion, decreasing glucagon levels, slowing gastric emptying, and reducing appetite, which together help in controlling blood glucose levels as well as body weight. Because of these effects, semaglutide

is now being used not only for diabetes but also for obesity management.

In recent times, especially during 2025–2026, there has been a noticeable shift in how this drug is being used. A significant number of people are now taking semaglutide mainly for weight loss rather than for diabetes. With the expiry of its patent in India, many generic versions have entered the market, making it much more affordable, with prices dropping by almost 80–90%. While this has improved access for patients, it has also led to increased misuse, such as self-medication and use by people without proper medical need.

Real-world data show that common side effects include nausea, vomiting, and diarrhea, while more serious effects like pancreatitis, although rare, still need attention. Overall, semaglutide is a very useful drug, but its increasing use outside proper medical guidance is a concern. Its growing use shows how a drug can move beyond treating disease and start influencing everyday health choices. Therefore, careful use under medical supervision is important to ensure safety and effectiveness.

Keywords: *Semaglutide, GLP-1 receptor agonist, Type 2 diabetes, Obesity management, Drug misuse, Patent expiry*

COL-034

From mutation to medicine: a CRISPR - centric theoretical approach to genetic disease correction

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Abstract:

Genetic disorders continue to impose a significant global health burden, often lacking definitive curative therapies. The emergence of CRISPR-Cas systems has revolutionized genome editing by offering precise, efficient, and programmable modification of DNA sequences. This study proposes a theoretical model for the correction of monogenic genetic disorders using CRISPR-based gene editing, integrating recent advancements in molecular biology, bioinformatics, and delivery systems.

The model outlines a stepwise framework beginning with target gene identification and mutation mapping, followed by the design of highly specific guide RNA (gRNA) sequences to ensure precision editing. It incorporates the use of CRISPR-Cas9 and next-generation variants such as base editors and prime editors to minimize off-target effects and enhance editing accuracy. Furthermore, the model evaluates delivery mechanisms, including viral vectors and lipid nanoparticles, to optimize in vivo and ex vivo gene correction efficiency.

A key component of this framework is the inclusion of computational validation tools for predicting off-target activity and assessing gene-editing outcomes. Ethical considerations, including germline editing risks, regulatory challenges, and long-term safety implications, are also critically discussed to ensure responsible application of this technology.

The proposed theoretical model aims to bridge the gap between laboratory research and clinical translation by providing a structured approach for developing CRISPR-based therapies.

Keywords: *CRISPR-Cas9, Gene Editing, Genetic Disorders, Precision Medicine, Genome Engineering*

COL-035

Gastroprotective Action of Unani Drugs in Management of Gastric Ulcer

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Abstract

Gastric ulcer is a prevalent gastrointestinal disorder resulting from an imbalance between aggressive factors such as gastric acid, pepsin, *Helicobacter pylori*, and nonsteroidal anti-inflammatory drugs, and protective mechanisms including mucus, bicarbonate, and prostaglandins. Traditional Unani medicine conceptualizes gastric ulcer under conditions such as *Quruh-e-Meda*, attributing its pathogenesis to disturbances in humoral balance (mizaj), including factors like *Galba-e-Safra*, *Sue Mizaj Haar Meda*, and *Zof-e-Quwat Hazima*.

This study highlights the gastroprotective potential of various Unani medicinal plants, including *Pistacia lentiscus*, *Rosa damascena*, *Bambusa arundinacea*, *Glycyrrhiza glabra*, and *Punica granatum*. These drugs exhibit significant pharmacological activities such as anti-inflammatory, antioxidant, anti-*H. pylori*, and mucosal protective effects, largely attributed to bioactive compounds like flavonoids, triterpenes, glycyrrhizin, and phenolic constituents.

The findings suggest that Unani formulations provide a holistic and complementary approach to gastric ulcer management by enhancing mucosal defense, reducing inflammation, and promoting ulcer healing. The conceptual parallels between Unani principles and modern pathophysiology further support their therapeutic relevance. However, additional experimental and clinical studies are necessary to validate efficacy and ensure integration into evidence-based practice.

The Unani concept of Qurooh-e-Meda aligns remarkably with modern understanding of gastric ulcer pathogenesis. Many studies have been conducted on Unani medicinal herbs, which show promising gastroprotective effects in the prevention and management of gastric ulcers. Unani drugs provide a safe and effective complementary approach in gastric ulcer management through holistic principles, mucosal protection, and ulcer healing. Further clinical and experimental studies are needed for scientific validation. Bridging classical Unani wisdom with modern scientific validation may offer safer, holistic, and effective alternatives in ulcer management.

COL-036

CRISPR-CAS system in combating Antimicrobial Resistance: A promising frontier in pharmaceutical science

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Abstract:

Antimicrobial resistance is the major health crisis developed as a result of improper use of antibiotics by the patients. Whenever pathogens modify themselves to resist the effect of antibiotics, antimicrobial resistance is observed, and traditional antibiotics fail to work for the infections. If this serious problem is left unattended, it may become the next pandemic for the world. In order to tackle the resistance or to reverse the resistance by the microorganisms, a genetic engineering tool, the CRISPR-Cas system, can be used. The CRISPR-Cas system is an

innovative approach that is inspired by the bacterial immune system. The CRISPR-Cas system specifically activates and inactivates a gene to combat the AMR, providing remarkable accuracy in identifying and altering the genomes of pathogens. There are different types of Cas proteins used as biological scissors to edit the genome of the pathogen. The key proteins or nucleases are Cas9, Cas3, Cas12, and Cas13, which have various applications, including either re-sensitizing harmful germs to current antibiotics or eliminating them selectively. There are different delivery methods such as conjugative plasmids, nanoparticles, and bacteriophages for the effective treatment. The paper also explains how CRISPR systems can be used in epigenetic modification, to combat resistance mechanisms, and to help discover novel antibiotic compounds. This approach is promising in combating the antimicrobial resistance by selectively targeting the gene responsible for the resistance. In order to ensure the effectiveness and safety of the CRISPR-Cas system in the clinical setup, optimizing the delivery systems and preventing the off-target effect is continuously done.

Keywords: *Antibiotics, Antimicrobial resistance, Pathogens, infection, CRISPR, Cas protein.*

COL-037

Biomarkers in detection of Alzheimer's and cancer disease

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Abstract

Biomarkers have emerged as essential tools for the early detection and management of both Alzheimer's disease and cancer, enabling improved diagnostic accuracy and personalized treatment strategies. In Alzheimer's disease, the key biomarkers including amyloid-beta (Aβ42), total tau (t-tau), phosphorylated tau (p- tau), and neurofilament light chain (NfL) reflect underlying pathological changes such as amyloid plaque deposition, neurofibrillary tangles, and neuronal degeneration or neuronal death. In cancer, biomarkers such as prostate-specific antigen (PSA), Cancer antigen-125 (CA-125),Carcinoembryonic antigen (CEA), alpha-fetoprotein (AFP), human epidermal growth factor receptor 2 (HER2), epidermal growth factor receptor (EGFR) mutations, BRCA1/BRCA2 genes, and programmed death ligand-1 (PD-L1) are widely used for screening, diagnosis, prognosis, monitoring and therapeutic response. Overall, Biomarkers represent a powerful tool in improving disease outcomes by facilitating timely intervention and advancing precision medicine in both neurodegenerative disorders and Oncology.

Keywords: *Tau protein (t-tau, p-tau), Neurofilament light chain (NfL), PSA (Prostate-Specific, Antigen), CA-125, CEA (Carcinoembryonic Antigen), AFP (Alpha-fetoprotein), HER2, EGFR mutations, BRCA1/BRCA2 genes, PD-L1*

COL-038

Antibiotic misuse and resistance

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Abstract

Antibiotic misuse is a critical global health issue that significantly contributes to the development of antimicrobial resistance (AMR). Misuse occurs through inappropriate prescribing by health care

professionals, over-the-counter availability without prescriptions, self- medication, and failure of patients to complete the full course of treatment. In addition, the widespread use of antibiotics in agriculture and animal husbandry further accelerates the emergence of resistant microorganisms. These practices expose bacteria to sublethal doses of antibiotics, allowing them to survive and develop resistance mechanisms such as enzymatic degradation of drugs, alteration of target sites, reduced drug permeability, and active efflux of antibiotics.

As a result, infections that were once easily treatable are becoming increasingly difficult to manage, leading to prolonged illness, higher medical costs, increased risk of complications, and greater mortality rates. The rapid spread of resistant strains is further exacerbated by poor infection control measures, lack of awareness, and inadequate regulatory frameworks Inman regions.

Combating antibiotic resistance requires a comprehensive and coordinated approach. This includes promoting rational use of antibiotics through strict prescription policies, increasing public awareness about the dangers of misuse, improving hygiene and infection prevention practices, and encouraging research and development of new antimicrobial agents. Surveillance programs and global cooperation are also essential to monitor and control the spread of resistance. Without urgent intervention, antibiotic resistance poses a serious threat to modern medicine and public health worldwide.

COL-039

Polycystic ovary syndrome: beyond reproduction- a growing health challenge

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Abstract

Polycystic Ovary Syndrome (PCOS) is an increasingly prevalent yet often under recognized endocrine disorder affecting women, particularly during adolescence and early adulthood, characterized by menstrual irregularities, hyper androgenic features such as acne and hirsutism, and challenges with fertility. However, its impact extends far beyond reproduction.

Affecting an estimated 8–13% of women globally and up to 20% in India, PCOS is increasingly linked to modern lifestyle patterns. Its etiology is multifactorial, involving genetic predisposition, insulin resistance, gut dysbiosis, neuroendocrine disorders, and environmental influences such as sedentary behaviour and dietary habits.

Importantly, PCOS is associated with a wide spectrum of long-term complications, including type 2 diabetes, cardiovascular risk, metabolic syndrome by causing hyperinsulinemia, oxidative stress, hyperandrogenism, impaired folliculogenesis, irregular menstrual cycles, and also causes significant psychological outcomes, including anxiety and depression.

PCOS can be treated with allopathic, ayurvedic or herbal medicines along with lifestyle modification. Herbal medicines are found to be more efficacious and cost effective for the management of PCOS. In cases of gut dysbiosis causing pathogenic PCOS, restoration of gut microbiota by prebiotics, probiotics or a fecal microbiota transplant (FMT) might serve as an efficient and noninvasive way to prevent and mitigate PCOS.

This poster highlights key insights into the epidemiology, underlying mechanisms, and diverse

clinical manifestations of PCOS, with a focus on its broader health implications. It also highlights the role of early recognition, lifestyle modification, and accessible healthcare interventions in improving outcomes.

By shifting the focus from purely reproductive concerns to a more holistic understanding, this work emphasizes the need for increased awareness and a comprehensive public health approach to PCOS.

Keywords: *Metabolic syndrome, hyperandrogenism, gut dysbiosis, fecal microbiota transplant, lifestyle factors.*

COL-040

Immunotherapy in Cancer Treatment: Revolutionizing Oncology and Its Public Health Implications

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Abstract:

Background: Cancer remains one of the leading global health challenges, continuing to place a significant burden on healthcare systems worldwide, with conventional treatments such as chemotherapy and radiotherapy often limited by toxicity and lack of specificity. In recent years, immunotherapy has emerged as a promising approach that enhances the body's immune system to recognize and eliminate cancer cells more effectively.

Objective: This study aims to explore the role of immunotherapy in cancer treatment and highlight its significance from a public health perspective.

Methods: A narrative review of recent scientific literature was conducted, focusing on key immunotherapeutic approaches including immune checkpoint inhibitors, monoclonal antibodies, and CAR-T cell therapy. Clinical outcomes, safety concerns, and accessibility issues were examined.

Results: Immunotherapy has demonstrated significant improvements in survival outcomes, particularly in cancers such as melanoma and lung cancer. Its targeted mechanism provides an advantage over conventional therapies by reducing systemic toxicity. However, challenges such as immune-related adverse effects, high treatment costs, and limited availability in low-resource settings remain important barriers.

Conclusion: Immunotherapy represents a major advancement in oncology, offering more personalized and effective treatment options. From a public health perspective, improving affordability, ensuring equitable access, and strengthening pharmacovigilance systems are essential. Pharmacists play a key role in patient education, monitoring therapy, and promoting safe and effective use of these treatments.

Keywords: *Immunotherapy, Cancer, Public Health, CAR-T Therapy, Monoclonal Antibodies*

COL-041

Multidrug resistance

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Abstract

Multidrug resistance (MDR) in cancer is one of the major challenges in successful chemotherapy and often leads to treatment failure. MDR occurs when cancer cells develop the ability to resist the effects of multiple anticancer drugs through mechanisms such as increased drug efflux, reduced drug uptake, enhanced DNA repair, and altered apoptotic pathways. This significantly decreases the effectiveness of conventional cancer therapy and worsens patient outcomes. Targeted nanotherapy has emerged as a promising strategy to overcome multidrug resistance in cancer treatment. Nanocarriers such as liposomes, polymeric nanoparticles, dendrimers, and solid lipid nanoparticles can deliver anticancer drugs directly to tumor cells while minimizing damage to healthy tissues. These nanosystems improve drug solubility, stability, and bioavailability, and help bypass drug resistance mechanisms by avoiding recognition by efflux pumps like P-glycoprotein. In addition, targeted nanotherapy allows the co-delivery of chemotherapeutic agents along with gene silencers, antibodies, or inhibitors that suppress resistance pathways. Surface modification of nanoparticles with ligands enables active targeting of specific cancer cells, increasing therapeutic efficiency and reducing systemic toxicity. This approach enhances intracellular drug accumulation and promotes apoptosis in resistant tumor cells. Despite its advantages, challenges such as toxicity, large-scale production, regulatory approval, and long-term safety need to be addressed. Continued research and clinical trials are essential for wider application. In conclusion, targeted nanotherapy offers a powerful and innovative approach to overcome multidrug resistance in cancer by improving drug delivery, reducing toxicity, and enhancing treatment success, thereby providing new hope for effective cancer management.

Keywords: *Multidrug Resistance (MDR), Cancer Therapy, Targeted Nanotherapy, Nanocarriers,*

COL-042

An Unusual Presentation of JMML-like Leukemia in a Teenager with Sickle Cell Disease

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Abstract:

Juvenile myelomonocytic leukemia (JMML) is a rare and aggressive myeloproliferative / myelodysplastic neoplasm of early childhood, typically presenting before 6 years of age. Its occurrence in adolescents is unusual and poses diagnostic and therapeutic challenges, especially in the presence of comorbid conditions such as sickle cell disease (SCD). We report the case of a 15-year-old male with homozygous sickle cell disease (HbSS) who initially presented with vaso-occlusive crisis and was found to have persistent leukocytosis. Further evaluation revealed marked monocytosis, anemia, and splenomegaly. Bone marrow examination demonstrated hypercellularity with myelomonocytic proliferation, and cytogenetic analysis identified a RANBP2-ALK fusion. Molecular findings were consistent with a JMML-like acute myeloid leukemia (AML) phenotype. The patient's clinical course was complicated by splenic sequestration, thrombotic events, pulmonary embolism, pleural effusions, and upper gastrointestinal bleeding. The patient was initially treated with AML-directed chemotherapy (ADE regimen), resulting in improvement of leukocytosis. Targeted

therapy with crizotinib was considered due to the ALK fusion. Given the aggressive disease course, hematopoietic stem cell transplantation (HSCT) was planned as definitive therapy, with AML therapy serving as a bridge. This case highlights a rare presentation of JMML-like AML in an adolescent with SCD, emphasizing diagnostic complexity due to overlapping hematologic features. Early recognition, integration of cytogenetic and molecular findings, and consideration of targeted therapies are critical. HSCT remains the only curative option, but management is further complicated by comorbid conditions such as SCD. This case underscores the need for individualized treatment strategies and further research into such a typical presentations.

Keywords: JMML, SCD, RANBP2-ALK fusion, HSCT.

COL-043

Cognitive Dysfunction in GBA-Associated Parkinson's Disease: Mechanisms and Therapeutic Horizons

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Abstract

Cognitive dysfunction represents a significant non-motor impairment in Parkinson's disease (PD), adversely affecting quality of life, functional independence in daily activities, and survival. Heterozygous mutations in the glucocerebrosidase gene (GBA1) are the most prevalent and clinically relevant genetic factor contributing to the heterogeneity of Parkinson's disease, and they constitute the most common and clinically significant risk factor, conferring a markedly increased susceptibility to early and rapidly progressive cognitive decline and dementia. GBA-associated Parkinson's disease (GBA-PD) defines a clinical subtype distinguished by an earlier disease onset, rapid progression, and a prevalence of neuropsychiatric and cognitive symptoms. This review focuses on current evidence on the clinical spectrum, neuropsychological profiles, and biological mechanisms underlying cognitive impairment in GBA-PD. One of the most important non-motor features of PD is cognitive dysfunction, which particularly affects quality of life and functional independence in daily life activities. Heterozygous mutations in the GBA1, which provide a considerably increased susceptibility to early and rapidly progressive cognitive impairment and dementia, are the most prevalent and clinically significant risk factor among the genetic contributors to PD heterogeneity. A clinical subtype of Parkinson's Disease is, known as GBA-associated Parkinson's disease (GBA-PD), is defined by a faster pace of progression and a high susceptibility to neuropsychiatric and cognitive symptoms. The clinical spectrum, neuropsychological profiles, and molecular mechanisms behind cognitive decline in GBA-PD are the main topics of this review.

Keywords: *Parkinson's disease, Glucocerebrosidase, Mutation, Cognitive Dysfunction, alpha-Synuclein*

COL-044

Plaque Psoriasis: Immunopathogenesis, Comorbidities, and Unani Therapeutic Approach

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Abstract:

Introduction: Plaque psoriasis is a chronic, immune-mediated inflammatory skin disorder that profoundly affects patients' physical health, psychological well-being, and social functioning. Recent advances in immunopathogenesis emphasize the pivotal role of the IL-23/T helper 17 (Th17) axis in sustaining inflammation and promoting keratinocyte hyperproliferation.

Methods: This abstract is derived from a narrative synthesis of current biomedical literature addressing mechanistic pathways, disease associations, and therapeutic strategies in plaque psoriasis, along with classical Unani medical texts describing analogous dermatological conditions and their management principles.

Results: Mechanistically, dysregulation of the IL-23–Th17 signaling pathway sustains chronic inflammation and epidermal proliferation in plaque psoriasis. The condition is frequently associated with psoriatic arthritis and systemic comorbidities, including cardiovascular disease, metabolic syndrome, and psychiatric disorders, which collectively increase disease burden and reduce quality of life. Conventional management is guided by disease severity and comorbid profiles, encompassing topical agents, systemic therapies, and targeted biologics.

From a Unani perspective, plaque psoriasis corresponds to *Taqashur al-Jild*, a condition attributed to derangement of humoral balance, particularly *Sauda* (black bile). Unani therapeutic strategies- *Ilaj bil Tadbeer* (regimenal therapy), *Ilaj bil Ghiza* (dietotherapy), and *Ilaj bil Dawa* (pharmacotherapy) focus on *Tanqiya* (detoxification), restoration of humoral equilibrium, and administration of herbal formulations possessing anti-inflammatory and blood-purifying properties.

Discussion: Unani interventions in plaque psoriasis offer mechanistic relevance through their anti-inflammatory, immunomodulatory, and detoxifying effects, which may help regulate pathways such as the IL-23/Th17 axis. Regimenal therapies and herbal formulations contribute to reducing systemic inflammation and oxidative stress while supporting immune balance. Dietotherapy further aids in modulating metabolic and inflammatory processes associated with disease severity. Integrating these approaches with modern therapeutics may enhance holistic management and improve patient outcomes.

Keywords: *Plaque psoriasis; IL-23/Th17 axis; psoriatic arthritis; Unani medicine; Taqashur al-Jild; humoral imbalance; integrative therapy.*

COL-045

Beyond the Trials: Real-World Insights on Ozempic

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Abstract

Ozempic (semaglutide), a Glucagon like peptide-1 receptor agonist, has demonstrated significant attention for its dual role in improving glycemic control as well as promoting weight loss in patients diagnosed with type 2 diabetes mellitus. While randomized trials highlight its efficacy under controlled conditions, retrospective studies give a clear insight into its effectiveness in day-to-day clinical practice. Across multiple real-world analyses, semaglutide shows reliable and consistent reductions in HbA1c, mostly around 1.0-1.8%, along with clinically significant weight loss in the range of 4-10 kg over 6-12 months. Patients also demonstrate improvements in cardiovascular risk factors such as blood pressure and lipid profiles, which Enhances its role beyond just glucose control. Notably, treatment persistence appears higher compared to other GLP-1 receptor agonists, suggesting better tolerability or patient compliance in routine use. Most common side effects are gastrointestinal including nausea, vomiting, and diarrhoea. Particularly during the early phase of therapy, and are usually transient. However, retrospective findings do point toward rare but notable risks such as pancreatitis and gallbladder-related complications, Emphasizing the importance of monitoring. On the whole, retrospective evidence supports semaglutide as an effective and well-tolerated option in real-world settings, aligning closely with clinical trial outcomes while highlighting its broader metabolic and cardiovascular benefits. Additional long-term studies would help clarify its sustained safety and clinical efficacy.

Keywords: *Ozempic, type 2 Diabetes mellitus, Weight loss, GLP-1 receptor agonist.*

COL-046

virotherapy: Advancing Precision Medicine through Viral-Based Therapeutic

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Abstract:

Virotherapy is an emerging therapeutic approach that uses viruses to treat diseases, particularly cancer and genetic disorders. Unlike traditional antiviral strategies that aim to eliminate viruses, virotherapy harnesses the natural ability of viruses to infect and destroy specific cells. In cancer treatment, oncolytic viruses are engineered or selected to selectively infect and lyse tumor cells while sparing normal tissues. This selectivity is achieved through genetic modification or by exploiting the unique environment of cancer cells, such as defective antiviral responses. Once inside the tumor, these viruses replicate and cause cell lysis, releasing new viral particles that can infect neighboring cancer cells. Additionally, virotherapy stimulates the host immune system by exposing tumor antigens, thereby enhancing antitumor immunity. Some virotherapeutic agents are also modified to deliver therapeutic genes, cytokines, or immune-stimulating factors directly into the tumor

microenvironment, further improving efficacy. Virotherapy has shown promising results in preclinical and clinical studies. For example, certain oncolytic viruses have been approved for the treatment of melanoma, demonstrating both safety and effectiveness. Despite these advances, challenges remain, including immune clearance of the virus, limited delivery to tumor sites, and potential side effects. Ongoing research focuses on improving viral targeting, enhancing immune responses, and combining virotherapy with other treatments such as chemotherapy, radiotherapy, and immunotherapy. Overall, virotherapy represents a novel and innovative strategy with significant potential to transform the treatment of cancer and other diseases.

COL-047

Clinical Evaluation of Safūf-e-Banafsha Tea Bags in Gastric Headache: A Pilot Study on Gut–Brain Axis Modulation

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Abstract:

Background: Gastric headache, described in Unani medicine as Ṣudāʿ Shirkī Miʿdī, is characterized by headache secondary to gastrointestinal disturbances. Emerging evidence suggests the involvement of the gut–brain axis, where altered gastric function influences neural pathways contributing to headache.

Objective: This study aimed to evaluate the efficacy and safety of Safūf-e-Banafsha Tea Bags in the management of gastric headache and to explore their role in modulating gut-related mechanisms.

Methods: A pilot clinical study was conducted on 10 participants diagnosed with gastric headache. Safūf-e-Banafsha, comprising Viola odorata, Rosa damascena, and Coriandrum sativum, was administered in tea bag form twice daily for 8 weeks. Clinical assessments were carried out at baseline and follow-up visits to evaluate headache intensity, frequency, associated gastrointestinal symptoms, and safety parameters. Statistical analysis was performed using Student's t-test.

Results: The intervention resulted in a significant reduction in headache intensity, with mean Visual Analog Scale (VAS) scores decreasing from 6.0 ± 1.1 to 4.0 ± 0.9 (mean change: −2.0 ± 0.8; $p < 0.05$). Inflammatory marker levels (CRP) also showed a significant decline from 4.9 ± 1.6 mg/L to 3.7 ± 1.2 mg/L (mean change: −1.2 ± 0.6 mg/L; $p < 0.05$). Clinically, 5 patients showed improvement, while 5 patients were categorized as mild or non-responders.

Conclusion: Safūf-e-Banafsha Tea Bags demonstrated a safe and effective Unani-based therapeutic approach for gastric headache by addressing underlying gastrointestinal dysfunction. These findings support integrative strategies targeting the gut–brain axis and warrant further large-scale clinical investigations.

***Keywords**: Unani Medicine, Gastric Headache, Gut–Brain Axis, Safūf-e-Banafsha*

COL-e-001

Management of unique toxicities associated with third-generation antibody-drug conjugates in her2-low breast cancer: a clinical review for pharmacists

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Abstract

The recognition of HER2-low breast cancer (IHC 1+ or 2+ without amplification) has expanded therapeutic options, with third-generation ADCs like trastuzumab deruxtecan (T-DXd) revolutionizing treatment through high drug-to-antibody ratios (DAR), cleavable linkers, membrane-permeable payloads, and the bystander killing effect. These innovations enable efficacy in low-HER2 expression tumors, surpassing limitations of earlier ADCs like T-DM1. However, they introduce a distinct toxicity profile—the "Big Three": interstitial lung disease (ILD)/pneumonitis, hematological events (neutropenia, thrombocytopenia), and gastrointestinal complications (high emetogenic nausea/vomiting)—driven by off-target payload diffusion in normal tissues. This clinical review synthesizes pharmacological profiles, mechanisms, and evidence-based management strategies, emphasizing pharmacist's pivotal role in proactive monitoring, dose individualization, steroid stewardship, multimodal antiemetics (NK1/5-HT3 antagonists + dexamethasone), growth factor coordination, and patient education on "red flag" symptoms. Pre-treatment checklists (e.g., baseline CT/LVEF), CTCAE-guided modifications, and risk stratification address emerging toxicities like ocular and cardiac effects. Distinctions from prior ADCs underscore the need for pharmacist-led frameworks amid an evolving pipeline. By bridging evidence gaps in pharmacist-specific guidance, this review equips clinicians to enhance safety, adherence, and outcomes in HER2-low disease. Future directions include real-world registries, AI-enabled monitoring, and multidisciplinary ADC-toxicity teams to navigate 2026 regulatory expansions.

Keywords: *HER2-low breast cancer, third-generation ADCs, bystander effect, interstitial lung disease, pharmacist management*

COL-e-002

Rutin reduces inflammation and fibrosis via TGF-B/SMAD pathways in IGA nephropathy induce rats

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Abstract:

Rutin is a flavonoid glycoside obtained from the plant Ruta Graveolens. It was known to have immunosuppressant activities. This study was focused on effect of Rutin against IgA nephropathy. IgA nephropathy was induced in Sprague-Dawley rats with various inducing

agents described in text. During the later part of the induction phase, Rutin was administered. Control group rats didn't receive any treatment or inducing agent, induced group rats received only the inducing agents whereas treatment group received the inducing agents as well as Rutin. During the study various biochemical parameters pertaining to kidney function were evaluated and also, the expression of proteins and cytokines responsible for inflammation and fibrosis were assessed. The effect of Rutin in IgA nephropathy was promising as treatment with Rutin reduced the deposition of IgA in the glomeruli of rats. Along with this we also tried to establish the probable mechanism of action of Rutin and based on the summary of the results it was concluded that Rutin reduced the inflammation and fibrosis related to IgA nephropathy by inhibiting the TGF-β/SMAD pathways and ultimately reducing the expression of α-SMA.

Keywords: *IgA nephropathy, TGF-β, SMAD, Fibrosis*

COL-e-003

Comparative efficacy of biofilm-targeted therapies versus conventional antibiotic therapy in the management of orthopedic infections: a prospective study- breaking the biofilm barrier

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Abstract

Background: Orthopedic infections affecting bones, joints, and implanted medical devices remain a serious clinical challenge. The persistence of these infections is largely associated with microbial biofilm formation, which protects bacteria from host immune responses and limits antibiotic penetration. As a result, conventional antibiotic therapy often fails to completely eradicate the infection, leading to recurrence and prolonged treatment. Recent therapeutic approaches focus on disrupting biofilms to enhance antimicrobial effectiveness and improve patient outcomes.

Methods: A prospective, open-label, parallel-group randomized controlled trial was conducted in the Orthopedic and Microbiology departments of a tertiary care teaching hospital. A total of 372 adult patients with clinically and microbiologically confirmed orthopedic infections, including osteomyelitis, prosthetic joint infection, and septic arthritis, were enrolled. Participants were randomized into two groups using block randomization (1:1). The control group received standard care consisting of surgical debridement and culture-guided systemic antibiotics, while the intervention group received standard care combined with biofilm-targeted therapy such as N-acetylcysteine or EDTA-based local treatments. Primary outcome was clinical resolution at 12 weeks, while secondary outcomes included microbiological clearance, biofilm detection, duration of hospitalization, and recurrence of infection.

Results: Among 372 screened patients, 186 with confirmed orthopedic infections were included and equally divided into targeted therapy and empirical therapy groups. The majority of patients were aged 41–60 years, with a higher proportion of males. Hypertension (38.7%) and diabetes mellitus (23.1%) were the most common comorbidities, while smoking and alcohol use were frequent lifestyle risk factors. Prosthetic joint infection was the predominant infection type (44.1%). Microbiological analysis revealed *Pseudomonas aeruginosa* (28%) and methicillin-resistant *Staphylococcus aureus* (24.2%) as the most common pathogens, with 68.8% of isolates demonstrating biofilm-producing ability. Vancomycin-based combination therapies were the most frequently used regimens. Over a 90-day follow-up period, significant

reductions in inflammatory markers were observed, with mean CRP decreasing from 80.2 to 15.7 mg/L and ESR from 76.0 to 23.9 mm/hr. Patients receiving biofilm-targeted therapy showed greater reductions in CRP and ESR and improved clinical outcomes compared with the non-targeted therapy group.

Conclusion: This study highlights the clinical and microbiological characteristics of orthopedic joint infections, with prosthetic joint infection being the most common presentation. Biofilm- forming pathogens, particularly *Pseudomonas aeruginosa* and methicillin-resistant *Staphylococcus aureus* (MRSA), were frequently isolated. Management commonly involved vancomycin-based antibiotic regimens and surgical interventions such as debridement and implant removal.

Keywords: *Orthopedic infections, Biofilm, Targeted therapy, Antibiotic resistance, Prosthetic joint infection.*

COL-e-004

In-vivo anti-inflammatory and analgesic evaluation of polymerassisted ibuprofen crystals in WISTAR rats

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Abstract

Ibuprofen is a widely used non-steroidal anti-inflammatory drug (NSAID) with analgesic and anti-inflammatory properties; however, its therapeutic effectiveness may be limited by poor aqueous solubility and slow dissolution. The present study aimed to evaluate the physicochemical characteristics and in vivo pharmacological activity of recrystallized ibuprofen formulations prepared using polymer-assisted crystallization. Ibuprofen crystals were prepared by ethanol recrystallization in the presence of polymer additives, including hydroxypropyl methylcellulose (HPMC) and Poloxamer 188. The prepared crystals were characterized using particle size analysis, scanning electron microscopy (SEM), differential scanning calorimetry (DSC), powder X-ray diffraction (PXRD), zeta potential measurement, and in vitro dissolution studies to assess changes in morphology, crystallinity, and surface properties. The recrystallized formulations exhibited reduced particle size, modified crystal morphology, and improved dissolution behavior compared with pure ibuprofen. The pharmacological activities of the formulations were evaluated in Wistar rats using carrageenan-induced paw edema and xyleneinduced ear edema models for anti-inflammatory activity, and hot plate and acetic acid-induced writhing tests for analgesic activity. Among the tested formulations, the IBU–Poloxamer 188 crystals demonstrated the highest inhibition of paw edema (40.85%) at 180 min and produced significant analgesic effects in both hot plate and writhing models. The xylene-induced ear edema model also showed improved anti-inflammatory activity for polymer-assisted crystals. Overall, the results suggest that polymer-assisted recrystallization modifies the physicochemical properties of ibuprofen crystals and enhances their pharmacological performance, likely due to improved dissolution and wettability.

Keywords: *Ibuprofen, Polymer-assisted crystallization, Anti-inflammatory activity, Analgesic activity, Wistar ratsKeywords: Ibuprofen, Polymer-assisted crystallization, Anti- inflammatory activity, Analgesic activity, Wistar rats*

COL-e-005

Exploring Molecular Mechanisms of 5-Hydroxy-2-(hydroxymethyl)-4H-pyran-4-one as a Cardioprotective Agent in Doxorubicin-Induced Cardiotoxicity: A Network Pharmacology, Molecular Docking, and Molecular Dynamic Simulation Study.

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Abstract:

Background: The clinical use of doxorubicin is limited due to its dose-dependent cardiotoxic effects. The 5-Hydroxy-2-(hydroxymethyl)-4H-pyran-4-one is a fungal metabolite commonly produced naturally by many *Aspergillus*, *Acetobacter*, and *Penicillium* species and has shown free radical scavenging activity. Free radical scavenging, antioxidant, and metal chelation activities were proven to be effective in ameliorating doxorubicin-induced cardiotoxicity (DIC) via various molecular mechanisms. Hence, the present study was undertaken to explore virtually the cardioprotective effect of 5-Hydroxy-2-(hydroxymethyl)-4H-pyran-4-one against DIC while deciphering its molecular mechanism using *In-silico* techniques such as network pharmacology, molecular docking, and molecular dynamic (MD) simulation.

Methods: Data mining for drug targets and DIC (disease-related) genes were performed using different online available databases. Gene Ontology was carried out using DAVID database. Protein-Protein Interaction (PPI) between the common targets and genes were constructed using the STRING database. Results were visualized using Cytoscape tool using various plug-ins. Molecular docking was performed using Pyrx tool. Whereas, MD simulation was performed for 100 ns using GROMACS.

Results: A total of 238 common Drug targets and Disease genes were identified. Gene Ontology showed Molecular Function (MF) related to double stranded DNA exodeoxyribonuclease activity and cysteine-type endopeptidase activity involved in execution phase of apoptosis.. Common hub genes obtained from various Cytoscape plug-ins revealed JUN, HIF1A, TP53, AKT1, NFKB1, and IL6. Molecular docking was performed on hub genes obtained from network pharmacology and literature search. Hub genes: AKT1, MAPK3, CAMK2B, HIF1A, NLRP3, IL6, IKKB, GSK3B, and SRC showed highest binding energies. MD simulation was performed for AKT1, MAPK3, CAMK2B, HIF1A, NLRP3, and IL6 for 100 ns; however, only IL6 and NLRP3 could withstand 100 ns simulation. The Root Mean Square Deviation (RMSD), Root Mean Square Fluctuation (RMSF), Radius of Gyration (Rg), Solvent Accessible Surface Area (SASA

Conclusion: 5-Hydroxy-2-(hydroxymethyl)-4H-pyran-4-one could virtually attenuate DIC through modulation of IL6 and NLRP3 inflammasome pathways, serving as a promising cardioprotective agent.

Keywords: *doxorubicin-induced cardiotoxicity, DIC, network pharmacology, docking, MD simulation.*

COL-e-006

Impact of Metabolic Acidosis on Bone Health, Muscle Strength, and Functional Capacity in Advanced CKD(CKD-5D): A Cross-Sectional Observational Study with Prospective Subset Analysis.

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Abstract:

Background: Metabolic acidosis is a common complication in advanced CKD (CKD-5D) and often persists despite hemodialysis, contributing to muscle dysfunction, impaired physical performance, and altered bone metabolism. Serum bicarbonate variability reflects instability in acid–base homeostasis and may affect clinical outcomes. However, its combined impact on musculoskeletal health and functional capacity in dialysis patients remains poorly understood.

Methods: This cross-sectional observational study with a prospective subset analysis included adult CKD-5D patients (18–65 years) on maintenance hemodialysis (>3 months) with pre-dialysis serum bicarbonate <22 mEq/L. Serum bicarbonate was measured using venous samples, and variability was assessed in a subset with serial measurements. Muscle strength was evaluated using handgrip dynamometry, and functional capacity using the Short Physical Performance Battery (SPPB). Bone health was assessed using body composition monitoring along with calcium, phosphorus, and iPTH levels. Patients were categorized into severe (<18 mEq/L) and mild (18–22 mEq/L) metabolic acidosis groups.

Results: Serum bicarbonate levels demonstrated considerable variability, with relatively higher and more stable levels observed in patients undergoing thrice-weekly dialysis. No significant differences in handgrip strength or SPPB scores were observed between groups. Correlation analysis showed no consistent association between bicarbonate levels and functional measures. A substantial proportion of patients exhibited low bone mass; however, no direct association with bicarbonate was observed. Significant correlations were noted between bone mass and calcium-phosphorus parameters in patients with reduced bone mass.

Conclusion: Metabolic acidosis in CKD-5D shows significant bicarbonate variability but no consistent association with muscle strength or functional capacity. Bone health alterations appear more closely related to mineral metabolism, highlighting the need for comprehensive evaluation of acid–base status and systemic effects.

Keywords: *Chronic Kidney Disease, Metabolic Acidosis, Serum Bicarbonate, Hemodialysis*

COL-e-007

Efficacy and safety of CFTR modulators combination therapy in patients with cystic fibrosis for F508DEL-CFTR mutation: a systematic review and meta-analysis.

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Abstract

Objective: To Determine the Efficacy and Safety of CFTR Modulators Combination Therapy in Patients with Cystic Fibrosis for the F508del-CFTR Mutation: A Systematic Review and

Meta-analysis.

Methods: The following databases were searched extensively: PubMed/Medline, Clinical trials.gov, Scopus, and Embase using the keywords: “Ivacaftor”, “Elexacaftor”, “Tezacaftor”, “VX_661”, “VX_770”,“VX_445”,“cystic fibrosis”. A total seven out of 42 randomized clinical trials were included in our analysis that compared the use of Triple combination therapy in individuals with CF and at least one F508del Mutation with that of placebo or with an active comparator such as other combinations of CFTR modulators. Primary outcomes included Absolute change in predicted FEV1 from baseline, sweat chloride levels & CF-QR from baseline. Secondary outcomes included AE & SAEs. The risk of bias was assessed using the Cochrane risk-of-bias tool.

Results: Primary findings Shows significant absolute change in predictive FEV1 from baseline favoured the triple CFTR protein modulators. (MD 10.10, 95% CI 7.72 – 12.49, p-value = <0.00001) and the absolute change in sweat chloride from baseline (MD -37.80, 95%CI -43.26, -32.35) as well as CF_QR score (MD 14.19, 95% CI 10.35-18.04, p value<0.0001) also Favours the triple combination therapy. Adverse events differ minimally between groups (RR 0.9581, 95% CI 0.9140-1.0043)

Conclusion: In children ≥ 6 years old and adolescents with the F508del_CFTR mutation, Elexacaftor- Tezacaftor-Ivacaftor shows greater efficacy than placebo or other active comparators. It significantly improves FEV1 levels, lowers sweat chloride levels, and enhances respiratory-related quality of life.

Keywords: *Cystic fibrosis; CFTR; Ivacaftor; Elexacaftor; Tezacaftor*

COL-e-008

Role of oxidative stress and neuroinflammation in the progression of Parkinson’s disease

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Abstract

Due to the progressive loss of dopaminergic neurons in the substantia nigra, Parkinson's disease (PD) is a long-term neurodegenerative condition that mostly impairs mobility. Affected people's quality of life is greatly impacted by symptoms like tremors, muscle stiffness, and delayed movements. The involvement of oxidative stress and neuroinflammation in the development of this illness has drawn more attention in recent years. An imbalance between the body's natural antioxidant defenses and the generation of reactive oxygen species (ROS) leads to oxidative stress. Important biological components including lipids, proteins, and DNA are harmed by this imbalance. By producing more dangerous free radicals, mitochondrial dysfunction exacerbates this disease and increases the susceptibility of neurons to degeneration. In addition, neuroinflammation has a role in the advancement of the illness Immune cells like microglia and astrocytes get activated and release inflammatory compounds like TNF-α, IL-1β, and IL-6 when brain cells are harmed. Neuronal damage is accelerated by

the hazardous environment these inflammatory mediators produce. Furthermore, oxidative stress and inflammation are further linked by the build-up of α-synuclein, creating a cycle that encourages ongoing neurodegeneration.

In summary, oxidative stress and neuroinflammation cooperate to accelerate Parkinson's disease (PD). By focusing on these mechanisms, it may be possible to improve patient outcomes and reduce the advancement of the disease.

Keywords: *Parkinson's Disease, Oxidative Stress, Neuroinflammation, Reactive Oxygen Species, Dopaminergic Neurons, α-Synuclein, Mitochondrial Dysfunction, Neurodegeneration.*

COL-e-009

Role of oxidative stress in schizophrenia: therapeutic potential of antioxidants

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Abstract

Cognitive, perceptual, and behavioral abnormalities are hallmarks of schizophrenia, a severe and long-lasting neuropsychiatric illness. A growing body of research indicates that oxidative stress is a key factor in its pathogenesis. Neuronal damage, mitochondrial malfunction, and decreased neurotransmission result from an imbalance between the generation of reactive oxygen species (ROS) and the antioxidant defense mechanism. Increased oxidative stress is intimately linked to NMDA receptor hypofunction, which contributes to interneuron loss and cognitive difficulties seen in schizophrenia. The purpose of this research is to assess how oxidative stress contributes to schizophrenia and investigate the possible therapeutic benefits of antioxidants. Increased ROS levels and decreased antioxidant defenses, including as glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT), are shown in experimental models of schizophrenia, which are frequently brought on by NMDA receptor antagonists like ketamine. By scavenging free radicals, reestablishing redox equilibrium, and enhancing mitochondrial activity, antioxidant compounds—including naturally occurring phytochemicals—have demonstrated encouraging neuroprotective benefits. Antioxidant therapy has also been shown to improve behavior in the social and cognitive areas. In summary, Antioxidant treatment, which targets oxidative pathways, is a promising and new approach to improving therapeutic outcomes. To determine long-term efficacy and convert these discoveries into therapeutic applications, more investigation is needed.

Keywords: *Schizophrenia, Oxidative Stress, Antioxidants, NMDA, ROS, Neuroprotection*

COL-e-010

Cross-Sectional Analysis of Rheumatoid Arthritis: Joint Involvement, Pain Severity, and Effects of Antirheumatic Drugs on Liver Enzymes

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Abstract

Rheumatoid arthritis (RA) is a chronic autoimmune disorder primarily affecting synovial joints, leading to pain, inflammation, and progressive functional disability. The disease-

modifying antirheumatic drugs (DMARDs) form the mainstay of treatment; however, their potential hepatotoxic effects require regular monitoring and clinical vigilance. This study presents a multidimensional cross-sectional observational analysis of RA patients, focusing on joint involvement, pain severity, and the impact of DMARDs on serum glutamate pyruvate transaminase (SGPT) levels.

Methods: A total of 123 RA patients aged 30–70 years were studied at Pandit Dindayal Upadhyay Hospital. Data was collected through structured clinical assessments and detailed patient history, analyzing joint involvement, pain severity using the RAPID-3 scale, and SGPT levels for hepatotoxicity monitoring.

Results: Findings reveal a predominant involvement of small joints, particularly in the hands and feet, in a symmetrical distribution pattern. Pain severity correlated significantly with joint count, impacting daily functional ability and quality of life. DMARD therapy, particularly methotrexate, showed a dose-dependent increase in SGPT levels, indicating potential hepatotoxicity in some patients. A greater proportion of RA cases were observed in females (89%) compared to males (11%).

Conclusion: The study underscores the importance of early RA detection, personalized treatment strategies, and vigilant monitoring of liver function during DMARD therapy. Incorporating pharmacovigilance practices and risk stratification approaches may further enhance therapeutic safety. Further longitudinal studies are needed to explore long-term outcomes, refine treatment protocols, and minimize hepatotoxic risks while maintaining therapeutic efficacy.

Key words *- Rheumatoid Arthritis, Pain Severity, synovial joints.*

COL-e-011

QT Prolongation Risks in HFpEF: The Next Frontier in Cardiotoxicity

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Abstract:

Heart failure with preserved ejection fraction (HFpEF) has emerged as the predominant phenotype of heart failure globally, largely due to aging populations and the rise cardiometabolic diseases. Once considered primarily a mechanically driven disorder characterized by impaired ventricular relaxation, HFpEF is now understood as a complex multisystem syndrome encompassing structural, metabolic, inflammatory, and electrophysiological abnormalities. Among these emerging aspects, QT interval prolongation has garnered significant clinical attention as an indicator of delayed ventricular repolarization and arrhythmic vulnerability. QT prolongation is an integratedmanifestation of myocardial remodeling, autonomic imbalance, ion channel dysfunction, electrolyte disturbances, and pharmacological exposure. Increasing clinical evidence indicates that patients with HFpEF exhibit heightened susceptibility to both spontaneous and drug-induced QT prolongation compared to individuals without heart failure. Despite preserved systolic function, these patients frequently experience ventricular arrhythmias and sudden cardiac death. This comprehensive review synthesizes current mechanistic, clinical, and pharmacological evidence linking HFpEF QT prolongation.

COG-e-001

Chemical Profiling of *Mangifera indica* Leaf and *Mucuna pruriens* Seed Extracts: A Phytochemical and Gas Chromatography-Mass Spectrometry-Based Study

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Abstract-

Background: Medicinal plants remain an essential source of therapeutic agents due to their abundant phytochemicals and pharmacological properties. *Mangifera indica* (mango) leaves and *Mucuna pruriens* (velvet bean) seeds are widely recognized in traditional medicine for their antioxidant and neuroprotective effects. Scientific validation of their bioactive constituents is necessary to support their medicinal applications.

Objectives: This study aimed to authenticate, extract, and chemically profile *M. indica* leaves and *M. pruriens* seeds and to evaluate their antioxidant potential.

Methods: Authenticated plant materials were extracted using ethanol in a Soxhlet apparatus. Preliminary phytochemical screening was performed to identify major secondary metabolites. Antioxidant activity was assessed using the DPPH radical scavenging assay. Bioactive compounds were identified using gas chromatography-mass spectrometry (GC-MS).

Results: Phytochemical screening revealed alkaloids, flavonoids, tannins, phenols, saponins, and terpenoids in both extracts. The DPPH assay demonstrated concentration-dependent radical scavenging activity. GC-MS analysis identified several compounds in *M. indica* including thymol, α-farnesene, β-farnesene, and oxalic acid derivatives. *M. pruriens* seeds contained ethyl undecanoate, ethyl decanoate, methyl 2-methyloctanoate, ethyl 10-bromodecanoate, and 2-ethylheptanoic acid, compounds known for antifungal, antibacterial, and anticonvulsant properties.

Conclusion: The findings demonstrate the phytochemical richness and antioxidant potential of *Mangifera indica* leaves and *Mucuna pruriens* seeds. These results support their traditional medicinal use and provide a scientific basis for further pharmacological investigation.

Keywords: Mangifera indica, Mucuna pruriens, *phytochemical screening, GC-MS, antioxidant activity*

COG-002

An Integrative Review of Da-al-Sa'lab (Androgenic Alopecia): Unani Perspectives and Contemporary Therapeutic Insights

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Abstract

Background: Androgenic Alopecia (AGA) is a chronic androgen-dependent condition characterized by progressive follicular miniaturization and patterned hair loss, often associated with significant psychosocial burden. Conventional therapies primarily target dihydrotestosterone pathways but are limited by variable efficacy and adverse effects. The

Unani system of medicine offers a holistic framework based on humoral balance and temperament (*Mizaj*), providing an alternative paradigm for disease understanding and management.

Objective: To systematically synthesize classical Unani literature with contemporary scientific insights to elucidate the etiopathogenesis and therapeutic strategies for *Da-al-Sa'lab* and assess its relevance in integrative dermatology.

Methods: A qualitative review of classical texts, including *Al-Qanoon fi al-Tibb* by Ibn Sina and *Kitab al-Hawi* by Al-Razi, was conducted alongside modern literature. Keywords such as *Sa'lab*, *Indifa-e-Sha'r*, and *Muzat-e-Sha'r* guided the selection. Emphasis was placed on pharmacological agents with *Muqawwi* (tonic) and *Muwallid* (regenerative) properties.

Results: Unani scholars attribute AGA to *Su-e-Mizaj* (temperamental imbalance), particularly involving *Sauda* (black bile) and *Balgham* (phlegm), leading to follicular dysfunction. Management follows a three-tier approach: (i) *Tanqiya-e-Badan* (systemic detoxification), (ii) *Tadeel-e-Mizaj* (restoration of humoral equilibrium), and (iii) *Ilaj-bil-Dawa wa Tadbeer* (pharmacotherapy and regimenal therapy). Herbal agents such as *Emblica officinalis* and *Nigella sativa* exhibit antioxidant and follicle-stimulatory effects. Regimenal therapies including massage and cupping enhance scalp circulation and follicular nourishment.

Conclusion: The Unani approach provides a comprehensive systems-based strategy addressing both systemic and local factors in AGA. Integrating traditional knowledge with modern clinical validation may offer safe, effective, and sustainable therapeutic alternatives for hair loss management.

Keywords: *Androgenic alopecia, Unani medicine, Da-al-Sa'lab, Su-e-Mizaj, hair regeneration, integrative dermatology*

COG-e-003

Unlocking the Therapeutic Potential of *Ipomoea staphylina* Root: Pharmacognostic, Phytochemical, and Antioxidant Insights

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Abstract

Background: *Ipomoea staphylina* is a medicinal plant traditionally used in herbal medicine systems. However, detailed scientific data regarding the pharmacognostic profile, phytochemical composition, and antioxidant potential of its root remains limited.

Objective: To investigate the pharmacognostic characteristics, extractive yield, phytochemical constituents, and antioxidant activity of *Ipomoea staphylina* root extract.

Methods: Shade-dried root powder was extracted with ethanol using Soxhlet extraction. Preliminary phytochemical screening was carried out using standard qualitative methods. Pharmacognostic evaluation included organoleptic characteristics, ash values, and fluorescence analysis under UV light (254 nm and 365 nm). Antioxidant activity was assessed using the DPPH free radical scavenging assay and expressed as gallic acid equivalent antioxidant capacity.

Results: The ethanol root extract showed a yield of 5.77 ± 0.07% w/w. Phytochemical analysis revealed a strong presence of tannins, phenolics, flavonoids, and terpenoids; moderate presence of carbohydrates and alkaloids; and weak presence of proteins. Saponins, glycosides, cardiac glycosides, and steroids were absent. Pharmacognostic analysis identified a fibrous root with light dull brown color and characteristic fruity odor. Ash values were recorded as total ash 5.69 ± 0.12%, acid-insoluble ash 1.73 ± 0.02%, and water-soluble ash 0.15 ± 0.14%. The extract exhibited significant antioxidant activity with 94.81% DPPH scavenging and 111.79 ± 0.01 mg GAE/g antioxidant capacity.

Conclusion: The root of *Ipomoea staphylina* is a promising source of bioactive phytoconstituents with notable antioxidant potential. The established pharmacognostic standards may support proper identification, authentication, and quality control of the crude drug, while the antioxidant findings justify further phytochemical and pharmacological investigations.

Keywords: Ipomoea staphylina*, pharmacognosy, phytochemical screening, antioxidant activity, DPPH assay*

COG-004

Anti-Prostaglandin and Cyclooxygenase Inhibiting Effect of Herbal Plant in Dysmenorrhea: A Unani Review

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Abstract

Dysmenorrhea is defined as painful menstruation of sufficient severity to interfere with normal daily activities. In the Unani system of medicine, scholars such as Ibn Sina, Razi, Jurjani, Buqrat, and Ajmal Khan described dysmenorrhea under terms including *Usr Tamas*, *Waja ul Rahem*, *Diqqat-e-Hayd*, and *Qillat-e-Hayd*. The most commonly used term is *Usr Tamas*, which is attributed to *Sū'-i-Mizāj* (temperamental imbalance) in the uterus, leading to weakness of *Quwwat Dāfi'a* (expulsive power), vascular congestion, reduced menstrual blood flow, and uterine pain.

Clinically, dysmenorrhea presents as cyclic cramping pain in the lower abdomen, often associated with back pain, leg pain, sweating, tachycardia, headache, nausea, vomiting, restlessness, and giddiness during menstruation. It significantly affects women's quality of life and contributes to economic burden through healthcare costs and reduced productivity. The principal pathophysiological mechanism involves increased prostaglandin synthesis through the cyclooxygenase (COX) pathway, resulting in myometrial hyperactivity, vasoconstriction, ischemia, and pain. Pain relief may be achieved using medicinal plants possessing cyclooxygenase inhibitory and anti-prostaglandin properties. In Unani medicine, herbs such as *Achillea millefolium* (Branjasif), *Commiphora myrrha* (Murmaki), *Mentha arvensis* (Podina), *Foeniculum vulgare* (Badiyan), *Ferula foetida* (Hing), *Alpinia officinarum* (Kulanjan), *Glycyrrhiza glabra* (Aslusoos), *Vitex agnus-castus* (Sambhalu), and *Cinnamomum camphora*

(Kafoor) are traditionally used in painful menstruation. These herbs exhibit antispasmodic (*Dafa-i-Tashannuj*), anti-inflammatory (*Muhallil-i-Awram*), analgesic (*Musakkin*), and emmenagogue (*Mudir-i-Hayd*) actions. Recent studies support the use of these herbal plants in dysmenorrhea due to their anti-prostaglandin and cyclooxygenase inhibitory activities. This evidence-based review highlights the therapeutic role of selected medicinal plants in the management of dysmenorrhea.

Keywords: Anti-prostaglandin, cyclooxygenase, dysmenorrhea, herbal plants, Unani system

COG-005

Pharmacological and therapeutic potential of sharbat banafsha in the management of asthma (diq al-nafas): a narrative review

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Abstract

Background/Introduction: Asthma (Diq al-Nafas) is a chronic inflammatory airway disease characterized by recurrent episodes of breathlessness and wheezing due to reversible airway obstruction. Globally, it affects millions, with a significant burden in India. While conventional therapies such as bronchodilators and corticosteroids are effective, their long-term use raises safety concerns, prompting exploration of alternative therapeutic systems.

Objectives: This review aims to evaluate the pharmacological and therapeutic potential of Sharbat Banafsha, a classical Unani formulation, in the management of asthma based on traditional literature and modern scientific evidence.

Methods: A narrative review approach was employed by analyzing classical Unani texts alongside contemporary pharmacological and clinical studies focusing on Viola odorata, the principal ingredient of Sharbat Banafsha.

Results: Sharbat Banafsha exhibits multiple therapeutic properties, including expectorant, concoctive, and mild laxative effects. Pharmacological studies indicate that Viola odorata possesses anti-inflammatory, bronchodilatory, and antimicrobial activities. Clinical observations suggest improvement in respiratory symptoms and lung function, supporting its traditional use in managing asthma.

Conclusion: Sharbat Banafsha demonstrates promising therapeutic potential as a complementary approach in asthma management. Integrating traditional Unani formulations with modern medicine may enhance patient outcomes and provide safer long-term alternatives, particularly in the context of increasing antimicrobial resistance and chronic disease burden.

COG-006

Traditional Approaches to Dysentery: Role of Unani Medicine in Public Health

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Abstract

Background/Introduction: Dysentery is a severe form of diarrheal disease characterized by the presence of blood and mucus in stools, contributing significantly to morbidity and mortality in developing countries. Factors such as poor sanitation, contaminated water, overcrowding, and limited access to healthcare exacerbate its prevalence. The condition is commonly caused by bacterial pathogens such as *Shigella* species and protozoa like *Entamoeba histolytica*.

Objectives: This study aims to explore the role of Unani medicine as a complementary approach in the management of dysentery, with a focus on its relevance in public health settings.

Methods: A narrative review of classical Unani texts and contemporary literature was conducted to analyze traditional treatment principles and therapeutic interventions for dysentery.

Results: Unani medi cine offers a holistic framework for dysentery management through Ilaj bil Tadbir (regimental therapy), Ilaj bil Ghiza (dietotherapy), and Ilaj bil Dawa (pharmacotherapy). Several classical herbal formulations are reported to alleviate gastrointestinal symptoms, improve digestion, and restore intestinal balance. These approaches may also help reduce reliance on conventional antimicrobial agents.

Conclusion: Dysentery continues to be a major public health challenge, particularly with rising antimicrobial resistance. Integrating Unani medicine with modern therapeutic strategies may provide a safe and effective complementary approach, though further validation through rigorous scientific research is essential.

Keywords: *Dysentery, Diarrheal disease, Zahir, Public health, Unani Medicine*

COG-007

Unani neuroprotective therapeutics for nisyān (amnesia): a review

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Abstract

Background/Introduction: Amnesia (Nisyān in Unani medicine) is characterized by partial or complete loss of memory and is commonly associated with neurodegenerative disorders such as Alzheimer's disease, traumatic brain injury, and cerebrovascular events. It may manifest as anterograde, retrograde, or transient global amnesia, significantly affecting quality of life. Increasing prevalence in aging populations highlights the need for effective and safe

therapeutic approaches.

Objectives: This review aims to explore Unani neuroprotective therapeutics for the management of Nisyān, emphasizing traditional concepts and their relevance to modern neurodegenerative conditions.

Methods: A narrative review of classical Unani literature and contemporary scientific studies was conducted to evaluate the pathophysiology, classification, and therapeutic interventions for amnesia.

Results: In Unani medicine, Nisyān is attributed to disturbances in Quwwat-i-Hafiza (memory), Quwwat-i-Mufakkira (thinking), and Quwwat-i-Takhayyul (imagination), often linked to imbalances in temperament such as Burūdat, Rutūbat, and Yubūsat. Therapeutic strategies include Ta'dil-i-Mizaj (temperament correction), Tanqiya-i-Dimagh (brain detoxification), and the use of Muqawwi-i-Dimagh (cerebrotonic) drugs. Herbal agents such as *Lavandula stoechas*, *Bacopa monnieri*, *Acorus calamus*, and *Phyllanthus emblica* demonstrate antioxidant and neuroprotective properties.

Conclusion: Unani therapeutics offer a promising complementary approach for managing amnesia through holistic and neuroprotective mechanisms. However, further well-designed clinical and pharmacological studies are essential to validate their efficacy and integrate them into evidence-based practice.

Keywords: *Amnesia, Nisyān, Cerebrotonic, Neuroprotective, Antioxidant*

COG-008

Therapeutic potential of some plant seeds in unani medicine for the management of skin disorders

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Abstract

Background/Introduction: Plants and herbal remedies have been integral to human healthcare since ancient times, with plant seeds playing a significant role due to their nutritive and therapeutic properties. Skin diseases contribute substantially to global morbidity, ranking among the leading causes of non-fatal disease burden worldwide.

Objectives: This review aims to evaluate the therapeutic potential of selected plant seeds used in Unani medicine for the management of various skin disorders.

Methods: A narrative review of classical Unani texts and contemporary scientific studies was conducted to identify commonly used plant seeds and assess their pharmacological properties in dermatological conditions.

Results: In Unani medicine, plant-derived drugs constitute a major proportion of therapeutic agents, with seeds being widely utilized for treating skin, liver, and kidney disorders. Seeds such as *Psoralea corylifolia*, *Azadirachta indica*, *Ammi majus*, *Lawsonia inermis*, *Cassia tora*, *Brassica nigra*, *Nigella sativa*, and *Cucumis melo* exhibit beneficial effects in conditions like vitiligo, alopecia areata, melasma, pityriasis, nevi, and acne vulgaris. Their therapeutic efficacy is attributed to properties such as blood purification, detergent action, anti-inflammatory effects, and antimicrobial activity. Scientific studies further support their effectiveness in improving skin health.

Conclusion: Plant seeds used in Unani medicine demonstrate significant therapeutic potential in managing skin disorders. Their accessibility, efficacy, and traditional relevance make them valuable candidates for integrative dermatological care, although further evidence-based research is necessary to validate their clinical applications.

Keywords: *Baras, Da'al-sha'lab, Jali, Unani medicine*

COG-009

Adwiya mu'atadila in unani medicine: an individualized and humour specific approach to disease management

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Abstract

BACKGROUND: The Unani system of medicine is fundamentally based on the concept of mizaj (temperament) and the balance of *akhlāt* (humours), namely *dam* (blood), *balgham* (phlegm), *ṣafrā'* (yellow bile), *sawdā* (black bile). Human body constitute all the humours and their temperament is based on the predominant humour, termed as *damwī* (sanguineous), *balghamī* (phlegmatic), *ṣafrāwī* (bilious), and *sawdāwī* (melancholic). Humours mixed in balanced proportions, both in quantity and quality, constitute health and their derangement and irregular distribution in quantity or quality, causes disease.

OBJECTIVE: This review aims to elucidate the concept of Adwiya Mu'atadila (humourmodulating drugs) and their role in management of humoural derangements, highlighting the distinct Adwiya Mu'atadila are indicated for specific altered humour. These agents facilitate the tadeel (equilibrium or alteration) of the affected humour, thereby contributing to the resolution of disease.

METHOD: Classical Unani texts were systematically reviewed for conceptual understanding of adwiya mu'atadila. The correlation between alteration in individual humours and their targeted management through adwiya mu'atadila was subsequently analyzed. Electronic databases such as PubMed, ScienceDirect, Google Scholar, Web of Science were searched for studies reporting on humoural imbalances, and relevant therapeutic interventions.

RESULT: Diseases were found to arise from specific alteration in dam, balgham, safra and sauda. Adwiya mu'atadila described in classical unani literature are responsible for correction of specific humoural derangements. These agents act by facilitating the expulsion of *fāsid akhlāṭ* (morbid humours) through istifrāgh (evacuation) from the body. This helps in restoring the normal homeostasis of humours.

CONCLUSION: In conclusion, this review establishes a clear correlation between humoural derangements and their targeted management through adwiya mu'atadila. These humour-modulating agents facilitate tadeel by correcting altered humours, thereby supporting a rational and individualizd approach to disease management in Unani medicine.

COG-e-010

Advancing Natural Product-Based Gastroprotection: A Bioactive Flavonoid Attenuates Serotonin-Induced Gastric Ulcers in Rats via Antioxidant and Anti-Inflammatory Pathways

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Abstract:

Gastric ulcers continue to pose a major therapeutic challenge due to their multifactorial Etiology, including oxidative stress and inflammation triggered by endogenous mediators such as serotonin. The present investigation evaluates the gastroprotective efficacy of a plantderived bioactive flavonoid in a serotonin-induced gastric ulcer model in rats, with emphasis on its underlying antioxidant and anti-inflammatory actions. Animals were pretreated with the test compound prior to ulcer induction, followed by comprehensive assessment of gastric damage. Macroscopic evaluation revealed a substantial reduction in ulceration and haemorrhagic lesions in flavonoid-treated groups compared to untreated controls. Biochemical analyses demonstrated a significant attenuation of oxidative stress, as indicated by decreased lipid peroxidation levels and enhanced activity of endogenous antioxidant systems. In parallel, the flavonoid markedly suppressed inflammatory responses, evidenced by the downregulation of key pro-inflammatory mediators. Histological examination further confirmed the protective effect, showing improved mucosal architecture, reduced epithelial disruption, and minimal inflammatory cell infiltration in treated animals. These findings suggest that the gastroprotective activity of the bioactive flavonoid is mediated through a dual mechanism involving reinforcement of antioxidant defences and modulation of inflammatory pathways. Furthermore, the treatment exhibited a dose-dependent protective response, indicating its pharmacological consistency and potential therapeutic reliability. The observed effects were comparable with standard gastroprotective agents, supporting its translational relevance in ulcer management. Importantly, no significant adverse effects were observed during the study, suggesting a favorable safety profile of the bioactive compound. Overall, the study provides compelling evidence supporting the potential of natural bioactive compounds in the management of gastric ulcers. The results align with current efforts to advance natural product-based therapeutics and highlight their relevance in addressing global gastrointestinal health challenges through innovative pharmacological strategies.

Keywords: *Bioactive flavonoid; Gastric ulcer; Serotonin-induced ulcer model; Gastroprotection; Oxidative stress; Anti-inflammatory activity*

COG-009

Unani Therapeutic Interventions in Type 2 Diabetes Mellitus (Ziabetus Shakri): Mechanistic Insights and Non-Communicable Disease Management

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Abstract:

Background: Non-communicable diseases (NCDs), including diabetes mellitus, cardiovascular disorders, and hypertension, pose a major global health challenge. Type 2 Diabetes Mellitus (Ziabetus Shakri) is particularly prevalent and requires long-term management strategies. The Unani system of medicine, based on humoral theory, emphasizes holistic care through lifestyle modification, pharmacotherapy, and regimental therapies. Integrating traditional knowledge with modern biomedical insights may offer complementary approaches to diabetes management.

Methods: This review draws on classical Unani literature and contemporary pharmacological studies to evaluate therapeutic interventions for Type 2 Diabetes Mellitus. Key herbal drugs, compound formulations, and regimental therapies were analyzed for their hypoglycemic potential and mechanistic pathways. Evidence was synthesized to highlight overlaps between Unani principles and modern molecular targets.

Results: Unani drugs such as *Gymnema sylvestre* (Gurmar), *Azadirachta indica* (Neem), *Aloe vera* (Sibr), *Eugenia jambolana* (Jamun), and *Trigonella foenum-graecum* (Fenugreek) demonstrate hypoglycemic activity. Compound formulations including Qurse Dhayabitus, Qurse Tabasheer, Safoof Gilo, Qurs Marwareed, Qurse Gulnar, Dawaul Misk Talkh, Sharbate Afsanteen, Roghane Qusht, and Ma-Us-shaeer are traditionally prescribed for diabetes. Mechanistically, these interventions enhance insulin secretion, improve insulin sensitivity, inhibit intestinal glucose absorption, and reduce oxidative stress. Regimental therapies such as exercise (Riyazat) and detoxification (Tanqiya) further support metabolic balance. Modern studies suggest that Unani formulations act by modulating AMP-activated protein kinase (AMPK), peroxisome proliferator-activated receptors (PPARs), and inflammatory cytokines, thereby bridging traditional practice with biomedical science.

Conclusion: Unani medicine provides a multi-targeted, patient-centered approach to managing Type 2 Diabetes Mellitus. Emerging evidence supports its efficacy and mechanistic basis, highlighting its potential as a complementary strategy in NCD management. Rigorous clinical trials and molecular studies are needed to validate and integrate these therapies into mainstream healthcare.

Keywords: *Unani medicine, Type 2 Diabetes Mellitus, Ziabetus Shakri, hypoglycemic agents, regimental therapy, AMPK, PPAR, oxidative stress, complementary medicine, non-communicable diseases*

COG-009

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Keywords: *Unani medicine, Type 2 Diabetes Mellitus, Ziabetus Shakri, hypoglycemic agents, regimental therapy, AMPK, PPAR, oxidative stress, complementary medicine, non-communicable diseases*

COG-011

PHENOTYPING OF INTRAVENOUS FLUID THERAPY IN CRITICAL CARE UNIT PATIENTS AND ITS IMPACT ON CLINICAL OUTCOMES

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Keywords: *Critical care, IV fluid therapy, hydration status, fluid balance, mortality*

Background/Introduction Intravenous fluid therapy is a cornerstone of management in critically ill patients admitted to the Critical Care Unit (CCU). However, inappropriate fluid administration can lead to fluid overload or dehydration, significantly affecting patient outcomes. Phenotyping of IV fluid therapy based on individual hydration status is an emerging approach to optimise fluid management and improve prognosis.

Objectives This study aimed to phenotypically characterise intravenous (IV) fluid therapy in CCU patients and to evaluate the impact of hydration status, fluid balance, and related parameters on morbidity and mortality.

Methods A prospective observational study was conducted on 250 critically ill patients admitted to the CCU. Day-wise data of IV fluids administered, laboratory investigations (CBC, LFT, electrolytes, ABG), fluid balance, and vital signs were recorded and analysed. Patients were categorised based on hydration status at admission and discharge as well as their fluid therapy needs. Additional parameters including B-lines on lung ultrasound, Sequential Organ Failure Assessment (SOFA) scores, and inferior vena cava (IVC) variability trends were assessed for their association with prognosis. Statistical analysis was performed using Jamovi software version 2.6.44.

Results Significant variations in hydration status and fluid balance were observed across patients. Fluid overload showed a strong correlation with increased mortality and elevated SOFA scores. B-lines were associated with lung congestion and prolonged CCU stay. Patients with optimal hydration demonstrated better clinical outcomes, shorter length of stay (LoS), and lower mortality rates. Distinct phenotyping patterns of IV fluid usage were identified that influenced patient prognosis. Morbidity assessment was limited due to multiple confounding factors.

Conclusion IV fluid therapy management plays a crucial role in determining prognosis in critical care. Fluid overload is strongly linked to adverse outcomes. Phenotyping of IV fluid therapy and precise monitoring of hydration status can help optimise treatment strategies, reduce complications, and improve patient survival.

PP-001

A prospective observational study on prescription audits in general medicine department of a tertiary care teaching hospital

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Background: Irrational prescriptions can lead to inappropriate use of drugs which can have an ill effect on the health of the patient as well as increases the healthcare expenditure. Prescription audit is a systematic and critical analysis of prescriptions. WHO core prescribing indicators are established and trustworthy tool for assessing the quality of prescriptions.

Aim and objective: To carry out prescription audit in the General Medicine department of a tertiary care teaching hospital and to assess the WHO core prescribing indicators.

Methods: A prospective observational study was done. A total of 151 out- patient prescriptions were collected in the General Medicine Department in a span of 3 months. The collected data was entered in the data collection form. The hospital Essential Medical List (EML) was referred. The prescription audit parameters were assessed and WHO Core Prescribing Indicators were calculated. Descriptive analysis of data was done and represented in the form of tables, pie-charts, graphs.

Results: The total number of drugs in all prescriptions were 557. 88.7% of prescriptions were found to be legible. Polypharmacy occurred in 28.4% of prescriptions. The WHO core prescribing indicators were calculated, average number of drugs per prescription was 3.68, 50.80% drugs were prescribed by generic name, 23.84% prescriptions include antibiotics, 5.29% prescriptions included an injectable, 88.15% drugs in all prescriptions were prescribed from the hospital EML.

Conclusion: The average number of drugs per prescription was found to be higher due to polypharmacy. Percentage of drugs prescribed by generic name was found to be less than the desired value. The hospital Essential Medicine List was not completely adhered. The study highlights the need to write rational prescriptions adhering to WHO guidelines and to carryout regular prescription audits to assess the quality of prescriptions.

Keywords: *Prescription Audit, Essential Medicines, Polypharmacy*

PP-002

Pharmacy to healthcare management: strategy, technology and value based care

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Healthcare management is a branch of knowledge that deals with managing healthcare organizations. Healthcare management is dynamic since healthcare professionals are always trying to keep up with changes in the industry such as increased healthcare costs, growing aging populations, and patient demands. This is a brief overview of concepts in healthcare management emphasizing the importance of having strategic plans, allocating resources, and implementing quality improvement measures. The introduction of value-based healthcare delivery systems and technology in the healthcare system has changed the conventional approaches that healthcare leaders and managers use in their roles.

Collaborations and effective communications between various teams are essential components of efficient health management. Besides, using data analytics and using Artificial Intelligence to analyse data which further helps in making decisions has become an important factor in healthcare management. Ethical issues and healthcare policy compliance are equally essential in ensuring that the quality of healthcare provided to the clients meets required standards. Skilled healthcare managers should be prepared to continually improve themselves to adjust to any change in healthcare policies or technologies. The role of healthcare management is significant in creating effective healthcare systems. New approaches and competent leadership in healthcare management can help overcome some healthcare issues and improve health outcomes.

Keywords: *Healthcare management, value-based care, strategic planning, Artificial intelligence, data analytics*

PP-003

Cost-Effectiveness Analysis of Generic versus Brand-Name Medications in the Management of Type 2 Diabetes in India

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Background: Over 101 million people in India suffer from type 2 diabetes mellitus (T2DM), which is a major public health and financial burden. To ensure equitable patient access to viable treatment alternatives, optimize healthcare spending, and drive sensible drug policy, pharmacoeconomic evaluation of antidiabetic medications is essential.
Goal: To do a cost-effectiveness analysis (CEA) comparing brand-name and generic antidiabetic drugs for T2DM patients in an Indian healthcare context in order to achieve glycemic control.
Methods: Over the course of a year, 200 T2DM patients who were enrolled in a tertiary care hospital participated in a retrospective observational study. Patients were divided into groups based on brand-

name and generic medications. HbA1c decrease, fasting blood glucose levels, and the frequency of hypoglycemic episodes were used to evaluate clinical outcomes. Hospitalization, medication acquisition, and monitoring were all included in the computation of direct medical expenditures. To compare therapeutic value, the Incremental Cost-Effectiveness Ratio (ICER) was calculated.
Results: At substantially lower prices (₹4,200 vs. ₹11,500 annually per patient), generic antidiabetic drugs produced a similar HbA1c reduction (1.8% vs. 2.0%). Due to its improved cost-effectiveness and lack of statistically significant variations in safety or efficacy results, the ICER recommended generic treatment. In both groups, patient adherence was comparable (82% vs. 85%).In conclusion, generic antidiabetic pharmaceuticals are an affordable substitute for namebrand medications in the treatment of type 2 diabetes, which makes them ideal for settings in India with limited resources. The cost of managing diabetes can be significantly decreased by incorporating pharmacoeconomic evidence into prescription guidelines

PP-004

Assessment of N-acetylcysteine in the treatment of Early parkinson's disease in a Tertiary Care Hospital

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Background: Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by both motor and non-motor impairments that significantly affect patient's quality of life. Current pharmacological therapies mainly provide symptomatic relief and have limited impact on disease progression. N-acetylcysteine (NAC), a precursor of glutathione, possesses antioxidant and potential neuroprotective properties and has been proposed as a promising adjunctive therapy in the management of early Parkinson's disease.
Objective: To assess the effectiveness of N-acetylcysteine in improving motor symptoms, cognitive function, and quality of life in patients with early Parkinson's disease.
Methods: A prospective interventional study was conducted in a tertiary care hospital involving 60 patients diagnosed with early Parkinson's disease. Participants were equally allocated into a test group receiving N-acetylcysteine and a control group receiving standard therapy. Outcome measures included the Montreal Cognitive Assessment (MoCA), MiniMental State Examination (MMSE), Movement Disorder Society-Unified Parkinson's Disease Rating Scale (MDS-UPDRS), Hoehn and Yahr (HY) stage, and Parkinson's Disease Questionnaire-39 (PDQ-39). Assessments were performed at baseline, first follow-up, and final follow-up. Statistical analysis was carried out using repeated measures ANOVA and independent sample tests to evaluate within-group and between-group differences.
Results: Significant improvements over time were observed in MoCA, MMSE, MDSUPDRS, and PDQ-39 total scores ($p < 0.001$). Significant time × group interactions were found for MoCA ($p < 0.001$), MMSE ($p < 0.001$), and PDQ-39 total scores ($p < 0.001$), indicating greater improvement in the test group compared to the control group. However, no significant interaction was observed for MDS-UPDRS scores ($p = 0.095$). The mean change from baseline was significantly greater in the test group for MoCA (1.60 vs 0.60), MMSE (1.50 vs 0.47), and PDQ-39 total scores (6.03 vs 3.00) ($p < 0.001$), whereas the improvement in MDS-UPDRS scores was not statistically significant ($p = 0.077$).

Conclusion: Adjunctive N-acetylcysteine therapy demonstrated significant improvements in cognitive function and quality of life in patients with early Parkinson's disease. However, no significant additional benefit was observed in motor symptom outcomes. These findings suggest that N-acetylcysteine may serve as a promising supportive therapy for cognitive and quality of life improvement in early Parkinson's disease.

Keywords: *N-acetylcysteine, Parkinson's Disease, Glutathione precursor, Antioxidant, Neuroprotection.*

PP-005

Economic Burden of Chronic Diseases on Indian Households: A Secondary Data Analysis

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Chronic diseases, also referred to as non-communicable diseases (NCDs) such as diabetes, high blood pressure, heart problems, and asthma are serious concerns for public health in India.

These illnesses need ongoing care, regular check-ups, and long-term medicine, which leads to higher healthcare costs. In India, most people pay directly for their medical care and hence chronic diseases can really strain families, especially those with lower or middle incomes. This study used data from different sources such as WHO reports, Government documents, health accounts, and research papers. The data looked at both direct costs, like medicine, doctor visits, tests and hospital stays, and indirect costs, such as lost income, less work output, and missed days at work. The goal was to understand how much money these diseases cost families overall.

The study found that the cost of long-term medicine and frequent doctor visits is a major part of the total spending. Also, not having enough health insurance and not having access to cheap healthcare make things worse. This can lead to people putting off treatment, not taking their medicines properly, and facing more health problems, which in turn makes healthcare even more expensive. In general, chronic diseases put a heavy financial burden on Indian households. To help, it's important to improve health insurance, use cheaper medicines like generics, and create better public health policies. These steps can reduce the financial stress and make heal and care more accessible for everyone.

PP-006

Wearable Devices in Healthcare: A Review

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Wearable devices have emerged as a transformative technology in modern healthcare by enabling continuous monitoring of physiological parameters and supporting proactive disease management. The present review aims to evaluate the role and impact of wearable technologies in improving patient care, clinical outcomes, and overall quality of life. A comprehensive review of recent literature was conducted focusing on commonly used wearable devices such as smart watches, fitness trackers, and biosensor-based systems in various healthcare applications. The findings indicate that wearable devices play a significant role in real-time health monitoring, early disease detection, and enhancing patient engagement, particularly in the management of chronic conditions such as cardiovascular diseases and diabetes. Furthermore, these devices facilitate remote patient monitoring, reduce hospital visits, and support telemedicine services, thereby improving healthcare accessibility and

reducing overall healthcare costs. They also assist in tracking physical activity, sleep patterns, and vital signs, contributing to preventive healthcare strategies. However, certain challenges including data accuracy, privacy concerns, device reliability, and regulatory limitations remain barriers to widespread clinical adoption. In addition, issues related to user compliance, battery life, and data integration with existing healthcare systems also affect their long-term usability. Despite these limitations, ongoing technological advancements and integration with artificial intelligence and digital health platforms are expected to improve their efficiency and reliability. In conclusion, wearable devices hold great potential in revolutionizing healthcare delivery by promoting preventive care, enabling personalized treatment, and improving patient outcomes, although further research and development are necessary to overcome existing challenges.

Keywords: Wearable devices, Healthcare, Biosensors, Remote monitoring, Digital health

PP-007

Patient-Derived 3D Organoids for Chemoresistance: Microenvironment-Guided Prediction and Reversal

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Chemoresistance remains a critical challenge in the effective management of cancer, often resulting in treatment failure and disease recurrence. Traditional two-dimensional cell culture systems lack the structural and functional complexity required to accurately model tumour behaviour, thereby limiting their translational relevance. Patient-derived three-dimensional organoids have emerged as advanced preclinical models that closely recapitulate the histological architecture, genetic heterogeneity, and functional characteristics of native tumours.

This study highlights the role of patient-derived 3D organoids as predictive platforms for evaluating chemotherapeutic response and investigating mechanisms of drug resistance. By preserving key features of the tumour microenvironment, including cell-cell interactions, extracellular matrix dynamics, and spatial organization, these models provide a physiologically relevant system for drug screening. The integration of microenvironmental factors such as hypoxia, stromal components, and signalling pathways enables a deeper understanding of resistance mechanisms that are often overlooked in conventional models.

Furthermore, this approach emphasizes microenvironment-guided strategies to overcome chemoresistance by targeting adaptive tumour responses and reprogramming resistant cellular niches. Such strategies may enhance drug sensitivity and support the development of personalized therapeutic interventions.Overall, patient-derived 3D organoids represent a promising bridge between in vitro studies and clinical application. Their utility in predicting and reversing chemoresistance underscores their potential in advancing precision oncology and improving patient-specific treatment outcomes.

Keywords: *3D organoids; chemoresistance; tumour microenvironment; personalized medicine; drug response prediction*

PP-008

Beyond expected pathways: a case stuyd of metastatic breast cancer presenting in the urinary bladder.

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The metastatic disease process of breast cancer into the urinary bladder is rare but not unknown, creating a difficult differential diagnosis and a challenge for thinking beyond common metastatic patterns. The following case study demonstrates the need to consider other possibilities in patients with metastasized breast cancer. Here is a case of an 80-year-old female patient, who was previously diagnosed with estrogen receptor-positive breast cancer, was admitted with nonspecific but progressively debilitative symptoms, such as abdominal pain, poor appetite, and urinary dysfunction, all of which initially masked the underlying diagnosis.

In radiological findings, asymmetric bladder wall thickening, retroperitoneal lymph node involvement, and bilateral hydronephrosis were observed. Cystoscopy with transurethral resection helped identify the primary problem, which turned out to be metastatic invasive lobular breast cancer. In this, it is important to point out that lobular carcinoma tends to spread In a diffuse way, and atypical metastatic sites may be observed.

Although thorough investigations were conducted, the patient's condition rapidly deteriorated due to additional complications, like malignant ascites, pleural effusion, and sepsis, which was caused by spontaneous bacterial peritonitis. Due to the advanced disease stage, palliative care became the treatment approach in this case. Therefore, the patient died after the decision was made by the family that, only relief measures would be applied.

This case serves as a reminder that uncommon presentations of common malignancies can delay diagnosis and severely impact outcomes. Recognizing such rare metastatic patterns is important not only for timely intervention but also for guiding compassionate care in advanced disease stages.

For clinical pharmacist, cases like these, highlights their critical role in optimizing symptom management, evaluating therapeutic appropriateness and supporting patient-centered decisions.

Keywords- *metastatic breast cancer, differential diagnosis, lobular carcinoma, palliative care*

PP-009

Game changer in multiple myeloma – innovation to life

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Introduction

The malignant plasma cell disease known as multiple myeloma is typified by recurrent relapses and resistance to traditional treatments. While cellular treatments, monoclonal antibodies, immunomodulatory drugs, and proteasome inhibitors have improved survival, relapsed and refractory multiple myeloma (RRMM) is still a major clinical problem. This unmet treatment need led to the development of belantamab mafodotin, a first-in-class antibody–drug combination that targets B-cell maturation antigen (BCMA).

Methods and Materials

This study examines belantamab mafodotin's structure, mechanism, and clinical assessment using data from the DREAMM (Driving Excellence in Approaches to Multiple Myeloma) clinical trial program. Data from published clinical trials evaluating combination tactics, safety, and efficacy were examined.

PP-010

A decadal review of global pharmaceutical safety systems: regulatory gaps, pharmacovigilance evolution, and the impact of NDPS frameworks

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Clinical and Translational Research has significantly evolved over the past decade, driven by rapid therapeutic innovations and increasing complexity in drug safety monitoring. This review aims to analyze the key gaps in pharmaceutical safety between 2015 and 2025 and to understand the transition from traditional reactive systems to proactive, technology-driven approaches. The methodology involves a comprehensive review and synthesis of recent research articles, focusing on pharmacovigilance practices, regulatory frameworks, and the role of emerging technologies such as artificial intelligence. The findings indicate that AI-based pharmacovigilance systems have improved early detection of adverse drug reactions, although challenges such as data integration, regulatory compliance, and global supply chain vulnerabilities persist. Additionally, stricter implementation of Narcotic Drugs and Psychotropic Substances (NDPS) regulations has significantly influenced pharmacy practice, expanding the responsibilities of pharmacists as key contributors to patient safety. In conclusion, the study highlights the need for continuous advancement in safety monitoring systems and emphasizes the evolving role of pharmacists as clinical safety stewards in modern healthcare.

PP-011

Pharmacoeconomic Analysis of Breast Cancer Drug Pricing Across Hospitals in Hyderabad

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Background: Breast cancer is one of the most common cancers among women in India and accounts for approximately 670,000 deaths globally and nearly 98,000 deaths annually in India. The high cost of medicines makes treatment difficult for many patients. This study aims to evaluate the pricing of commonly prescribed breast cancer drugs across different types of hospitals in Hyderabad

Methods: A survey was conducted in five hospitals, including private specialty, trust-based, and government hospitals. Data were collected from doctors regarding commonly prescribed breast cancer medicines. Based on their responses, three drugs were identified. Prices of these medicines were collected from each hospital. Generic prices and estimated manufacturing costs were obtained from IndiaMART and chemical supplier websites for comparison.

Results: The most commonly prescribed medicines were Letrozole, Tamoxifen, and Letronol. Significant price variation was observed across hospitals. For Letrozole, private specialty hospitals charged ₹3,000–4,000 per month, while trust hospitals charged ₹500–1,500. The generic price ranged from ₹360–400. At the retail level, generic strips were available at approximately ₹60 per strip, while branded versions ranged from ₹170 to ₹620 per strip. The estimated manufacturing cost was ₹15–45.

Conclusion: There is a wide gap between manufacturing cost, generic price, and hospital selling price of breast cancer medicines. This increases the financial burden on patients. Improving access to low-cost generics and promoting cost-effective prescribing can help make treatment more affordable.

Keywords: *Pharmacoeconomics, Breast Cancer, Drug Pricing*

PP-012

Adverse Drug Reactions to Breast Cancer Medicines: A Survey of Hyderabad Hospitals

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Background: Breast cancer medicines save lives but cause side effects called Adverse Drug Reactions (ADRs). This study investigates ADR patterns in Hyderabad hospitals.
Methods:I surveyed 5 hospitals in Hyderabad, including private specialty and trust-based hospitals. I asked doctors to identify common ADRs for Letrozole and Tamoxifen (the most prescribed drugs from my first study).
Results: Doctors reported common ADRs: nausea, vomiting, fatigue, joint pain (especially Letrozole), and hair loss. For Tamoxifen specifically: hot flashes, vaginal discharge, mood changes, and leg cramps. Doctors also told me that breast cancer patients often take multiple medicines at the same time - chemotherapy, anti-nausea drugs, painkillers, and others. Taking many drugs together increases the risk of additional side effects. Published research supports my findings, reporti ng that while 85.11% of ADRs are unavoidable, 14.89% are potentially preventable.
Conclusion: I conducted further research and found that a fixed-dose combination drug called NEPA (netupitant/palonosetron) has been developed. Clinical studies show that a single dose of NEPA with reduced steroids provides effective protection against nausea and vomiting. I recommend that hospitals adopt these simplified, fixed-dose combination regimens and include essential supportive drugs in cancer care packages. This will help patients complete their treatment more comfortably and safely.

Keywords: *Pharmacovigilance, breast cancer, adverse drug reactions, polypharmacy, India*

PP-013

The decentralized paradigm: revolutionizing clinical research through digital biomarkers and passive surveillance presenting

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The healthcare paradigm is currently undergoing a fundamental shift from episodic, clinicbased assessments toward continuous, real-world monitoring. This evolution is driven by the synergy between digital biomarkers—objective, quantifiable physiological, behavioural measures—and passive surveillance, the seamless collection of data without requiring active participant engagement. Digital biomarkers leverage the ubiquitous sensor suites within smartphones and wearables, such as accelerometers, gyroscopes, and PPG sensors, to capture high-fidelity data on gait, sleep architecture, and autonomic activity. Unlike traditional "snapshot" biomarkers, digital indicators provide longitudinal insights that reflect a patient's "free-living" state.

When embedded within passive surveillance frameworks, these tools effectively eliminate participant burden, thereby increasing data adherence and eradicating the recall bias inherent in traditional self-reporting.

Current applications demonstrate significant clinical promise, particularly in the early detection of neurodegenerative and cardiovascular disorders. Subtle alterations in "digital exhaust"—such as keystroke dynamics or vocal patterns—can serve as prodromal signatures for conditions like

Parkinson's disease years before clinical manifestation. Furthermore, in the realm of clinical trials, passive surveillance facilitates decentralized designs and the collection of robust Real-World Evidence (RWE). While challenges regarding data privacy, algorithmic validation, and the signal-to-noise ratio in complex environments remain, the 2026 landscape of advanced AI is increasingly capable of translating raw data into actionable insights. Ultimately, the fusion of digital biomarkers and passive surveillance promises a move toward a more proactive, predictive, and patient-centric healthcare ecosystem.

Keywords: Digital Biomarkers, Passive Surveillance, Real-World Evidence,

PP-014

Effectiveness of Acetazolamide for Decongestion and Quality of Life in Acute Decompensated Heart Failure: A Prospective Interventional Study

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Background: Acute decompensated heart failure (ADHF) is a major cause of hospitalization worldwide and is commonly associated with significant fluid overload and systemic congestion. Loop diuretics remain the cornerstone of decongestive therapy; however, diuretic resistance and suboptimal response frequently limit their effectiveness. Acetazolamide, a carbonic anhydrase inhibitor acting at the proximal tubule, has emerged as a potential adjunctive therapy to enhance natriuresis and improve decongestion. Evidence regarding its effectiveness in the Indian population and its impact on patient-reported quality of life remains limited.

Objective: To evaluate the effectiveness of adjunctive acetazolamide therapy in improving decongestion and quality of life in patients hospitalized with acute decompensated heart failure.Methods:A prospective interventional study was conducted at two tertiary care hospitals in Hyderabad, India. A total of 140 adult patients with clinically diagnosed ADHF were allocated to receive either standard loop diuretic therapy alone (control group, n = 70) or loop diuretics combined with oral acetazolamide (acetazolamide group, n = 70). The primary outcome was improvement in decongestion assessed by weight reduction and congestion score during hospitalization. Secondary outcomes included changes in quality of life measured using the Minnesota Living with Heart Failure Questionnaire (MLHFQ), length of hospital stay, fluid balance parameters, adverse drug reactions, and 3-month rehospitalization and mortality. Statistical analysis was performed using IBM SPSS version 27.

Results: Baseline demographic and clinical characteristics were comparable between the two groups. The acetazolamide group demonstrated significantly greater weight reduction (2.84 ± 0.29 kg vs 0.82 ± 0.50 kg, $p < 0.001$) and improvement in congestion score (4.71 ± 0.46 vs 1.94 ± 0.63, $p < 0.001$) compared with the control group. Length of hospital stay was significantly shorter in the acetazolamide group (5.61 ± 1.65 days vs 8.26 ± 2.44 days, $p < 0.001$). Urine output improvement and fluid balance were also significantly better in the acetazolamide group. Quality of life improved significantly, with greater reduction in MLHFQ scores both during hospitalization and at 3-month follow-up ($p < 0.001$). The incidence of symptomatic hypotension and worsening renal function was significantly lower in the acetazolamide group, while other adverse events, readmission rates, and

mortality were comparable between groups.Conclusion: Adjunctive acetazolamide therapy significantly enhances decongestion, improves diuretic response, shortens hospital stay, and improves quality of life in patients with acute decompensated heart failure without increasing adverse events.

PP-015

Emergence of an early Dengue outbreak detected through Artificial Intelligence powered health data analysis.

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In India, Dengue is becoming a serious public health issue. Over the past few years dengue cases have shown significant rise in hospitals. Having early awareness of an outbreak would be extremely beneficial for any surveillance team. Currently, dengue surveillance systems often fail to detect early trends or the inset of outbreaks in a timely manner. Since these alerts rely on reported data, they are often delayed and therefore less effective. To address this challenge, we use AI to predict future dengue outbreaks. For this study, historical dengue cases data were collected from publicly available sources, including Our World in Data and national medical reports. Over time,the data was examined to identify regional patterns, recurring hotspots, and any unusual changes in dengue transmission. Monsoon season usually coincides with peak in dengue cases. In order to predict dengue outbreaks, computers that analyse health & patient flow data at major hospitals were instructed to include information about crowd and weather patterns. Previous year-based outcome revealed a good correlation with actual dengue cases by using only numbers and data on temperature changes. In some instances, the software identified spikes in Dengue cases before reported. The system previously warned of spikes in dengue cases based on humidity levels. Using AI for public health monitoring can help identify patterns in data sooner than humans can, thus allowing for earlier decision in order to address emerging risk before they spread. This enables the rapid delivery of supplies and medications to healthcare facilities, reducing response time from days to hours and helping to control dengue outbreaks .

Keywords- *Public health monitoring, Outbreak prediction, Early detection, Predictive Analytics, Digital Epidemiology.*

PP-016

Smart Pharmacy Management System with Drug Monitoring and Analytics

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Manual pharmacy operations often lead to medication errors, inefficient inventory control, and poor monitoring of habit-forming drugs. To address these challenges, this study proposes a Smart Pharmacy Management System integrated with drug monitoring and analytics to enhance accuracy, safety, and operational efficiency. The system is designed to automate key pharmacy processes and support data-driven decision-making.

The proposed system includes smart medicine envelope printing, which ensures clear labeling of drug name and dosage instructions, reducing dispensing errors. An integrated stock management module tracks inventory in real time and generates alerts for low stock levels, improving supply chain efficiency. Additionally, a narcotic drug monitoring feature maintains detailed records of controlled substances, helping to prevent misuse and ensure regulatory compliance. The drug sales analytics

component enables the analysis of sales trends and patterns, assisting pharmacists in forecasting demand and optimizing inventory. Advanced features such as patient history tracking, drug interaction alerts, QR code integration, and mobile application support further enhance the system's functionality.

These features contribute to improved patient safety and better clinical outcomes. The system can be implemented in retail pharmacies, hospitals, clinics, and government health centers. Although the system requires digital infrastructure and trained personnel, its benefits in reducing medication errors, improving inventory management, and enabling early detection of drug misuse make it a valuable solution. Overall, the Smart Pharmacy

Management System offers a practical and scalable approach to modernizing pharmacy services.

Keywords: *Pharmacy Management, Drug Monitoring, Inventory Control, Patient Safety, Analytics*

PP-017

Breaking the chain: stopping hepatitis transmission in dialysis

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Viral hepatitis remains a critical complication for patients undergoing maintenance haemodialysis (HD). Despite advances in medical technology, the nosocomial transmission of Hepatitis B (HBV) and Hepatitis C (HCV) persists as a significant global health challenge, particularly in high-endemicity regions like South-east Asia. Haemodialysis patients are uniquely vulnerable due to frequent vascular access, shared treatment environments, and prolonged exposure to potentially contaminated equipment. This abstract evaluates the multifaceted strategies required to eliminate bloodborne virus (BBV) transmission within the dialysis circuit.

Transmission primarily occurs through cross-contamination of external machine surfaces, contaminated healthcare worker hands, and the sharing of multi-dose medication vials. While HBV prevalence has stabilized due to mandatory vaccination and patient segregation, HCVcontinues to pose a threat due to its environmental stability and the lack of a preventative vaccine. A robust preventive framework must prioritize four pillars: rigorous screening, aggressive immunization, physical segregation of infected patients, and strict adherence to universal precautions.

Effective diagnosis relies on the timely detection of specific biological markers. For HBV, the primary markers include Hepatitis B Surface Antigen (HBsAg) for active infection, Anti-HBs to confirm immunity, and HBV DNA via Real-Time PCR for occult infections. For HCV, screeni ng involves Anti-HCV antibodies, supplemented by HCV RNA (nucleic acid testing) to differentiate between past exposure and active viremia, especially in patients with unexplained elevations in aminotransferase (ALT/AST) levels.

In conclusion, reducing the burden of viral hepatitis in HD units requires a shift toward "zerotolerance" for cross-contamination. By integrating frequent diagnostic surveillance (every 6 months) with stringent environmental hygiene and patient education, clinical outcomes and long-term survival for renal replacement therapy patients can be significantly improved.

Keywords: *Haemodialysis, Infection Control, Biological Markers, Nosocomial Transmission, Viral Surveillance*

PP-018

From Approval To Harm: Delays In Identifying Adverse Drug Reactions In Branded Drugs

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Adverse Drug Reactions (ADRs) remain a significant challenge in modern healthcare, often being identified only after a drug has been widely marketed and established as a branded product. Despite rigorous pre-marketing evaluation through Clinical Trials, many ADRs go undetected due to limitations such as small sample sizes, short study durations, and restricted participant populations. Once introduced into real-world settings, drugs are exposed to diverse patient groups, co-morbid conditions, and polypharmacy, which may reveal previously unrecognized adverse effects. A major contributing factor to delayed ADR identification is the underutilization of Pharmacovigilance systems, particularly the Spontaneous Reporting System, where underreporting by healthcare professionals and patients limits early signal detection.

Additionally, the transition of drugs into branded products often involves extensive marketing, leading to widespread usage before comprehensive safety data is accumulated. This further delays the recognition of rare or long-term adverse effects. Historical examples such as Thalidomide and Rofecoxib highlight the serious consequences of delayed ADR detection, emphasizing the need for robust post-marketing surveillance. The Coldrif cough syrup tragedy 2025, of Madhya Pradesh is also a classic modern day example of delayed identification and under reporting of ADR. This article explores the multifactorial reasons behind such delays and underscores the importance of strengthening pharmacovigilance systems, promoting ADR reporting, and integrating modern data analytics for early signal detection. In conclusion, timely identification of ADRs requires a collaborative effort among healthcare professionals, regulatory authorities, pharmaceutical companies and patients to ensure drug safety beyond market approval.

Keywords: *ADRs, Under reporting, Delayed detection, Pharmacovigilanc, Healthcare, Premarketing evaluation, Polypharmacy*

PP-019

Pharmacoeconomics and HEOR - “Maximizing value in modern healthcare”

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“Pharmacoeconomics is the description and analysis of the costs of drug therapy to healthcare systems and society.”— International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Health Economics and Outcomes Research (HEOR) evaluates the clinical, economic, and humanistic outcomes of healthcare interventions to determine their overall value.

Pharmacoeconomics and HEOR are important today because healthcare costs are rising while resources remain limited, making it essential to choose treatments that provide the best value. They help compare costs with patient outcomes to guide better decisions in drug selection and policy-making. These fields support efficient resource allocation and improve access to effective, affordable healthcare.

Objectives: To explain pharmacoeconomics and HEOR. To compare costs and outcomes of treatments. To support value-based healthcare decisions. (CEA, CUA, CBA)Analyzes from different perspectives (patient, hospital, societal)

Applications: Drug pricing and reimbursement decisionsSelection of cost-effective treatments in hospitals Healthcare policy and insurance planningImproving patient outcomes with optimal resource useInsurance reimbursement Hospital formulary selectionPublic health programsMini Case ExampleA hospital compares two drugs for treating hypertension:

Drug A is cheaper but less effective Drug B is slightly expensive but gives better patient outcomes Using Cost-Effectiveness Analysis (CEA), it was found that Drug B provides better value for money by improving quality of life and reducing complications.

Conclusion: Spending slightly more can lead to better health outcomes and long-term cost savings. HEOR Components: Clinical outcomes Economic outcomes Humanistic outcomes (quality of life) Future Scope / Innovations: AI in healthcare economics Personalized medicineValue-based healthcare

Pharmacoeconomics and HEOR help in choosing treatments that provide the best balance between cost and patient outcomes. They support evidence-based and value-driven healthcare decisions in clinical practice and policy-making. Applying these principles leads to better resource utilization and improved patient care.

PP-020

Burden of Non-Communicable Diseases (NCDs) in Developing Countries

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Burden of Non-Communicable Diseases (NCDs) in Developing Countries. Noncommunicable diseases (NCDs), particularly diabetes, hypertension, and cardiovascular diseases, represent a major and rapidly increasing public health burden in developing countries. Epidemiological transitions driven by urbanization, population aging, and lifestyle changes have shifted disease patterns from communicable to chronic conditions. According to the World Health Organization's most recent estimates, NCDs cause more than 70% of deaths worldwide, disproportionately affecting low- and middleincome nations. The epidemiology of NCDs in these regions shows an increasing prevalence of type 2 diabetes, hypertension, and cardiovascular diseases at younger ages, leading to prolonged disease burden and higher risk of complications such as stroke, kidney failure, and heart disease. Behavioural risk factors—including unhealthy diets rich in processed foods, physical inactivity, tobacco use, and harmful alcohol consumption—play a central role. However, environmental determinants such as air pollution, occupational hazards, limited access to nutritious food, and socioeconomic disparities significantly amplify these risks and influence disease distribution.

Addressing this growing crisis requires a comprehensive public health strategy integrating both population-level and individual interventions. Preventive measures include promoting healthy lifestyles, implementing tobacco and alcohol control policies, improving urban planning to encourage physical activity, and reducing environmental risks. Strengthening primary healthcare systems for early detection, continuous management, and community-based education is essential.

In conclusion, in order to reduce long-term socioeconomic impact, improve health outcomes, and mitigate risk factors, the increasing epidemiological burden of NCDs in developing nations necessitates immediate, comprehensive, and sustainable Public health interventions.

Keywords: *Non-Communicable Diseases (NCDs), Global Health Burden, Hypertension, Cardiovascular Diseases (CVDs).*

PP-021

The role of pharmacoeconomics and heor in optimizing healthcare outcomes

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Pharmacoeconomics and Health Economics and Outcomes Research (HEOR) plays a crucial role in modern healthcare by guiding the efficient allocation of limited resources while also ensuring optimal patient outcomes. Pharmacoeconomics focuses on comparing the cost as well as the effects of pharmaceutical products and services, using various methods such as cost-minimization, cost-effectiveness, cost-utility, and cost-benefit analysis. The HEOR expands this perspective by incorporating the real-world evidence, patient-reported outcomes, quality of life measures, and healthcare system impacts.In the context of the rising healthcare costs, and increasing demand for innovative therapies, pharmacoeconomic evaluations help not only policymakers and clinicians but also help industry stakeholders to make informed decisions regarding the drug selection, pricing, reimbursement, and formulary inclusion. HEOR enhances this by generating data on how treatments will perform outside controlled clinical trials, reflecting real-world patient populations and clinical practices.

This abstract emphasizes the integration of pharmacoeconomics and HEOR in improving healthcare decision-making more particularly in developing countries where resource constraints are significant. The use of these tools facilitates prioritization of interventions that deliver the greatest value in terms of both clinical benefit and economic sustainability. Furthermore, increased advancements in data analytics, digital health, and real-world data sources are improving the scope and accuracy of HEOR studies.

In conclusion, pharmacoeconomics and HEOR are imperative for achieving cost-effective and patient-centered healthcare. Their application not only supports evidence-based decisionmaking but also promotes rational drug use, and ultimately contributes to better health outcomes and sustainable healthcare systems for people.

Keywords: *Economic evaluation, HEOR, Pharmacoeconomics, Real-world evidence, Value-based healthcare, Patient outcomes.*

PP-022

Reducing medication errors through clinical pharmacist interventions: a quality improvement initiative

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Medication errors represent one of the most critical and preventable challenges in modern healthcare, occurring across all stages of the medication-use process prescribing,dispensing, administration, and monitoring. These errors contribute significantly to adverse drug events, prolonged hospitalization, permanent morbidity, and mortality. Keycontributing factors include poor inter-professionalcommunication, inadequate pharmacological knowledge,patient-related variables, and systemic deficiencies within healthcare institutions.This quality improvement project aimed to evaluate the impact of clinical pharmacist-led interventions in identifying, intercepting, and reducing medication errors, thereby enhancing overall medication safety within an inpatient healthcare setting.

Clinical pharmacists were embedded within the multidisciplinary care team, with defined responsibilities including prescription review, dose verification, drug interaction assessment, patient counselling, and post-discharge follow-up. Systematic strategies such as regular medication chart audits, bedside monitoring during ward rounds, and active participation in pre-ward round discussions were implemented to detect and prevent errors at multiple points of care. Error severity was categorized using the NCC MERP index to ensure standardized classification.

Pharmacist-led interventions resulted in a substantial reduction in prescribing errors, from 14.7 to 2.56 per 1,000 patient-days. Errors were identified across all phases of the medication-use process, with prescribing and administration errors being the most frequently encountered. The value of clinical pharmacist involvement was particularly evident during the COVID-19 pandemic, where heightened patient acuity and medication complexity posed significant safety risks.

Integrating clinical pharmacists into multidisciplinary healthcare teams is a highly effective and scalable strategy for reducing medication errors and improving patient outcomes. Universal institutionalization of clinical pharmacy services across all healthcare settings is strongly recommended to advance medication safety and minimize preventable drug-related harm.

PP-023

Gut Microbiome and Drug Response: The Missing Link in Personalized Therapy

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Even when patients receive identical drug dosages and treatment regimens, their responses can vary significantly. While genetic and environmental factors contribute to this variability, the gut microbiome has emerged as a critical yet overlooked determinant. Comprising trillions of microorganisms, the gut microbiota directly and indirectly influences drug absorption, metabolism, and overall pharmacological activity.

Gut bacteria can chemically activate, inactivate, or convert drugs into toxic metabolites. For example, bacterial beta-glucuronidase enzymes reactivate the toxic metabolite SN-38 from irinotecan (a colorectal cancer chemotherapy), causing severe dose-limiting diarrhea. Similarly, Eggerthella lenta inactivates digoxin — a heart failure drug — reducing its therapeutic efficacy.

In Parkinson's disease, gut bacteria prematurely metabolize levodopa before it reaches the brain, explaining inconsistent patient responses.

The microbiome also modulates immune responses critical to cancer therapy. Three landmark 2018 Science studies showed that melanoma patients with Faecalibacterium prausnitzii- and Akkermansia muciniphila-rich microbiomes responded significantly better to anti-PD-1 immunotherapy. Microbiome profiling is now being explored as a predictive biomarker for drug response across oncology and beyond.

Antibiotic-induced dysbiosis further illustrates clinical stakes: disruption of normal flora enables Clostridioides difficile overgrowth, now treated with FDA-approved Fecal Microbiota Transplantation (Rebyota®) achieving 85–90% cure rates. Despite challenges including interindividual variability and limited clinical standardization, the gut microbiome represents a transformative frontier in personalized medicine, offering novel opportunities to enhance therapeutic efficacy while minimizing adverse effects.

Key words: *Gut Microbiome, Drug response variability, Biomarkers, Anti PD -1 therapy*

PP-024

Look-Alike Sound-Alike (LASA) Drugs: A Hidden Threat to Patient Safety and Strategies for Prevention

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A major and frequently overlooked or neglected contributor to medication errors in clinical practice is Look-Alike Sound-Alike (LASA) drugs. These mistakes result from similarities in drug names, spelling, pronunciation or packaging, which causes patients and medical professionals to become confused. Prescription, dispensing and administration are only a few phases of the pharmaceutical process where LASA-related mistakes can happen. These mistakes have the potential to cause major adverse drug events, increased morbidity and even death.

Typical instances of LASA : Certain medications, such as dopamine and dobutamine, celecoxib and citalopram, furosemide and omeprazole have been often linked to clinical errors. Poor handwriting, verbal miscommunication, insufficient information and similarities in packing and labeling are all contributing issues. Some of the approaches that could be adopted to prevent the occurrence of LASA errors include barcode medication administration, Computerized physician order entry (CPOE), useof Tall Man Letters like DOBUTamine or DOPamine, standardized label preparations and regular training of healthcare workers. Clinical pharmacists have an important role to play in the detection of such errors, proper dispensing and patient education. The current paper focuses on the clinical significance of LASAs, associated risks, and ways of preventing these errors. It is essential to ensure that knowledge about LASAs is increased and that safety measures are implemented.

Keywords: *LASA drugs, medication error, patient safety, clinical pharmacy, error prevention.*

PP-025

From Hemoglobin S (HbS) to Hope: Rewriting the Genetic Fate of Sickle Cell Disease-The Era of Casgevy and Lyfgenia

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Sickle Cell Disease (SCD) is more than just a genetic disorder, it is a lifelong struggle marked by pain, fatigue, and uncertainty. Caused by a small mutation in the β-globin gene, it produces abnormal hemoglobin (HbS) that turns healthy red blood cells into rigid, sickleshaped cells. These cells block blood flow, leading to intense pain crises, repeated hospitalizations, and gradual organ damage, deeply affecting both patients and their families.

For years, treatments like hydroxyurea and blood transfusions have offered some relief, but they could only manage the symptoms—not cure the disease.

Today, science is rewriting that story. Breakthrough gene therapies such as Lyfgenia and Casgevy address SCD at its root cause. Lyfgenia introduces a healthy gene into a patient's own stem cells, helping the body produce functional hemoglobin. Casgevy uses CRISPR-Cas9 technology to reactivate fetal hemoglobin (HbF), which protects red blood cells from sickling.

These therapies work by modifying the patient's cells outside the body and reinfusing them, offering not just treatment—but hope for lasting change. Patients receiving these therapies have shown fewer

pain episodes, reduced dependence on transfusions, and a renewed sense of normalcy in their lives. Although challenges like high cost and accessibility remain, these therapies represent a major step forward—from just managing symptoms to potentially curing the disease. What was once a life defined by pain is now being reshaped by possibility. From temporary relief to lasting solutions, the future is being redefined. Sickle Cell Disease is moving closer to becoming not just treatable, but curable.

Keywords: *Sickle Cell Disease; Gene Therapy; CRISPR-Cas9; Hemoglobin S; Fetal hemoglobin.*

PP-026

Determinants and Prevention Strategies in Public Health and Epidemiology

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Public health and epidemiology play a critical role in understanding, preventing, and controlling diseases within populations. Public health focuses on improving overall community well-being through organized efforts such as health education, policy development, and preventive interventions. Epidemiology, as its scientific foundation, studies the distribution and determinants of health-related events, enabling the
identification of risk factors and patterns of disease occurrence. Together, they provide evi dence-based approaches to reduce morbidity and mortality.

In recent years, the burden of both communicable and non-communicable diseases has highlighted the importance of integrated public health strategies. Factors such as lifestyle changes, environmental exposures, socioeconomic conditions, and access to healthcare significantly influence population health outcomes. Epidemiological methods, including observational and analytical studies, assist in establishing causal relationships and evaluating the effectiveness of interventions.

Preventive measures remain a cornerstone of public health practice. These include primary prevention through vaccination and health promotion, secondary prevention through early diagnosis and screening, and tertiary prevention aimed at reducing complications and improving quality of life. Surveillance systems and data analysis further support timely decision-making and resource allocation.

Ultimately, strengthening public health infrastructure and promoting interdisciplinary collaboration are essential for addressing emerging health challenges. By combining scientific research with practical implementation, public health and epidemiology contribute to sustainable health improvements and equitable healthcare delivery across diverse populations.

Keywords: *Public health, Epidemiology, Disease prevention, Risk factors, Health promotion*

PP-027

From Cost to Care: The Impact of Pharmacoeconomics

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Pharmacoeconomics is an essential discipline within healthcare that evaluates the cost and outcomes associated with pharmaceutical products and services. With the continuous rise in healthcare expenditure and limited resources, pharmacoeconomic analysis plays a crucial role in guiding rational decisionmaking and optimizing resource allocation. This study aims to highlight the significance of pharmacoeconomics in improving healthcare efficiency and patient outcomes.

Pharmacoeconomic evaluations include various methods such as cost-minimization analysis, costeffectiveness analysis, cost-utility analysis, and cost-benefit analysis. These approaches compare the economic and clinical value of different therapeutic interventions, enabling policymakers, healthcare professionals, and stakeholders to select the most efficient treatment options. Additionally, pharmacoeconomics supports formulary decisions, reimbursement policies, and pricing strategies.

The integration of pharmacoeconomics with Health Technology Assessment (HTA) and Health Economics and Outcomes Research (HEOR) further enhances evidence-based decision-making. It ensures that healthcare interventions are not only clinically effective but also economically sustainable.

Despite its importance, challenges such as limited data availability, lack of awareness, and variability in healthcare systems persist, particularly in developing countries.In conclusion, pharmacoeconomics is a vital tool for achieving cost-effective and patient-centered healthcare. Its application promotes the rational use of medicines, improves healthcare quality, and supports sustainable healthcare systems. Strengthening pharmacoeconomic research and its implementation can significantly contribute to better health outcomes globally.

Keywords: *Cost-effectiveness, Cost-utility analysis, Cost-benefit analysis, Healthcare economics, Resource allocation, Quality-adjusted life years (QALYs), Incremental cost-effectiveness ratio (ICER)*

PP-028

Retrospective Study and Evaluation of Dermatology Prescriptions in a Tertiary Care Hospital

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Introduction: Skin diseases are common in developing countries and significantly affect quality of life. Rational prescribing is essential to ensure effective treatment, minimize adverse drug reactions, and reduce healthcare costs. Prescription audits help in evaluating drug utilization and improving prescribing practices.

Aim and Objectives: To evaluate the prescribing pattern of drugs in dermatology OPD and analyze drug utilization, poly pharmacy, and use of common drug classes.

Methods: A retrospective study was conducted on 50 dermatology outpatient prescriptions. Data on patient demographics, diagnosis, and drug details were collected and analyzed using Microsoft Excel.

Results: Most patients were males, predominantly in the 20–30 age group. A total of 253 drugs were prescribed. Antibiotics, antifungals, and moisturizers were most commonly used.

Polypharmacy was observed, with 4–6 drugs per prescription. Tablets and topical formulations were frequently prescribed.

Discussion: The high use of antibiotics and multiple drug combinations indicates a trend of poly pharmacy. Diverse dermatological conditions and cosmetic concerns contributed to varied prescriptions. Inadequate documentation of vital signs suggests the need for improved prescription practices.

Conclusion: The study highlights the prevalence of polypharmacy and frequent antibiotic use in dermatology prescriptions. Regular prescription audits and adherence to rational drug use guidelines are essential to improve patient safety and therapeutic outcomes.

PP-029

A prospective study evaluating the role of combined laparoscopy, hysteroscopy,platelet rich plasma and stem cell therapy on fertility outcomes in infertile women

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Background: - Infertility is a major global reproductive health problem, impacting nearly one in six couples worldwide. It is defined as the inability to conceive after one year of consistent, unprotected sexual activity. The causes of infertility are complex and multifactorial, including ovulatory dysfunction, tubal blockage, endometriosis, uterine abnormalities, and reduced ovarian reserve. In recent years, its prevalence has increased due to factors such as delayed childbearing, lifestyle changes, and environmental influences.

Objectives: -The primary aim of this study is to thoroughly assess the effectiveness of a combined therapeutic strategy that includes laparoscopy and hysteroscopy along with regenerative treatments such as platelet-rich plasma (PRP) and stem cell therapy in improving fertility outcomes among women with infertility. This integrated approach is designed to manage both structural and functional causes of infertility by facilitating precise diagnosis, appropriate intervention, and enhancement of reproductive capacity. The secondary aims of the study involve identifying and evaluating the various demographic, clinical, and pathological factors that contribute to infertility in the study population.

Methodology: -This study was designed as a prospective observational study and was carried out at CARE Hospital, Hitech City, Hyderabad, over a duration of six months, involving a total of 103 patients. The inclusion criteria consisted of women aged between 20 and 40 years who presented with either primary or secondary infertility for a period exceeding one year, along with a normal semen analysis of their male partners. Patients were excluded if they had persistent tubal obstruction or hydrosalpinx despite correction, male factor infertility, malignancy, or significant uterine pathology. All enrolled participants underwent a comprehensive clinical evaluation along with baseline investigations, which included hormonal profiling, ultrasonographic assessment, measurement of Anti-Müllerian Hormone (AMH) levels, and evaluation of endometrial thickness.

Results: - The majority of participants belonged to the 36–40 years' age group (26.2%). Primary infertility was more prevalent (63.6%) compared to secondary infertility. Laparoscopic evaluation revealed polycystic ovarian morphology (26.2%), endometriosis (19.6%), tubal blockage (16.8%), and pelvic adhesions (14%) as common findings. Hysteroscopic assessment showed a predominantly normal uterine cavity (58.9%), while abnormalities such as thin endometrium (16.8%), endometrial polyps (11.2%), and intrauterine adhesions (8.4%) were also observed.

Conclusion: The findings of this study highlight that the combined use of laparoscopy and hysteroscopy, along with regenerative therapies such as PRP and stem cell therapy, offers a comprehensive strategy for managing infertility. These approaches not only facilitate accurate diagnosis and treatment of structural abnormalities but also contribute to improving endometrial and ovarian function.

PP-030

Machine Learning–Based Identification of Medication Errors and Promotion of Safe Medication Use

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Background: Medication errors associated with high-risk drugs remain a major cause of preventable patient harm. Existing detection methods are often manual, inconsistent, and lack standardized classification. Integrating machine learning with structured safety frameworks offers a potential approach for improving early identification and prevention.

Methods: A retrospective study was conducted using de-identified inpatient data from general wards involving high-risk medications. Medication errors were categorized using a standardized safety classification system. Machine learning models were developed to detect errors, classify error types, predict harm outcomes, and assign severity levels. Model performance was evaluated using accuracy, precision, recall, F1-score, and regression metrics.

Results: Pilot study results showed high accuracy in error detection (1.00) and error type classification (0.903), with moderate performance in harm outcome prediction and lower accuracy in severity classification. Precision, recall, and F1-score values demonstrated similar trends. Regression analysis indicated minimal prediction error (MAE = 0.002; RMSE = 0.0076) with strong model fit (R^2 = 0.99). Wrong-dose errors were the most frequently observed, followed by wrong-route and omission errors. Although most cases resulted in no harm, a proportion led to moderate to severe outcomes, including mortality.

Conclusion: The proposed machine learning framework demonstrates strong capability in identifying and classifying medication errors and shows potential for integration into clinical decision support systems. However, prediction of harm severity remains complex and requires further refinement with comprehensive clinical data. This approach supports proactive medication safety monitoring and reduction of preventable adverse events.

Keywords: *Medication Errors; Machine Learning; ISMP; Patient Safety; High-Alert Medications; NCC MERP.*

PP-031

From data to decisions: leveraging advanced analytics and heterogeneous data sources for real-world evidence synthesis

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Real-World Evidence (RWE) synthesis has emerged as a cornerstone of evidence-based medicine, bridging the gap between controlled clinical experimentation and routine clinical practice. While Randomized Controlled Trials (RCTs) remain the gold standard for establishing efficacy, they often lack external validity due to restrictive inclusion criteria and artificial environments. RWE synthesis integrates data from diverse sources—including Electronic Health Records (EHRs), administrative claims, registries, and wearable devices—to provide a comprehensive understanding of drug performance, safety, and patient outcomes in "real-world" settings.The methodology of RWE synthesis involves sophisticated statistical frameworks to address inherent biases, such as confounding by indication and missing data. Advanced techniques, including Propensity Score Matching (PSM) and Target Trial Emulation, are employed to enhance the causal inference of

observational data. By synthesizing these large-scale, heterogeneous datasets, researchers can identify long-term safety signals, evaluate comparative effectiveness in underrepresented populations (e.g., the elderly or those with comorbidities), and support regulatory decision-making and health technology assessments (HTA). Furthermore, the integration of Machine Learning (ML) and Natural Language Processing (NLP) has revolutionized the extraction of unstructured data, allowing for more granular longitudinal analysis. These computational advancements enable researchers to capture complex patient journeys and nuanced clinical outcomes that traditional structured data often miss. As the healthcare landscape shifts toward precision medicine, RWE synthesis plays a vital role in validating biomarkers and tailoring interventions to specific patient phenotypes.

Despite challenges regarding data quality and interoperability, the systematic synthesis of real-world data offers a scalable, cost-effective complement to traditional research, ultimately accelerating the translation of clinical insights into improved patient care and sustainable healthcare policy.

Keywords:- *Real World Evidence, Propensity Score Matching, Target Trial Emulation.*

PP-032

Sleep Deprivation: A Hidden Determinant of Clinical Drug Response

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Sleep, an essential regulator of physiological homeostasis, plays a critical yet often overlooked role in modulating drug response. Increasing evidence indicates that sleep deprivation can significantly alter both pharmacokinetic and pharmacodynamic processes, thereby influencing therapeutic outcomes. This review aims to synthesize current clinical and experimental evidence on the impact of sleep deprivation as a determinant of variability in drug response.

Disruption of normal sleep patterns leads to misalignment of circadian rhythms, resulting in alterations in endocrine function, autonomic balance, and metabolic activity. Notably, sleep deprivation has been associated with changes in hepatic enzyme activity involved in drug metabolism, potentially affecting the absorption, distribution, metabolism, and elimination of various pharmacological agents. In parallel, altered receptor sensitivity and central nervous system responsiveness may modify drug efficacy and tolerability. Clinical observations suggest that insufficient sleep may compromise treatment outcomes across multiple therapeutic areas, including analgesia, neuropsychiatric care, and cardiovascular management. Such variability underscores the importance of recognizing sleep status as a contributing factor in individualized therapy. Despite its relevance, sleep deprivation remains underrepresented in routine clinical assessment and pharmacotherapeutic decision-making.

Integrating sleep evaluation into clinical practice may enhance the precision of drug therapy and minimize adverse effects. This review highlights the need for greater clinical awareness and encourages further research to establish sleep as a key consideration in optimizing drug response and patient care.

Keywords*: Sleep Deprivation, Clinical Drug Response, Pharmacokinetics, Pharmacodynamics, Circadian Rhythm*

PP-033

Patient-Centric Clinical Trials: A New Era in Modern Clinical Research

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Background: Clinical research is undergoing a significant transformation from traditional protocol-driven approaches to patient-centric models that prioritize the needs, preferences, and experiences of

participants. Patient-centric clinical trials aim to enhance participant engagement, improve recruitment and retention rates, and generate outcomes that are more applicable to real-world clinical settings.

Methods: This approach incorporates innovative strategies such as decentralized clinical trial designs, remote monitoring, and flexible scheduling to reduce the burden on participants. The integration of digital health technologies, including wearable devices, telemedicine, and electronic patientreported outcomes, facilitates continuous data collection while improving accessibility and convenience. Furthermore, involving patients in protocol development ensures that studies are more ethical, inclusive, and aligned with patient expectations.

Results: Patient-centric trials address major challenges in clinical research, including low enrollment rates, high dropout rates, and limited diversity among study populations. By fostering trust, transparency, and active collaboration between researchers and participants, these models significantly improve data quality and study efficiency. This paradigm shift is especially important in the era of personalized medicine, where patient-specific factors influence therapeutic outc omes.

Conclusion: Patient-centric clinical trials represent a major advancement in modern research methodologies. By combining technological innovation with patient-focused strategies, this approach accelerates the translation of research into clinical practice and supports the development of safer, more effective, and accessible healthcare solutions for diverse populations.

Keywords: *Patient-Centric Clinical Trials, Clinical Research, Decentralized Clinical Trials, Digital Health Technologies, Patient Eng agement, Personalized Medicine*

PP-034

Real-World Evidence in Pharmacoepidemiology: Critical Case Studies Shaping Drug Safety and Public Health

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Pharmacoepidemiology has emerged as a cornerstone of modern public health, bridging clinical pharmacology with epidemiology to evaluate the real-world safety, effectiveness, and utilization of medicines. Recent years have witnessed a surge in high-impact case studies that highlight both transformative therapeutic benefits and persistent risks across diverse populations. During the COVID-19 pandemic, pharmacoepidemiology became critically visible. Large-scale vaccine surveillance identified rare adverse events, including myocarditis associated with Pfizer- BioNTech COVID-19 vaccine (Comirnaty) and thrombotic thrombocytopenia linked to AstraZeneca COVID-19 vaccine (Vaxzevria). These findings, derived from real-world data, enabled rapid regulatory adaptations and strengthened public trust through transparent risk–benefit communication. Equally critical is the rising misuse of ADHD medications such as Methylphenidate (Ritalin) and amphetamine derivatives (Adderall). Case-based analyses reveal increasing non-medical use among young adults, resulting in cardiovascular complications, dependence, and diversion networks, exposing gaps in prescription monitoring systems. A notable and controversial case involves Metamizole (Novalgin), widely used in several regions yet restricted elsewhere due to its association with Agranulocytosis. Additionally, large cohort studies indicate that SSRIs such as Paroxetine (Paxil) are linked to increased fall-related injuries in older adults, underscoring the importance of age-specific prescribing. Furthermore, GLP-1 receptor agonists including Semaglutide (Ozempic/Wegovy), Liraglutide (Victoza/Saxenda), and Tirzepatide (Mounjaro) demonstrate substantial benefits in Type 2 Diabetes Mellitus and obesity management. However, concerns regarding Gastroparesis, Pancreatitis, and inequitable access remain significant. Collectively, these

case studies exemplify the indispensable role of pharmacoepidemiology in identifying emerging risks, optimizing therapeutic outcomes, and informing evidence-based regulatory decisions. As healthcare increasingly integrates real-world data and advanced analytics, pharmacoepidemiology will continue to evolve as a critical discipline—ensuring that medical innovation is not only effective but also safe, equitable, and aligned with the broader goals of global public health.

Key words *-Pharmacoepidemiology, Real-world evidence, Drug safety surveillance,*

PP-036

Pulmonary Delivery of Insulin: Innovations, Clinical Benefits, and Challenges in Diabetes Management

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Background:
Diabetes mellitus is a major chronic health concern, particularly in countries like India, where long-term insulin therapy is often required. Conventional subcutaneous insulin administration is associated with poor patient adherence due to needle-related discomfort. Inhalation insulin has emerged as a novel, non-invasive alternative aimed at improving patient compliance and glycemic control.

Objectives:
To evaluate the clinical benefits, patient adherence, and challenges associated with inhalation insulin therapy in the management of diabetes mellitus.

Methodology:
A narrative review of recent clinical studies and published literature was conducted, focusing on the pharmacokinetics, efficacy, safety, and patient acceptance of inhaled insulin formulations. Comparative analysis with subcutaneous insulin therapy was also performed.

Results:
Previous studies have demonstrated that inhalation insulin is rapidly absorbed through the pulmonary route, resulting in a faster onset of action compared to subcutaneous insulin. Published evidence indicates improved postprandial glucose control and higher patient satisfaction due to its non-invasive nature. Several studies have also reported better adherence among patients who transitioned from injectable to inhaled insulin formulations. However, literature highlights certain limitations, including variability in drug absorption, contraindications in patients with underlying pulmonary conditions, and higher treatment costs. Mild respiratory adverse effects, such as cough, have been reported but are generally well tolerated.

Conclusion:
Inhalation insulin represents a promising advancement in diabetes management by improving patient compliance and providing effective glycemic control. Despite its advantages, challenges related to cost, long-term pulmonary safety, and patient selection must be addressed. Further research and clinical evaluation are necessary to optimize its role in routine clinical practice.

Keywords: *Diabetes Mellitus, Inhalation Insulin, Pulmonary Drug Delivery, Medication Adherence, Glycemic Control.*

PP-037

Biometric Based E-Prescription System for Control and PreventionofNarcotic Drug Misuse and Duplication

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The increasing misuse of narcotic drugs and prescription fraud poses asignificantchallenge to moder

healthcare systems, necessitating the development of secureand reliable prescription mechanisms. This proposes a novel e-prescriptionsystem integrated with biometric authentication to enhance the safety, accuracy,and accountability of prescribing practices. The systemleveragesuniquebiometric identifiers, such as fingerprint or iris recognition, toverifybothhealthcare providers and patients, ensuring that prescriptions are issuedandaccessed only by authorized individuals. By digitizing prescriptions and linking them with biometric data, thesystemeffectively reduces the risk of forgery, duplication, and unauthorizedaccesstocontrolled substances. It also enables real-time monitoring andtrackingofprescribed narcotic drugs, allowing regulatory authorities to detect suspiciouspatterns and prevent abuse. Additionally, the integration of centralizedelectronichealth records facilitates better clinical decision-making, minimizes medicationerrors, and ensures continuity of care. The proposed solution not only addresses the critical issue of drug misuse but also improves overall patient outcomes by promoting safe medication practices, enhancing transparency, and streamlining healthcare workflows. Furthermore, it reduces administrative burdens on healthcare providers and supports data-driven policy implementation. In conclusion, the adoption of a biometric-based e-prescription system represents a promising advancement in healthcare technology, offering a secure, efficient, and patient-centric approach to managing prescriptions, particularly for high-risk narcotic drugs.

Keywords: *E-prescription, Biometric authentication, Narcotic drug control, Prescription security, Patient outcomes.*

PP-038

Pharmacoeconomic Evaluation of Innovator Semaglutide and Potential Generic Alternatives in Diabetes and Weight Management

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Pharmacoeconomics plays a critical role in evaluating the balance between cost and clinical outcomes in modern therapeutics. This study assesses the economic impact of innovator semaglutide and explores the implications of potential generic alternatives in the management of type 2 diabetes mellitus and obesity. Semaglutide, a glucagon-like peptide-1 receptor agonist, has demonstrated significant efficacy in improving glycemic control, promoting weight reduction, and lowering cardiovascular risk. Currently, semaglutide is available as innovator formulations such as Ozempic, which are widely prescribed but associated with high treatment costs, limiting accessibility in resource-constrained settings. In the absence of widely available generic versions, this study adopts a model-based pharmacoeconomic approach to evaluate the potential impact of generic entry. Assuming comparable clinical efficacy due to bioequivalence standards, a reduction in drug cost is projected with the introduction of generic semaglutide. The analysis focuses on cost-effectiveness parameters, including treatment cost, clinical outcomes, and quality-adjusted life years. Modeled projections suggest that lower-cost generic alternatives would improve cost-effectiveness ratios, enhance patient adherence, and expand access to therapy. This highlights the importance of affordability in chronic disease management, particularly for long-term conditions such as diabetes and obesity. In conclusion, while current innovator semaglutide therapies offer substantial clinical benefits, the introduction of potential generic alternatives may significantly improve economic efficiency and healthcare accessibility without compromising therapeutic outcomes.

Keywords: *Pharmacoeconomics, Semaglutide, Cost-effectiveness, Generic alternatives, Ozempic, Type 2 Diabetes Mellitus*

PP-039

The pharmacist's vanguard: leading the charge against the silent pandemic of antimicrobial resistance

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Antimicrobial resistance (AMR) represents a critical global health emergency, responsible for approximately 1.27 million deaths annually, with projections reaching 10 million deaths per year by 2050. Often termed a "silent pandemic," AMR threatens the effectiveness of modern medicine, compromising procedures such as surgery, chemotherapy, and neonatal care. This poster highlights the strategic and evolving role of pharmacists in combating AMR through structured Antimicrobial Stewardship Programs (ASPs). As highly accessible healthcare professionals, pharmacists function as frontline defenders by ensuring rational antibiotic use, optimizing therapeutic regimens, and educating patients on adherence and resistance risks. Evidence indicates that pharmacist-led interventions significantly reduce inappropriate antibiotic utilization—cutting broad-spectrum antibiotic use by up to 35%, lowering Clostridioides difficile infection rates, and improving clinical outcomes, particularly in sepsis management. The poster further explores pharmacists' contributions to AMR surveillance, including medication use evaluations, integration of point-of-care diagnostics, and real-world data reporting to national and global monitoring systems. In community settings, especially in low and middle-income countries, pharmacists play a crucial role in regulating over-the-counter antibiotic access and influencing public behavior. Additionally, pharmacist-driven educational initiatives targeting patients and healthcare providers have demonstrated measurable reductions in unnecessary antibiotic demand. Collaborative care models, incorporating pharmacists into infectious disease teams, further enhance stewardship effectiveness.

Conclusion: This work advocates for the formal recognition of pharmacists as key AMR strategists, emphasizing the need for expanded prescribing authority, mandatory stewardship training, and integration into One Health frameworks to effectively address antimicrobial resistance at a global scale.

Keywords: *Antimicrobial resistance, Public health, Antimicrobial stewardship, WHO aware framework, drug resistance, AI diagnostics .*

PP-040

Munzij-Mushil (concoctive-purgative) Therapy for non-Communicable Disease Control and Prevention: A Public Health Approach

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Chronic diseases,such as NCDs, represent the global burden requiring sustained pharmacotherapeutic intervention and the mainstay challenge of management by healthcare providers. According to a systematic analysis of the Global Burden of Disease (GBD) Study 2019-2021, NCDs contribute to approximately 1.73 billion disability-adjusted life years (DALYs). The traditional system of medicine, such as the Unani system, conceptualises humoral balance as a healthy bodily state; disequilibrium in the humours leads to *Khilti* or *Maddi Amraz* (humoral disease). In Unani medicine, *Munzij-Mushil* therapy offers a distinctive pharmacodynamic approach for long-term management through sequential administration of *Munzij* (An agent that matures and prepares the morbid humours for evacuation from the body), followed by *Mushil* (purgative agents that facilitate their evacuation).

This strategy addresses root causes across conditions like poststroke management, paralysis, arthritis, respiratory disorders,and skin diseases by restoring humoral equilibrium, reducing inflammation, and preventing disease progression. Available evidence suggests that *Munzij-Mushil* therapy may exert multi-dimensional effects, including modulation of metabolic pathways, attenuation of chronic inflammation, reduction of oxidative stress, and enhancement of microcirculatory dynamics. In conclusion, it's a holistic approach to disease management; however, preliminary studies and RCTs on additional NCDs, such as metabolic and nervous disorders, are required for further validation.

Keywords: *Munzij, Mushil, Unani Pharmacotherapy, Chronic Disease, Integrative Medicine*

PP-041

Drug repurposing: a faster approach to drug discovery

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Drug discovery is a complex, time-intensive, and costly process with a high rate of failure. In recent years, drug repurposing has emerged as an effective strategy to overcome these challenges by identifying new therapeutic uses for existing drugs. This approach utilizes previously approved or investigational drugs and explores their potential in treating different diseases beyond their original indication. This study aims to highlight a practical and efficient approach in pharmaceutical research that can address urgent healthcare needs.

One of the major advantages of drug repurposing is the reduction in development time and cost, as these drugs have already undergone extensive testing for safety and pharmacokinetics. This significantly lowers the risk associated with the early stages of drug development. Additionally, advancements in computational tools and biological data analysis have further enhanced the identification of repurposing opportunities.

Drug repurposing gained significant attention during global health emergencies such as the COVID-19 pandemic, where existing drugs were rapidly evaluated for potential treatment options. This highlights its importance in accelerating the availability of therapies during critical situations.

However, challenges such as regulatory barriers, intellectual property issues, and limited clinical data for new indications still exist. Despite these limitations, drug repurposing continues to be a promising and practical approach in modern pharmaceutical research.

In conclusion, drug repurposing offers a faster, cost-effective, and safer alternative to traditional drug discovery, playing a crucial role in improving drug development efficiency and expanding therapeutic possibilities.

Keywords*: Drug Repurposing, Drug Discovery, Pharmaceutical Research, Therapeutic Applications, Cost-Effective Treatment*

PP-042

Self-Medication and Drug Misuse Among Young Adults: A Growing Public

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Background: Self-medication, defined as the use of medicines without professional supervision, is increasingly common among young adults. Easy access to over-the-counter drugs, internet-based information, and peer influence contribute to this practice, raising concerns about drug misuse and associated health risks.

Objective: This study aims to examine the prevalence of self-medication among young adults and assess its potential risks from a public health perspective.

Methods: A narrative review of existing literature was conducted, focusing on patterns of self-medication, commonly used drug categories, and factors influencing this behavior. Particular attention was given to misuse of analgesics, antibiotics, and antipyretics.

Results: Findings indicate a high prevalence of self-medication among young adults, primarily driven by convenience, cost-saving, and lack of awareness. Analgesics and antibiotics are among the most frequently used drugs. Inappropriate use, including incorrect dosing and duration, contributes to adverse drug reactions and the growing issue of antimicrobial resistance. Limited awareness regarding potential risks further worsens the problem.

Conclusion: Self-medication among young adults poses a significant public health challenge. Strengthening awareness, promoting responsible drug use, and enforcing stricter regulations on drug dispensing are essential steps. Pharmacists play a crucial role in guiding safe medication practices and educating the public to minimize misuse.

Keywords: *Self-medication, Drug Misuse, Young Adults, Public Health, Antibiotic Resistance*

PP-043

Targeting EGFR, Counting the Cost: A Pharmacoeconomic Evaluation of EGFR Inhibitors in Lung Cancer in India

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Patients with NSCLC and EGFR mutations are often treated with targeted drugs that interfere with molecular pathways involved in cancer cell proliferation. Such therapies include the use of Gefitinib and Erlotinib for inhibition of EGFR signaling and Osimertinib to counter drug resistance and increase life expectancy. Even though such drugs exhibit superior efficacy and tolerability compared to chemotherapy, their expensive nature is a significant drawback since most patients in India pay directly for their treatment without insurance coverage.

The aim of this study is to investigate the value of using EGFR inhibitors compared to conventional chemotherapy based on actual data from patients at two tertiary hospitals (n = 350). The outcome parameters are progression-free survival, overall survival, and quality-adjusted life years (QALYs). The costs associated with treatment are based on hospital charges and patient expenditures. The cost utility analysis is carried out considering the lifetime time horizon and 3% discount rate. ICERs will be compared to the threshold of ₹1.5–4.5 lakh/QALY set for India. The results revealed that gefitinib and erlotinib added 0.8 to 1.3 quality-adjusted life-years to patients with ICER values of ₹3-6 lakh per QALY due to the use of generic drugs, which indicated cost-effectiveness. Osimertinib yielded more survival gains (1.4-2.0 QALYs); however, ICER values reached ₹12-25 lakh per QALY, making osimertinib less cost-effective compared to other EGFR inhibitors. Fewer admissions and fewer adverse effects partially compensated for high prices; however, the main driver of the cost was still the price of the drug itself.

To summarize, EGFR inhibitors proved themselves clinically effective and economically justified in the treatment of NSCLC. However, cost-effectiveness largely depends on pricing policies and the selection of patients.

Keywords: *EGFR inhibitors; NSCLC; Pharmacoeconomics; Cost-effectiveness; Quality-adjusted life years (QALYs); Incremental cost-effectiveness ratio (ICER); India; Targeted therapy*

PP-044

Surveillance of Emerging Pathogens: Wastewater Monitoring for Early Detection of Respiratory Viruses

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Emerging pathogens represent a serious threat to public health, with the COVID-19 pandemic demonstrating this clearly. Outbreak detection has historically relied on clinical testing and hospital-based reporting and this can result in outbreaks being detected after substantial community transmission has already occurred. Wastewater-based epidemiology (WBE), however, is emerging as a potential early warning system for respiratory virus outbreaks at the community level. The purpose of this study is to assess whether (WBE) surveillance can provide early warning of SARS-CoV-2, influenza, and respiratory syncytial virus (RSV) compared with more traditional clinical surveillance data. Weekly wastewater samples were collected from five wastewater treatment facilities serving a total population of approximately 500,000 residents for a 12-month period (2025-2026). Viral RNA was extracted and quantified via reverse transcription qu antitative polymerase chain reaction (RT-qPCR) with the results compared to weekly clinical case reports attributable to hospitals and outpatient clinics located within the same catchment areas. Lead time was subsequently calculated for each pathogen. Peak SARS-CoV-2 viral loads as per WBE occurred 7 days (4 to 11 days) before clinical case peak. Influenza A WBE viral detections occurred approximately 5 days before clinical peak, while respiratory syncytial virus WBE viral detections occurred roughly 6 days prior to clinical peaks. Additionally, WBE detected resurgence of these three viruses during periods of low levels of clinical testing. Overall, sensitivity of WBE for detection of all viral presence was calculated to be 94% using clinical surveillance data as reference. Monitoring sewage gives early signs of coming respiratory viruses using a non-invasive and inexpensive method. It gives public health officials a 5-7-day early warning of the peak of the disease so they can begin their response earlier than they could have based solely on clinical reported cases. Therefore, it is appropriate to implement sanitary surveillance into existing public health systems so that they have improved readiness for future pandemics.

Keywords: *Wastewater surveillance, Emerging pathogens, Early detection, Respiratory viruses, SARS-CoV-2, Pandemic.*

PP-045

Diverse Forms of Pharmaceutical Research: A Comparative Analysis of Methodologies and Clinical Impact

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Background: Pharmaceutical sciences rely on diverse research methodologies to advance drug discovery, clinical practice, and evidence-based decision-making. Different publication types—including original research, systematic reviews, meta-analyses, case reports, short communications, and narrative reviews—serve distinct yet complementary roles. However, a structured understanding of their comparative significance and application remains essential for optimizing research utilization and clinical outcomes.

Objectives

- To analyze and compare major types of pharmaceutical research publications
- To evaluate their methodological frameworks, strengths, and limitations
- To assess their collective impact on clinical decision-making and scientific advancement

Methods

A structured analytical review was conducted examining six primary categories of pharmaceutical research publications:

- Original research articles, - Systematic (semantic) reviews, - Meta-analyses, - Case reports, - Short communications, - Narrative reviews. Each type was evaluated based on purpose, methodology, strengths, and limitations. Comparative synthesis was performed to identify their individual and collective contributions to evidence-based practice.

Results

Original research provides foundational experimental and clinical data, forming the basis of scientific innovation. Systematic reviews synthesize high-quality evidence using structured methodologies, reducing bias. Meta-analyses enhance statistical power and precision by combining multiple studies. Case reports highlight rare or novel clinical observations, contributing to hypothesis generation. Short communications enable rapid dissemination of preliminary findings. Narrative reviews offer broad conceptual understanding and identify emerging trends. Comparative analysis revealed high precision in meta-analyses, strong evidence integration in systematic reviews, high novelty but limited generalizability in case reports, and faster communication but limited depth in short communications.

Conclusion

Each research publication type plays a distinct and complementary role in the pharmaceutical research ecosystem. Their integration strengthens evidence-based practice, improves clinical decision-making, and drives innovation. A balanced utilization of these methodologies is essential for advancing pharmaceutical sciences and enhancing therapeutic outcomes.

Keywords: *Pharmaceutical Research, Original Research, Systematic Review, Meta-Analysis, Case Reports, Narrative Review, Evidence-Based Practice*

PP-046

A Multidimensional Healthy Ageing Vulnerability Index (HAVI): Integrating Social Support, Medication Management and Healthcare Access determinants

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Aging represents one of the major demographic shifts as the global population is characterized by the number of individuals aged 65 and older growing to more than 2 billion by 2050 thereby exerting an escalating strain on the healthcare system worldwide to promote positive aging. Healthy aging outcomes are shaped by a complex interplay wherein it not only relies on medical management, but also on social engagement and environmental factors. Although prior studies focused on individual determinants of healthy aging rather than examining their integrated effects. There is a lack of practical, integrated risk stratification tools that incorporate medication-related factors particularly polypharmacy and medication burden alongside social and healthcare determinants. This project presents multidimensional, novel, data-driven Healthy Aging Vulnerability Index (HAVI) a concept incorporating physical, cognitive, and psychosocial domains shaped by dynamic interactions between biological, behavioural, and social determinants and capable of identifying individuals at risk of poor ageing outcomes with prediction of functional decline. Medication-related risks, particularly polypharmacy and poor adherence, remain under-recognised drivers of adverse outcomes, while social isolation and limited healthcare access silently accelerate physical and cognitive decline.Leveraging a cutting-edge mixed-methods design, this study combines large-scale

longitudinal data with the lived experiences of older adults and caregivers. Enabling the detection of hidden patterns, complex interactions and high-risk trajectories that traditional methods fail to capture advanced statistical modelling is augmented by Artificial Intelligence and Machine Learning. This intelligent approach moves beyond static analysis to deliver dynamic, personalised risk prediction. The outcome is a robust construction of a composite index categorising individuals into low, moderate, and high-risk categories, enabling early, targeted, and actionable interventions. More than a measurement tool, HAVI is a decision-support innovation bridging the gap between data and real-world care. By integrating clinical insight with social realities and technological intelligence, multidimensional Vulnerability Index (HAVI) redefines the complex pathways that contribute to a more integrated understanding of the various factors determining healthy aging in quantification of individuals and modifying targeted root level interventions. This supports the paramount priorities on aging populations and multimorbidity management to develop medication safety, enhance optimal healthcare utilisation, develop social care strategies to reduce health inequalities and help policymakers empower aging populations to live with dignity, independence, and an enhanced quality of life.

Keywords: *Aging, Polypharmacy, Health Inequalities, Risk Stratification, Machine Learning, Public Health.*

PP-047

Hidradenitis Suppurativa: Pathophysiology and Emerging Role of Biologics in Patient- Centered Management – A Narrative Review

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Background: Hidradenitis Suppurativa (HS) is a chronic, recurrent inflammatory skin disorder characterized by painful nodules, abscesses, and sinus tract formation, primarily affecting intertriginous regions such as the axillae, groin, and perianal areas. It significantly impairs quality of life and remains underdiagnosed due to its heterogeneous clinical presentation and lack of awareness among healthcare professionals. Recent studies highlight immune dysregulation involving tumor necrosis factor-alpha (TNF-α), interleukin (IL)-17, and IL-23 pathways as key contributors to its pathogenesis (Zouboulis et al., 2020; Alikhan et al., 2019).

Aim: To review the pathophysiology, clinical features, and current as well as emerging therapeutic strategies, with emphasis on the role of biologics in the management of Hidradenitis Suppurativa.

Methods: A narrative review was conducted using electronic databases including PubMed, Scopus, and Google Scholar. Relevant peer-reviewed articles published between 2015 and 2024 were included using MeSH keywords such as “Hidradenitis Suppurativa,” “biologics,” “HS treatment,” and “QT interval.” Clinical guidelines, randomized controlled trials, systematic reviews, and narrative review articles were critically analyzed and synthesized.

Results: HS pathogenesis involves follicular occlusion followed by rupture and subsequent immunemediated inflammation. Key risk factors include obesity, cigarette smoking, and genetic predisposition (familial occurrence in approximately 30–40% of cases). The Hurley staging system (Stages I–III) classifies disease severity and guides treatment decisions. First-line therapies include topical clindamycin and systemic antibiotics such as tetracyclines (doxycycline). Biologic therapy, particularly adalimumab (anti-TNF-α), has demonstrated significant efficacy in moderate-to-severe HS with a clinical response rate of approximately 50% in pivotal trials (Kimball et al., 2016). Emerging biologics targeting IL 17A (secukinumab) and IL 23 pathways show promising outcomes

in Phase II/III clinical studies. Pharmacist involvement in therapy optimization and patient counseling has been identified as critical in improving adherence and minimizing adverse drug events.

Conclusion: HS is a complex, multifactorial chronic disease requiring early diagnosis and a multidisciplinary management approach. Biologics have revolutionized the therapeutic landscape, offering significantly improved clinical outcomes and quality of life for patients with moderate-to-severe disease. Pharmacist-led interventions in patient education, adherence monitoring, and adverse effect surveillance play a pivotal role in holistic disease management. Future research should focus on personalized biologic selection and long-term safety profiling.

Keywords: *Hidradenitis Suppurativa, Biologics, Adalimumab, Chronic Inflammation, TNF-α, IL-17, Dermatology, Drug Utilization, Pharmacist Role*

PP-048

Comparative assessment of fatty liver index (FLI) and hepatic steatosis index (hsi) for predicting non-alcoholic fatty liver disease (NAFLD) in metabolic syndrome patients

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Background: Non-alcoholic fatty liver disease (NAFLD) is a condition characterized by the accumulation of fat in the liver, commonly seen in overweight or obese individuals. Its causes include genetic factors, obesity, insulin resistance, type 2 diabetes, and high blood lipid levels, particularly triglycerides. The purpose of the study is to compare two measurement scales, {HSI, FLI}, to determine which one is more effective and appropriate for the prediction of NAFLD.

Methodology: A Prospective observational study was carried out in subjects of the age group 25- 69. NAFLD risk was assessed using Fatty Liver Index [FLI] and Hepatic Steatosis Index [HSI], categorizing participants into low, moderate, high groups. The predictive accuracy of FLI and HSI for NAFLD risk was evaluated using biostatistical analysis.

Results: A total of 200 responses were recorded, the majority of the subjects were from 40-55 years (47%), the male patients were 120 (60%) and females were 80 (40%), the majority of the patients with the BMI of 25-29.9 (44%) were at risk. The false positive value is more in HSI and false positive value is less in FLI, it means true positive value is more in FLI.

Conclusion: Our findings indicate that individuals with higher FLI scores are at greater risk of developing NAFLD. The demographic data concerning the age group of 40-55 years are at higher risk of developing NAFLD with [47%] due to obesity, Diabetes Mellitus, Metabolic Syndrome, advancing age, and sedentary lifestyle. NAFLD was observed to be more prevalent among males than females. Patients with Type 2 Diabetes Mellitus exhibited a higher risk of developing NAFLD. FLI is particularly useful in identifying high-risk patients who require early management

Keywords: *Fatty Liver Index, Hepatic Steatosis Index, Non-Alcoholic Fatty Liver Disease, Metabolic Syndrome*

PP-049

Clinical Trials: Bridging Scientific Discovery to Real-World Healing

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Clinical trials are how new medicines move from the lab to real patients. Before any drug or vaccine is approved, it has to be carefully tested in people to make sure it's both safe and effective. This happens in different stages. Early phases involve small groups, mainly to understand how the drug behaves in the body and to check for safety. As the trial progresses, more patients are included to see how well the treatment actually works and to compare it with existing options. Even after approval, studies continue to track long-term effects in real-world use.

At the heart of every clinical trial are ethical responsibilities. Participants are fully informed about what the study involves and must agree voluntarily. Their safety is always the top priority, and their personal information is kept confidential. Independent ethics committees review and monitor trials to ensure fairness and protect participants from harm.

However, running clinical trials is not easy. They require a lot of time, money, and careful planning. Finding willing participants can be challenging, and strict regulations must be followed at every step. Sometimes, even promising treatments fail in later stages. Despite these challenges, clinical trials are essential—they are the reason we have safe, reliable medicines today and continue to improve healthcare for the future.

Keywords: *Clinical Trials, Drug Development, Patient Safety, Informed Consent, EthicalGuidelines, Regulatory Challenges*

PP-050

From Monitoring to Precision care: Non-Invasive Strategies in Diabetes Management

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The recent innovation in Radio Frequency Identification (RFID) technology is changing how diabetes patients monitor their health by overcoming some of the problems associated with current techniques. Traditional methods, including prick tests and minimal invasive CGM, can be painful for the patients, lead to decreased compliance, and produce inaccurate readings.

Innovations in RFID technology and RF biosensing have led to the development of glucose monitors that are wireless, non-invasive, and continuous. This category includes implants, RFID glucose test strips, and bio-RFID systems. In implantable RFID technologies, microelectronic technology is combined with a biosensor, which can detect glucose concentration and transmit data wirelessly. RFID-enabled glucose test strips not only improve the accuracy of test results but also contain vital information like calibration data and expiration date.

Another major advance is the use of non-invasive RF biosensors, which operate on the basis of interaction between electromagnetic radiation and biological tissue. Changes in dielectric properties are assessed to provide estimates about the level of glucose in the blood without having to break the skin barrier. Another recent advancement includes the incorporation of Artificial Intelligence (AI) into the analysis process to increase accuracy in glucose estimation.

Moreover, the combination of RFID technology with Internet of Things (IoT) technology facilitates remote monitoring of patients, providing personalized solutions for diabetes patients.

Although there are several limitations to these approaches, including signal interference and regulatory issues, the emergence of Bio-RFID diagnostic methods has proven to be a breakthrough

over traditional RFID applications.

In conclusion, innovations related to RFID technology can have a great impact on diabetes patients, making the whole process more effective and efficient.

Keywords: *Radio Frequency Identification (RFID), Diabetes Mellitus, Non- invasive glucose monitoring, Radio Frequency Biosensors, Continuous glucose monitoring (CGM), Artificial Intelligence, Internet of Things (IoT), Wireless healthcare.*

CODE: PP-e-001

SPECIALIZATION: PP

TITLE: "Drug Utilization Evaluation Of QT Prolonging Drugs And Compliance with ECG And Electrolyte Monitoring –A Prospective Observational Study''

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ABSTRACT:

Background: Drug-induced QT interval prolongation is a significant and preventable cause of lifethreatening ventricular arrhythmias, particularly Torsade de Pointes (TdP). Patients admitted to the Cardiac Intensive Care Unit (CICU) are at higher risk due to advanced age, polypharmacy, electrolyte imbalance, and underlying cardiovascular diseases. Inadequate ECG and electrolyte monitoring further increases this risk.

Aim: To evaluate the prevalence of QT-prolonging drug utilization and assess ECG and electrolyte monitoring compliance among adult CICU patients.

Methods: A prospective observational study was conducted for 6 months at Shivpuje Heart Care, including 100 adult CICU patients receiving QT-prolonging medications. Data regarding demographics, comorbidities, QT-prolonging drug exposure, baseline and follow-up QTc intervals, electrolyte levels, and monitoring compliance were collected and analyzed.

Results: The majority of patients were elderly (>60 years, 62%) with female predominance (55%). Antiemetics (67%) were the most commonly prescribed QT-prolonging drugs, followed by antibiotics and antiarrhythmics. Polypharmacy was significant, with 62% of patients receiving two QT-prolonging drugs.

Conclusion: QT-prolonging drug use is highly prevalent in CICU settings and is associated with a substantial risk of significant QTc prolongation. Although ECG monitoring compliance was relatively high, electrolyte monitoring and corrective interventions were inadequate. Implementation of standardized monitoring protocols, risk stratification strategies, and pharmacist-led interventions can significantly reduce preventable adverse cardiac events and improve patient safety in critical care settings.

Keywords: QT prolongation, QTc interval, orsade de Pointes, CICU, ECG monitoring, electrolyte imbalance, drug utilization evaluation

CODE: PP-e-002
SPECIALIZATION: PP

TITLE: METFORMIN IN THE MANAGEMENT OF POLYCYSTIC OVARY SYNDROME: A CASE STUDY

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ABSTRACT:

Department of Pharmacy Practice, Grace College of Pharmacy, Palakkad, Kerala, India Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder characterized by insulin resistance, hyperandrogenism, and menstrual irregularities, significantly affec ting reproductive and metabolic health. Metformin, an insulin-sensitizing agent, is widely used in the management of Polycystic Ovary Syndrome to improve metabolic parameters and restore ovulatory function.

This study presents a case-based pharmacovigilance evaluation of metformin therapy in a patient with PCOS. A 22-year-old female presented with irregular menstrual cycles, acne, and weight gain and was initiated on metformin along with lifestyle modifications. During treatment, the patient experienced gastrointestinal adverse drug reactions (ADRs), including nausea and diarrhea.espite these ADRs, clinical outcomes showed significant improvement, including better menstrual regularity, modest weight reduction, and improved glycemic control. The reported ADRs were mild to moderate and were effectively managed through dose adjustment and administration with meals.

Causality assessment using the Naranjo scale suggested a probable association between metformin and the observed ADRs.

This case highlights that while metformin is effective in managing PCOS, continuous pharmacovigilance is essential to monitor and manage adverse effects, thereby improving patient adherence and therapeutic outcomes.

Keywords: Metformin; Polycystic Ovary Syndrome; Adverse Drug Reaction

CODE: PP-e-011
SPECIALIZATION: PP

TITLE: A Rare Case Study of Crimean-Congo Haemorrhagic Fever Presenting with Severe Thrombocytopenia

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ABSTRACT:

A 54-year-old Male is a Veterinary Compounder with a medical history of Hypertension, IHD, and DM-2 on regular medication. In Past, S/P CABG was done in 2019 Order was presented chief complaint of Fever, Vomiting, lower back pain, generalised weakness, & Abdominal Burning. The Patient denied any history of consuming alcohol or illegal drug abuse or smoking cigarettes.

Laboratory Investigation: CBC, RFT, LFT, PT/INR, APTT, CRP, Urinalysis, Bloo d Culture, Urine Culture, CCHF PCR, Dengue NS1, DengueIgM/IgG, Scrub Typhus IgM, Hepatitis B Surface Antigen, Hepatitis C Antibody, Hepatitis A IgM, Abdominal Ultrasound, Chest X Ray, and 2D Echocardiography. During the hospitalisation patient is talking about various medications like Analgesics, antiemetics, and antibiotics, antidiabetics, antiplatelet, etc. His Symptoms continued to improve during his course of hospitalisation. He was discharged home with complete resolution of his symptoms.

KEYWORD: CCHF, Antiviral Therapy

CODE: PP-e-010
SPECIALIZATION: PP

TITLE: Role of Real-World Evidence in Drug Safety and Regulatory Decision Making

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Abstract:

Real-world evidence (RWE) has emerged as a critical component in modern pharmacovigilance, complementing traditional randomized controlled trials by providing insights into drug safety within routine clinical practice. This narrative review aims to evaluate the role of RWE in enhancing drug safety monitoring and supporting regulatory decision-making processes. A comprehensive literature search was conducted using electronic databases, including PubMed, Scopus, and Google Scholar, focusing on studies published over the past decade. Relevant articles were identified and screened to identify key trends, applications, and challenges. The findings suggest that RWE, derived from sources such as electronic health records, insurance claims databases, patient registries, and digital health platforms, plays a vital role in identifying rare and long-term adverse drug reactions that are often not captured in pre-marketing clinical trials. Regulatory agencies are increasingly utilizing RWE to support post-marketing surveillance, label expansions, safety warnings, and risk management strategies. Furthermore, advancements in data analytics, including artificial intelligence and machine learning, have significantly enhanced the efficiency of signal detection and the interpretation of large-scale healthcare data. In addition, integration of real-world data into regulatory frameworks has improved the understanding of drug utilization patterns across diverse patient populations. Despite these advantages, challenges such as data heterogeneity, missing information, potential biases, and lack of standardized methodologies continue to limit its full utilization. Addressing these limitations through improved data quality, methodological rigor, and regulatory harmonization is essential to maximize its potential. Overall, RWE represents a transformative approach in drug safety and regulatory science, enabling more patient-centric, timely, and evidence-based healthcare decision-making.

Keywords: Real-world evidence, Pharmacovigilance, Drug safety, Regulatory decision making, Signal detection

CODE: PP-e-003
SPECIALIZATION: PP

TITLE: Determinants of Health-Related Quality of Life and Its Association with Medication Adherence in Deep Vein Thrombosis Patients: A Cross - Sectional Study

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ABSTRACT:

Background: Deep Vein Thrombosis (DVT) is a serious vascular disease associated with severe morbidity and risk of complications such as pulmonary embolism. Beyond clinical results, DVT has a dramatic influence on patients' health-related quality of life (HRQoL), which is becoming regarded as a crucial metric of treatment efficacy. Objective: This study aims to measure HRQoL and identify variables related with reduced quality of life among patients with DVT. Methods: A hospital-based cross-sectional research was conducted among 130 patients diagnosed with DVT at RVS Hospital, Chittoor (AP), between May and September 2025.

Participants were recruited using a sequential sampling strategy. HRQoL was examined using the validated VEINES-QOL/Sym questionnaire. Data were analyzed using SPSS version 27.

Logistic regression analysis was done to identify characteristics related with decreased HRQoL, with statistical significance established at $p < 0.05$.

Results: The mean VEINES-QOL score suggested a modest level of HRQoL among individuals. Factors strongly linked with poorer HRQoL were proximal DVT (AOR = 0.255, p = 0.009) and post-thrombotic syndrome (AOR = 0.120, p = 0.019). Conversely, greater duration since diagnosis was related with better HRQoL (AOR = 1.845, p = 0.016). Most individuals had comorbidities, with cancer being the most frequent.

Conclusion: HRQoL among patients with DVT is considerably affected, particularly among those with proximal DVT and post-thrombotic syndrome. Long-term follow-up and tailored care measures are needed to enhance patient outcomes. Incorporating routine HRQoL testing into clinical practice is suggested.

Keywords: Deep Vein Thrombosis, Quality of Life, VEINES-QOL(Venous Insufficiency Epidemiological and Economic Study on Quality of Life) , Post-Thrombotic Syndrome, Anticoagulation, Cross-sectional Study

CODE: PP-e-004
SPECIALIZATION: PP

TITLE: POLYPHARMACY AND POTENTIALLY INAPPROPRIATE MEDICATION USE AND THEIR IMPACT ON HEALTHCARE UTILISATION IN ELDERLY PATIENTS: A PROSPECTIVE OBSERVATIONAL STUDY FROM A TERTIARY CARE CENTRE IN TAMIL NADU

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Background : Polypharmacy and the use of potentially inappropriate medications (PIMs) are prevalent concerns in the elderly population and are associated with increased risk of adverse drug reactions, hospitalizations, and prolonged length of stay (LOS) which leads to increased healthcare utilization.Objectives: To determine the prevalence of polypharmacy (≥5 drugs) and PIM use; to analyze the medication profile of elderly inpatients; and to examine the association between polypharmacy, PIM use, and length of hospital stay.

Methods: A prospective observational study was conducted over a period of 6 momths at Government Medical College, Nagapattinam. A total of 75 elderly patients (aged ≥65 years) were enrolled. Demographic data, comorbidity burden, and complete medication profiles were recorded. PIMs were identified using Beers 2023 Criteria. Association between polypharmacy, PIM use, and LOS was assessed using independent samples t-test with $p<0.05$considered statistically significant.

Results: The majority of participants were aged 65–75 years (80%) with nearly equal gender distribution (male 49.3%, female 50.7%). The mean number of medications per patient was 6.9 ± 2.3. Polypharmacy was observed in 53.3% of patients, while PIM use was identified in 80.0% of patients. Patients with polypharmacy had a significantly higher mean LOS compared to those without polypharmacy (6.8 ± 2.1 vs 5.9 ± 1.8 days, $p = 0.043$). Similarly, patients with PIMs had a significantly higher mean LOS compared to those without PIMs (6.7 ± 2.0 vs 5.8 ± 1.7 days, $p = 0.032$).

Conclusion: Polypharmacy and PIM use are highly prevalent among elderly inpatients and are significantly associated with increased healthcare utilization, as reflected by prolon ged hospital stay. These findings highlight the importance of regular medication review and rational prescribing to optimize geriatric pharmacotherapy and reduce healthcare burden.

Keywords: Polypharmacy, Potentially Inappropriate Medications, Healthcare Utilization, Elderly, Beers Criteria.

CODE: PP-e-006
SPECIALIZATION: PP

TITLE: Development of an EMR-Informed Prototype Tool for Automated Chemotherapy Dose Calculation in Oncology Practice

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Background:

Accurate chemotherapy dosing is critical in oncology practice, as even minor deviations can significantly impact treatment outcomes and patient safety. During clinical oncology postings, it is often observed that dose calculations are performed manually using multiple parameters such as body surface area (BSA), renal function, and specific drug-based formulas, which increases the risk of calculation errors and variability in dosing. With the growing availability of patient data through electronic medical records (EMRs), there is a need for tools that can streamline and standardize this process.

Objective: To develop a prototype application for automated chemotherapy dose calculation using patient-specific clinical parameters integrated from EMR-based data inputs. Methods An Excel-based prototype tool was developed to automate chemotherapy dose calculations by incorporating key patient variables, including height, weight, BSA, body mass index (BMI), creatinine clearance (CrCl), and drug-specific dosing formulas such as the Calvert formula. The tool is designed to simulate integration with EMR data inputs, enabling real-time calculation and dose adjustment based on patient condition. Simulated patient cases reflecting real-world oncology scenarios were used to evaluate the functionality and clinical applicability of the tool.

Results

The prototype demonstrated accurate and consistent dose calculations across different chemotherapy regimens. It reduced manual calculation steps, minimized the risk of human error, and improved efficiency in dose determination. The tool also enabled quick adjustments based on changes in patient parameters, supporting safer and more precise chemotherapy dosing.

Conclusion

The developed prototype highlights the potential of EMR-informed tools in improving the accuracy and efficiency of chemotherapy dosing. Its implementation in clinical settings may enhance patient safety and support standardized oncology practice. Further validation in realtime clinical environments is recommended.

Keywords:

Chemotherapy; Dose Calculation; Oncology; Clinical Decision Support; EMR; Patient Safety

CODE: PP-e-007
SPECIALIZATION: PP

TITLE: EVALUATION OF RESTRICTED ANTIBIOTICS UTILIZATION IN A TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT:

Introduction:Restricted antibiotics are designed and aimed at combating multi-resistant organisms, with the goal of promoting the effective utilization of antimicrobials and markedly decreasing resistancepatterns among these agents . Some antibiotics fall under the restricted category due to worries about antibiotic resistance and the risk of improper usage resulting in treatment inefficacy.

Objectives:
The study aims to evaluate the restricted antibiotic utilization in a tertiary care teaching hospital, to assess the cost minimization of restricted antibiotic and to study medication related problems, if any with the restricted antibiotics.
Methods: A prospective observational study was conducted over 9 months at Adichunchanagiri Hospital & Research Centre (AH & RC). A total of 201 inpatients prescribed at least one restricted antibiotic were included, while pregnant, lactating women, and outpatients were excluded.
Data were collected using a structured form, capturing patient demographics, hospitalization details, treatment charts, and culture reports. The study focused on monitoring restricted antimicrobial rescriptions, identifying drug-drug interactions, and assessing adverse drug reactions. Acost-minimization analysis compared the actual cost of prescribed antibiotics to lower-cost alternatives. The analysis involved calculating the total cost of individual antibiotics using the prescribed brand versus the least expensive option and determining the cost difference and percentage savings. Ethical approval was obtained, and statistical analysis was performed using descriptive methods to generate insights on antibiotic use.
Results: This study assessed restricted antibiotic use among 201 inpatients at a tertiary hospital, revealing that 60.7% were male and 49.3% were adults. Most antibiotics were administered intravenously (83.6%), with Meropenem being the most common (71.1%). Single antibiotic prescriptions were prevalent (84%), often without susceptibility testing (78.1%). Most patients (90.5%) completed their course, with common comorbidities being single conditions (30.8%) and treatments typically lasting one week (46%). Adverse reactions, mostly from Meropenem, included icterus and headaches. Cost-minimization analysis showed significant savings with cheaper alternatives, underscoring the need for rational antibiotic use and targeted therapy.
Conclusion:

CODE: PP-e-009
SPECIALIZATION: PP

TITLE: Effect of Structured Pharmacist-Led Counselling on Knowledge, Nutritional Status, Inhaler Technique and Adverse Drug Reactions in COPD Patients: A Prospective Interventional Study

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BACKGROUND:

Chronic Obstructive Pulmonary Disease (COPD) management requires more than pharmacotherapy. Poor disease knowledge, improper inhaler technique, inadequate dietary patterns, and unrecognized adverse drug reactions (ADRs) contribute to poor outcomes.

OBJECTIVE:

To evaluate the impact of structured pharmacist-led counselling on disease knowledge, nutritional status, inhaler technique and inhaler-associated ADRs among COPD patients.

METHODS:

A prospective interventional study was conducted among 140 COPD patients in a tertiary care hospital. Baseline assessment included demographic data, Bristol COPD Knowledge Questionnaire (BCKQ), Healthy Eating Assessment Tool (HEAT), inhaler technique evaluation and ADR monitoring using the Naranjo causality assessment scale. Patients received structured counselling on disease education, smoking cessation, inhaler technique and dietary modification. Follow-up assessment was performed after 30 days. Pre- and post-intervention scores were compared using appropriate statistical tests.

RESULTS:

Significant improvement was observed in knowledge and dietary scores following counselling ($p < 0.001$). The proportion of patients with poor dietary scores decreased, while good and excellent categories increased. Inhaler technique errors were reduced following demonstration and reinforcement. Among reported ADRs, most were classified as possible according to Naranjo criteria, with oral thrush being the most common.

CONCLUSION: Structured pharmacist-led counselling significantly improves multidimensional outcomes in COPD patients. Incorporating pharmacist-based interventions into routine care may enhance disease management and reduce therapy-related complications.

KEYWORDS:

Chronic Obstructive Pulmonary Disease (COPD), Pharmacist-led counselling, Patient education, Inhaler technique, Nutritional status, Bristol COPD Knowledge Questionnaire (BCKQ), Healthy Eating Assessment Tool (HEAT), ADR.

AI-001

TITLE: Artificial Intelligence in Personalized Drug Therapy: Adopting Modern Pharmacy Practice

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Abstract:

Artificial Intelligence (AI) is rapidly modifying healthcare by enabling more accurate, efficient, and patient-focused drug therapy. In modern pharmacy practice, smart technologies are increasingly used to upgrade medication selection, and dosing, thereby improving therapeutic outcomes and minimize adverse drug reactions. This study focuses on the role of AI in personalized drug therapy and its applications in clinical decision support systems, and predict data processing, and patient information management.

AI algorithms enable analysing high-volume data, including patient history, genetic information, and clinical measurements, to recommend suitable plan of care. Predictive models assist pharmacists and physicians in identifying possible drug interactions, predicting patient care, and enhancing treatment adherence through technology. Moreover, AI-powered systems contribute to pharmacovigilance by identifying early signals of adverse effects/undesirable effects, safeguarding patient well-being.

Despite its promising potential, the fusion of AI in pharmacy practice faces challenges such as data protection, lack of standardized rules/procedures, and the need for skilled professionals to operate and decoding AI outputs. Ethical concerns and regulatory frameworks play an essential role in ensuring the safe and effective implementation of these technologies.

This study highlights the increasing importance of AI in advancing individuals care and also highlights the need for continuous research and interdisciplinary collaboration. By incorporating AI into medicines management/optimization, healthcare systems can achieve improved therapeutic outcomes, minimize healthcare costs, thus achieving enhanced performance in drug therapy management.

Keywords:

Artificial Intelligence, Predictive models, Pharmacovigilance, Skilled professionals, Regulatory frameworks, Drug Therapy, Medicine Management.

AI-003

TITLE: PYTHON PROGRAMMING IN PHARMACY

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Abstract:

Python programming has emerged as a powerful and versatile tool in the field of pharmacy, offering innovative solutions in pharmaceutical research, drug discovery, data analysis, automation, and healthcare management. Its simplicity, flexibility, and wide range of scientific libraries have made it highly suitable for solving complex pharmaceutical problems. In pharmaceutical research, large volumes of data are generated from experiments, clinical trials, and patient records. Python, with libraries such as NumPy, Pandas, and SciPy, enables efficient data processing, statistical analysis, and accurate interpretation of research findings. Visualization tools like Matplotlib further help researchers present results in a clear and meaningful manner. Python also plays an important role in drug discovery and molecular modelling by supporting chemical structure analysis, molecular simulations, and virtual screening of drug candidates, which reduces time and cost in the drug development process. In pharmacy practice, Python is widely used for automating routine tasks such as inventory control, prescription processing, billing, and report generation, thereby reducing human error and improving workflow efficiency. In clinical pharmacy, Python-based systems assist in dosage calculations, detection of drug interactions, and therapeutic drug monitoring, ultimately improving patient safety and treatment outcomes. Python is also increasingly used in pharmacy education, where students apply it to pharmacokinetics, data analysis, and research projects, enhancing their analytical and computational skills. Moreover, Python supports pharmacovigilance by analysing adverse drug reaction data to identify safety signals and ensure regulatory compliance. In conclusion, Python programming has become an essential technological tool in modern pharmacy, supporting research, clinical decision making, automation, and education. Its continuous integration with artificial intelligence and data science is expected to further advance pharmaceutical sciences and healthcare services in the future.

Keywords:
Pharmaceutical research, Drug discovery, Python libraries, Matplotlib, Data Analysis.

AI-004

TITLE: Next-Generation AI-Based Drug Discovery: A Multi-Modal Framework for Accelerated Therapeutic Development

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Abstract:

Artificial Intelligence (AI) is redefining the landscape of pharmaceutical innovation by addressing longstanding challenges associated with conventional drug discovery, including protracted development timelines, high attrition rates, and escalating costs. This study introduces a novel Hybrid Multi-Layer AI Drug Discovery Framework (HML-AIDD), strategically designed to enable accelerated drug candidate identification during the early stages of therapeutic development. The framework synergistically integrates deep learning–driven molecular generation, reinforcement learning–based lead optimization, and graph neural network–mediated drug–target interaction prediction within a unified, multi-modal architecture.

By harnessing heterogeneous datasets encompassing genomics, proteomics, chemical libraries, and real-world clinical data, HML-AIDD facilitates high-throughput, adaptive, and parallelized screening of potential drug candidates. In contrast to traditional linear and resource-intensive methodologies, this integrative approach significantly enhances screening efficiency and expedites hit identification. Empirical insights drawn from recent AI-enabled applications in antiviral discovery, oncology therapeutics, and antimicrobial resistance further substantiate the framework's capability to streamline early-stage drug development.

The proposed model demonstrates the potential to compress drug discovery timelines from several years to a matter of months, while preserving the robustness and reliability of candidate selection. This acceleration not only optimizes resource allocation but also strengthens the translational potential of identified compounds. Despite persisting challenges related to data bias, model interpretability, and regulatory integration, HML-AIDD represents a scalable and forward-looking paradigm for next-generation drug discovery. Ultimately, this study underscores the pivotal role of AI in revolutionizing early-stage screening by enabling rapid, efficient, and data-driven identification of promising therapeutic candidates.

Keywords: Artificial Intelligence (AI), Deep Learning, Reinforcement Learning, Graph Neural Networks (GNN), Multi-Modal Learning.

AI-005

TITLE: Artificial Intelligence-Enhanced Pharmacovigilance: Revolutionizing Adverse Drug Reaction Identification

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Abstract:

Adverse drug reactions (ADRs) pose a major global health issue, leading to higher rates of morbidity, mortality, and placing a financial strain on healthcare systems. It is believed that a significant number of ADRs go unreported due to the shortcomings of conventional pharmacovigilance systems, which mainly depend on spontaneous reporting. These systems frequently suffer from delayed signal recognition, incomplete information, and reporting biases, which impede the swift identification of possible drug safety concerns. In this regard, the incorporation of Artificial Intelligence (AI) into pharmacovigilance has emerged as a revolutionary strategy to improve ADR detection and drug safety oversight.

This research intends to examine the contribution of AI-based technologies, particularly machine learning (ML) and natural language processing (NLP), in boosting efficiency. and accuracy of pharmacovigilance systems. AI algorithms can process and analyse large volumes of structured and unstructured data from diverse sources such as electronic health records, clinical trial databases, and social media platforms. These advanced tools facilitate early signal detection, real time monitoring, and improved causality assessment, enabling a shift from reactive to proactive pharmacovigilance practices.

Furthermore, AI-based systems support automation in case processing, data extraction, and prioritization of high-risk ADRs, thereby reducing manual workload and enhancing operational efficiency. Despite these advantages, challenges such as data privacy concerns, lack of transparency in algorithmic decision-making, and regulatory acceptance must be addressed to ensure successful implementation.

In conclusion, AI-driven pharmacovigilance holds immense potential to revolutionize ADR detection, improve patient safety, and support evidence-based regulatory decision-making in the evolving healthcare landscape.

AI-006

TITLE: THE DECENTRALIZED PARADIGM: REVOLUTIONIZING CLINICAL RESEARCH THROUGH DIGITAL BIOMARKERS AND PASSIVE SURVEILLANCE

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Abstract:

The healthcare paradigm is currently undergoing a fundamental shift from episodic, clinic-based assessments toward continuous, real-world monitoring. This evolution is driven by the synergy between digital biomarkers—objective, quantifiable physiological, behavioural measures—and passive surveillance, the seamless collection of data without requiring active participant engagement. Digital biomarkers leverage the ubiquitous sensor suites within smartphones and wearables, such as accelerometers, gyroscopes, and PPG sensors, to capture high-fidelity data on gait, sleep architecture, and autonomic activity. Unlike traditional "snapshot" biomarkers, digital indicators provide longitudinal insights that reflect a patient's "free-living" state. When embedded within passive surveillance frameworks, these tools effectively eliminate participant burden, thereby increasing data adherence and eradicating the recall bias inherent in traditional self-reporting. Current applications demonstrate significant clinical promise, particularly in the early detection of neurodegenerative and cardiovascular disorders. Subtle alterations in "digital exhaust"—such as keystroke dynamics or vocal patterns—can serve as prodromal signatures for conditions like Parkinson's disease years before clinical manifestation. Furthermore, in the realm of clinical trials, passive surveillance facilitates decentralized designs and the collection of robust Real-World Evidence (RWE). While challenges regarding data privacy, algorithmic validation, and the signal-to-noise ratio in complex environments remain, the 2026 landscape of advanced AI is increasingly capable of translating raw data into actionable insights. Ultimately, the fusion of digital biomarkers and passive surveillance promises a move toward a more proactive, predictive, and patient-centric healthcare ecosystem.

Keywords: Digital Biomarkers, Passive Surveillance, Real-World Evidence, Decentralized Designs.

AI-007

TITLE: AI Driven Clinical Aid for Precision Diabetology in Low Resource Settings

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ABSTRACT

Background: Type 2 Diabetes Mellitus is a prevalent condition in India, however, the shortage

of specialized endocrinologists and limited access to routine clinical monitoring has hindered the management of diabetes. In this scenario, Artificial Intelligence (AI) offers a transformative potential for personalized healthcare, especially for precision medicine in chronic disorders.

Objectives: This comprehensive systematic review aims at assessing the current AI software and tools for glycemic prediction and precision nutrition and to propose a practical pharmacist-led clinical workflow that integrates these tools to curate a personalized regimen for diabetic patients.

Methods: The review was conducted over a wide range of published articles on PubMed, spanning the last 5 years, focusing on the study of Recurrent Neural Networks (RNNs) for predictive analysis. Additionally, AI tools for diabetic nutrition that analyze the gut microbiome to provide patient glycemic response data were also evaluated. Special emphasis was made on tools that utilize minimal data inputs and basic digital biomarkers, keeping in mind the feasibility in a low resource setting (LRS).

Results: Evidence proves that AI models for glycemic forecasting have the potential to achieve high accuracy in terms of glycemic prediction as well as determining dietary patterns. Key findings also suggest the use of 'Digital Twin' simulations to predict patient metabolism, offering an economical alternative to intensive clinical monitoring. Proposed Clinical Workflow: A Pharmacist-led system that utilizes the knowledge of drugs, combined with efficient AI tools is the most reliable approach for diabetic management in an LRS. This involves identifying high risk patients through predictive screening and curating personalized medication using metabolic modelling as well as providing AI-augmented nutrition design.

Keywords: Type 2 Diabetes, Artificial Intelligence, Low Resource Setting, precision medicine, personalized healthcare.

AI-008

TITLE: ARTIFICIAL INTELLIGENCE IN HEALTHCARE

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POSTER PRESENTATION (AI IN PHARMA AND DIGITAL HEALTH)

Abstract:

Artificial Intelligence (AI) is rapidly transforming the healthcare sector by enhancing efficiency, accuracy, and patient-centred care. AI technologies such as machine learning and deep learning enable the analysis of vast amounts of medical data, improving diagnostic precision, especially in medical imaging and pathology. Electronic Health Records (EHRs) are optimized through AI for better data management and clinical decision-making. In surgical settings, robot-assisted systems enhance precision, reduce invasiveness, and improve patient outcomes.AI also plays a vital role in disease prediction and risk assessment by identifying patterns in patient data, allowing early detection and preventive interventions for conditions such as cancer, diabetes, and cardiovascular diseases. In drug discovery and development, AI accelerates the identification of potential compounds, reduces costs, and improves success rates. Virtual assistants and chatbots provide accessible healthcare support, patient education. Furthermore, AI contributes to precision medicine by analysing genetic and clinical data to

tailor personalized treatment plans. Remote patient monitoring systems powered by AI enable continuous health tracking and timely interventions, especially for chronic conditions. Despite its advantages, AI in healthcare faces challenges such as data privacy concerns, ethical issues, system integration complexities, and the need for clinician trust. Overall, the integration of AI holds immense potential to revolutionize healthcare delivery, making it more efficient, accessible, and effective while emphasizing the importance of ethical implementation and collaboration with medical professionals.

Keywords: Artificial intelligence, Machine learning, electronic health care records, Patient data, Healthcare delivery

AI-009

TITLE: Emergence of an early Dengue outbreak detected through Artificial Intelligence-powered health data analysis.

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Abstract:

In India, Dengue is becoming a serious public health issue. Over the past few years' dengue cases have shown significant rise in hospitals. Having early awareness of an outbreak would be extremely beneficial for any surveillance team. Currently, dengue surveillance systems often fail to detect early trends or the inset of outbreaks in a timely manner. Since these alerts rely on reported data, they are often delayed and therefore less effective. To address this challenge, we use AI to predict future dengue outbreaks. For this study, historical dengue cases data were collected from publicly available sources, including Our World in Data and national medical reports. Over time, the data was examined to identify regional patterns, recurring hotspots, and any unusual changes in dengue transmission. Monsoon season usually coincides with peak in dengue cases. In order to predict dengue outbreaks, computers that analyse health & patient flow data at major hospitals were instructed to include information about crowd and weather patterns. Previous year-based outcome revealed a good correlation with actual dengue cases by using only numbers and data on temperature changes. In some instances, the software identified spikes in Dengue cases before reported. The system previously warned of spikes in dengue cases based on humidity levels. Using AI for public health monitoring can help identify patterns in data sooner than humans can, thus allowing for earlier decision in order to address emerging risk before they spread. This enables the rapid delivery of supplies and medications to healthcare facilities, reducing response time from days to hours and helping to control dengue outbreaks.

Keywords- Public health monitoring, Outbreak prediction, Early detection, Predictive Analytics, Digital Epidemiology.

AI-010

TITLE: Artificial Intelligence-Based Prediction of Adverse Drug Reactions for Safer Personalized Therapy

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Abstract:

Background: Adverse drug reactions (ADRs) cause 5-10% of hospital admissions worldwide and contribute to 100,000+ annual deaths in the US. Conventional pharmacovigilance relies on spontaneous reporting systems (FAERS, Yellow Card Scheme) that are reactive, under-reporting ADRs by >90%, and detect events only post-occurrence. Artificial intelligence (AI) enables proactive prediction using electronic health records (EHRs), genomic profiles, laboratory parameters, and medication histories to identify high-risk patients before prescribing.

Methods: Comprehensive literature search of PubMed, Scopus, Google Scholar (2014-2024). From 3,247 records, n=38 studies included using PICOS criteria: Patients on polypharmacy (≥3 medications); Intervention: AI/ML algorithms (supervised learning, deep neural networks, random forests, XGBoost); Comparator: rule-based systems/traditional pharmacovigilance; Outcomes: AUC≥0.80, sensitivity/specificity ≥75%; Study design: prospective validation cohorts (n≥500).

Excluded: case reports, non-validated algorithms, cross-sectional studies.

Results: AI models demonstrated superior performance: AUC 0.85-0.94 for severe cutaneous reactions (SJS/TEN) 82% sensitivity, 88% specificity for QT prolongation prediction 79% accuracy in drug-drug interaction (DDI) detection vs. 62% rule-based Deep learning on EHRs predicted myocardial infarction risk with 91% precision (7-day lead time) Random Forest/XGBoost outperformed logistic regression by 15-22% AUC.

Clinical Pharmacist Role: Clinical pharmacists operationalize AI predictions through: (1) Real-time high-risk prescription alerts; (2) Genotype-guided dosing (CYP2C19 for clopidogrel, TPMT for thiopurines); (3) Prospective medication reviews reducing ADRs by 27%; (4) AI-clinical judgment reconciliation; (5) Provider education on predictive black-box warnings.

Conclusion: AI transforms pharmacovigilance from reactive to predictive (AUC 0.85-0.94), reducing preventable ADRs by 25-35% across 38 validated studies. Pharmacist integration ensures clinical validity, medication safety, and personalized therapy despite data privacy/bias challenges.

Keywords: Artificial Intelligence, Adverse Drug Reactions, Pharmacovigilance, Machine Learning, Clinical Pharmacy.

AI-011

TITLE: Beyond Antibiotics: Integrating AI-Driven Phage Banks and Synergistic Therapeutics to Combat Multidrug-Resistant Superbugs

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ABSTRACT

Background: The escalation of antimicrobial resistance (AMR) has rendered many "last-resort" antibiotics ineffective, turning common infections into life-threatening "superbugs." While bacteriophage therapy offers a promising alternative, its widespread adoption has been hindered by the high specificity of phages and the speed at which bacteria develop resistance. Modern advancements in Artificial Intelligence (AI) and evolutionary biology now offer a path to transform this century-old concept into a high-tech, precision medicine.

Objectives: This presentation explores the dual-integration of AI-optimized phage selection and Phage-Antibiotic Synergy (PAS) as a novel framework for managing pan-drug resistant infections and rare orphan diseases. Methodology/Approach: We examine the transition from generic "phage cocktails" to AI-driven personalised phage banks. By leveraging machine learning algorithms to analyze bacterial genomes, researchers can now "match" the most effective phage to a patient's specific strain in real-time. Furthermore, we analyze the mechanism of Phage-Antibiotic Synergy (PAS)—an evolutionary strategy where phages are used to "re-sensitize" bacteria to traditional antibiotics by forcing evolutionary trade-offs, such as the loss of efflux pumps or biofilm degradation.

Results/Discussion: Case studies demonstrate that AI-guided matching significantly reduces the "time-to-treatment" window, which is critical in acute superbug infections. Additionally, the application of PAS has shown a "1+1=3" effect, where sub-lethal doses of antibiotics become highly effective when paired with the correct phage. This approach is particularly transformative for orphan diseases, such as Cystic Fibrosis-related infections, where chronic colonization requires highly specific, low-toxicity interventions.

Conclusion: The integration of AI and synergistic therapeutics moves phage therapy from a compassionate-use "last resort" to a scalable, precision-engineered solution. By creating an "evolutionary trap" for superbugs, this personalized approach provides a robust roadmap for the post-antibiotic era.

Keywords: Antimicrobial Resistance (AMR), Artificial Intelligence, Bacteriophage therapy, Phage-Antibiotic Synergy (PAS), Personalized Medicine.

AI-011

TITLE: Beyond Antibiotics: Integrating AI-Driven Phage Banks and Synergistic Therapeutics to Combat Multidrug-Resistant Superbugs

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ABSTRACT

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Conclusion: The integration of AI and synergistic therapeutics moves phage therapy from a compassionate-use "last resort" to a scalable, precision-engineered solution. By creating an "evolutionary trap" for superbugs, this personalized approach provides a robust roadmap for the post-antibiotic era.

Keywords: Antimicrobial Resistance (AMR), Artificial Intelligence, Bacteriophage therapy, Phage-Antibiotic Synergy (PAS), Personalized Medicine.

AI-013

TITLE: AI-Based Early Detection of Adverse Drug Reactions Using Patient-Reported Data

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Abstract: -

Medicine is very important for improving people's health. Sometimes they can cause bad and unexpected side effects, known as Adverse Drug Reactions. It is important to find out about these Adverse Drug Reactions early so that patients are safe. The current systems that monitor these problems mostly rely on doctors and other healthcare professionals to report them, and this often happens too late. This study is about a way of doing things that puts the patient first and uses Artificial Intelligence to look at the information that patients report in real time. In this model, patients use their phones and computers or the application to tell us about how they're feeling, what they are experiencing, and what medicines they are taking. Then we use Artificial Intelligence, including Machine Learning, to look at all this information and find out if there are any patterns or potential problems with the medicines.

This way, we can give warnings early so that something can be done to stop the side effects from getting worse. This approach is not only faster and more accurate, but it also gets patients more involved in their own healthcare. By getting patients to report their experiences and using Artificial Intelligence to analyze the information, we can make the systems that watch out for Adverse Drug Reactions work better.

The study shows that using Artificial Intelligence can make a difference in how we report and find out about Adverse Drug Reactions. It can make the process faster, more reliable, and more efficient. If we use this kind of system, we can reduce the problems caused by adverse effects, make medicines safer, and help patients achieve better outcomes. This research is important because it shows that we can use health technologies and get patients involved to make a system that watches out for medication safety and works well.

Keywords: Adverse Drug Reactions, Artificial Intelligence, Pharmacovigilance, Patient-Reported Data, Early Detection, Machine Learning, Drug Safety.

AI-014

TITLE: International Conference on Advancing Pharmaceutical Sciences in the Era of AI, Innovation, Global Health & Career Transformation (ICAPS 2026)

29–30 April 2026 | Sultan-ul-Uloom College of Pharmacy, Hyderabad
Track 2: Artificial Intelligence, Data Science & Digital Health

Artificial Intelligence in Personalized Medicine: A Narrative Review on Machine Learning Applications in Drug Dosing Optimization and Patient OutcomesMohammed Salman

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ABSTRACT

The integration of Artificial Intelligence (AI) and Machine Learning (ML) in pharmaceutical sciences is rapidly transforming the landscape of personalized medicine. Traditional drug dosing strategies often follow standardized protocols that fail to account for individual patient variability in genetics, metabolism, comorbidities, and lifestyle factors. AI-driven approaches offer a paradigm shift by enabling precise, patient-specific therapeutic interventions.

This narrative review explores the current applications of machine learning algorithms in drug dosing optimization, pharmacokinetic modelling, and clinical outcome prediction. Various ML models including random forests, neural networks, and deep learning frameworks have demonstrated significant potential in predicting optimal drug concentrations, minimizing adverse drug reactions, and improving therapeutic efficacy across disease areas such as oncology, cardiovascular diseases, and infectious diseases.

Furthermore, AI-powered digital health tools such as smart wearables and mobile health applications are increasingly being integrated into patient monitoring systems, enabling real-time dose adjustments based on continuous physiological data. The role of natural language processing in extracting clinically relevant patterns from electronic health records further strengthens the foundation for data-driven personalized pharmacotherapy.

Despite promising advancements, challenges including data privacy concerns, algorithmic bias, lack of regulatory frameworks, and limited clinical validation remain significant barriers to widespread adoption. This review highlights the urgent need for interdisciplinary collaboration among pharmacists, clinicians, data scientists, and regulatory bodies to responsibly integrate AI into mainstream pharmaceutical practice.

As future healthcare professionals, pharmacists must embrace AI literacy to remain relevant and contribute meaningfully to the evolving digital health ecosystem.

Keywords: Artificial Intelligence, Personalized Medicine, Machine Learning, Drug Dosing Optimization, Digital Health

AI-015

TITLE: ROLE OF ARTIFICIAL INTELLEGIENCE IN IMPROVING PHARMACOVIGILANCE AND ADVERSE DRUG REACTION REPORTING.

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Abstract:

Pharmacovigilance is essential for ensuring drug safety through the detection, assessment, and prevention of adverse drug reactions (ADRs). However, underreporting of ADRs and inefficiencies in traditional reporting systems continue to limit its effectiveness. Artificial Intelligence (AI) has emerged as a transformative approach to overcome these challenges by

enabling advanced data analysis and automation. AI-driven systems can process large-scale healthcare data from sources such as electronic health records, clinical databases, and global pharmacovigilance platforms like WHO–VigiBase and VigiFlow. Machine learning algorithms can identify patterns, detect previously unrecognized ADRs, and predict potential drug safety risks with higher accuracy and speed compared to conventional methods. Additionally, natural language processing (NLP) techniques allow extraction of relevant information from unstructured data, including clinical notes and patient reports, thereby improving signal detection. AI also facilitates automated ADR reporting, reducing manual workload and enhancing data quality. The integration of AI into pharmacovigilance supports real-time monitoring and strengthens clinical decision-making processes. Despite challenges such as data privacy, algorithm validation, and the requirement for high-quality datasets, AI-based pharmacovigilance systems demonstrate significant potential in improving drug safety surveillance. Overall, the application of AI can significantly enhance ADR detection, optimize reporting systems, and contribute to improved patient outcomes and safer therapeutic practices. Future integration of AI with global pharmacovigilance databases and regulatory frameworks will further strengthen drug safety monitoring systems.

Keywords: Pharmacovigilance, Artificial Intelligence, Adverse Drug Reactions, Machine Learning, VigiBase

AI-016

TITLE: Artificial Intelligence for Early Detection of Diabetic Cardiomyopathy: A New Era in Preventive Cardiology

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Abstract

Introduction:

Diabetic cardiomyopathy (DCM) is a major yet underdiagnosed complication of diabetes mellitus, characterized by structural and functional myocardial abnormalities independent of hypertension or coronary artery disease. Its insidious onset and lack of early symptoms make timely diagnosis challenging, often leading to progression toward heart failure. Conventional diagnostic approaches, including echocardiography and biomarkers, are limited in detecting subtle early-stage changes, highlighting the urgent need for more sensitive and predictive tools.

Objectives:

Artificial Intelligence (AI) has emerged as a transformative approach in cardiovascular medicine, offering advanced capabilities in data analysis, pattern recognition, and predictive modelling. Machine learning (ML) and deep learning (DL) algorithms can integrate large-scale multimodal data-such as electrocardiograms, imaging, clinical records, and genomic information-to identify hidden patterns associated with early myocardial dysfunction. AI-enhanced techniques have demonstrated high accuracy in detecting subclinical cardiac abnormalities, improving disease stratification, and enabling early risk prediction.

Methods:

Recent advancements also combine AI with emerging diagnostic modalities, including biomarker profiling and sequencing technologies, to enhance sensitivity in detecting early

myocardial injury and metabolic alterations. These integrative approaches facilitate personalized diagnosis and support preventive cardiology by enabling early intervention before irreversible cardiac damage occurs.

Results:

Despite its promise, challenges remain, including data standardization, model interpretability, and clinical validation. However, the integration of AI into routine clinical practice holds significant potential to revolutionize early detection strategies for DCM.

Conclusion:

Al-driven diagnostic approaches represent a new era in preventive cardiology, offering improved accuracy, early detection, and personalized management, ultimately aiming to reduce the burden of diabetic heart disease.

Keywords: Artificial intelligence (AI), Diabetic cardiomyopathy, Early detection, Preventive Cardiology

AI-017

TITLE: Artificial Intelligence -Driven Pharmacy Sales monitoring for early outbreak detection

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Abstract:

Over-the-counter (OTC) medications are often the first line of defence during the early stages of illness. A sudden surge in the sale of antipyretics, cough suppressants, or antidiarrheal agents frequently serves as a leading indicator of community-wide disease activity. This retail spike often precedes formal medical consultations, offering a window for early intervention. A classic example occurred during the 1993 Milwaukee cryptosporidiosis outbreak, where a massive shortage of antidiarrheal drugs signalled the crisis before hospitals were overwhelmed. Milwaukee's 1993 outbreak was signalled by early antidiarrheal sales surges.

Syndromic surveillance systems are designed to complement traditional methods by providing continuous, real-time monitoring of these symptomatic trends. In New York City, OTC medication sales have been incorporated into syndromic surveillance systems for monitoring influenza-like and gastrointestinal illnesses. Similar pharmacy-based surveillance models have also been explored in Japan and other countries, demonstrating the feasibility of using retail medication data for early outbreak detection. Combining pharmacy sales with AI-based pattern recognition may help identify abnormal trends and enable timely interventions.

Objective

To describe the role of artificial intelligence in monitoring pharmacy sales data for the early detection of disease outbreaks and to highlight its potential as a robust, real-time public health surveillance tool.

Methodology

Pharmacy sales data, harvested from electronic billing records, are categorised into symptom-based groups, including respiratory, gastrointestinal, and antipyretic agents. AI-based models analyse these daily sales patterns, comparing them against historical baselines. Anomaly detection techniques are employed to identify significant deviations from expected levels.

When abnormal increases are detected across related drug categories, the system generates automated alerts for public health officials.

Conclusion

AI-driven analysis of pharmacy sales data provides a cost-effective, scalable, and real-time approach to syndromic surveillance. By identifying potential outbreaks before they escalate into hospital-based crises, this technology enables timely public health interventions and improves overall community resilience.

Keywords: Artificial intelligence, pharmacy sales, syndromic surveillance, outbreak detection, public health monitoring.

AI-018

TITLE: AI-Driven Pharmacovigilance: Natural Language Processing in Adverse Drug Reaction Reporting.

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ABSTRACT

Background:

Adverse Drug Reaction (ADR) reporting is a critical component of pharmacovigilance; however, underreporting and reliance on manual systems limit its effectiveness. A large volume of clinically relevant information exists in unstructured healthcare data such as electronic health records (EHRs), clinical notes, and patient-generated content, necessitating advanced analytical approaches like Natural Language Processing (NLP).

Objective:

To present a conceptual framework and summarize current evidence on the application of NLP and Machine Learning (ML) techniques to enhance ADR detection and reporting.

Methodology:

A structured review of literature (2018–2024), including a recent scoping review, was conducted to identify NLP/ML approaches for detecting adverse drug events (ADEs) from unstructured EHR data. Techniques such as rule-based methods, statistical models, and deep learning were analyzed. A stepwise framework was developed incorporating data acquisition, text pre-processing, named entity recognition, relationship extraction, and automated signal detection.

Results and Implications:

NLP-based systems improve detection of underreported ADRs by extracting drug–event associations from free-text data and identifying previously unrecognized safety signals. For instance, an NLP model analysing EHR clinical notes identified repeated mentions of skin rash and itching in patients prescribed amoxicillin, despite the absence of formal ADR reports, thereby flagging a potential safety signal. Compared to traditional methods, these approaches

enhance detection accuracy, reduce reporting delays, and support large-scale, real-time pharmacovigilance. However, variability in methodologies, lack of standardization, and challenges in validation limit widespread implementation.

Conclusion:
AI-driven NLP techniques offer significant potential to transform ADR reporting by enabling automated, accurate, and scalable pharmacovigilance. Future efforts should focus on standardization, real-world validation, and addressing data privacy and algorithmic bias.

Keywords: Natural Language Processing, Adverse Drug Reaction, Pharmacovigilance, Artificial Intelligence, Machine Learning, Text Mining.

AI-019

TITLE: Role of Artificial Intelligence in Improving Pharmacy Practice

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Abstract:

Artificial Intelligence (AI) is rapidly transforming healthcare systems, including pharmacy practice, by enhancing efficiency, accuracy, and patient outcomes. AI refers to the use of computer systems capable of performing tasks that typically require human intelligence, such as decision-making, pattern recognition, and data analysis. In pharmacy practice, AI is increasingly being integrated into various domains, including drug dispensing, medication management, clinical decision support, and patient counselling.

AI-powered tools help pharmacists reduce medication errors by ensuring accurate dispensing and dosage calculations. Clinical Decision Support Systems (CDSS) assist in identifying potential drug interactions, adverse drug reactions, and contraindications, thereby improving patient safety. Additionally, AI can analyze large volumes of patient data to provide personalized treatment recommendations, supporting the concept of precision pharmacotherapy.

Another significant contribution of AI is in improving medication adherence through mobile applications and digital health platforms that provide reminders and monitoring. AI chatbots and virtual assistants also play a role in patient education by delivering reliable drug information and answering common queries. Furthermore, automation of routine tasks allows pharmacists to focus more on patient-centred care and clinical responsibilities.

Despite its advantages, challenges such as data privacy concerns, high implementation costs, and the need for technical expertise must be addressed for effective integration of AI in pharmacy practice. Overall, AI has the potential to revolutionize pharmacy services by improving accuracy, enhancing patient safety, and optimizing therapeutic outcomes. Its continued development and adoption will play a crucial role in shaping the future of pharmacy practice.

Keywords: Artificial Intelligence, Pharmacy Practice, Patient Safety, Clinical Decision Support Systems, Medication Adherence

AI-020

TITLE: SMART CHIPS, SMARTER PILLS: ADVANCING PRECISION TREATMENT

CATEGORY: AI & DIGITAL INNOVATION

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Abstract:

Radiofrequency (RF) microchips represent a revolutionary leap in the medical landscape, offering unprecedented capabilities in patient monitoring, therapeutic delivery, and clinical safety. By leveraging electromagnetic wave technology, these compact electronic components facilitate fluid data exchange between medical hardware and digital health platforms. The incorporation of these chips into clinical workflows and medicinal delivery systems is rapidly architecting a more interconnected, "intelligent" healthcare infrastructure.

A primary benefit of RF integration lies in the optimization of medication compliance. Through the use of RF-equipped smart packaging and ingestible biosensors, clinicians can remotely verify whether patients are following prescribed treatment regimens. A notable application already in practice is the "digital pill" within psychiatric medicine, where real-time ingestion alerts assist in maintaining therapeutic adherence. Furthermore, RF-linked wearable technology has become indispensable for the constant surveillance of health indices, including blood glucose metrics, cardiac rhythms, and physical activity levels.

Beyond direct patient care, RF technology strengthens the integrity of the pharmaceutical supply chain. By utilizing these chips for drug authentication and tracking, stakeholders can effectively mitigate the global risk of counterfeit medications. Within hospital settings, these systems are also deployed to manage inventory, allowing for precise tracking of medical assets and increased operational productivity.

However, the path to universal adoption is not without obstacles. Significant hurdles remain, specifically regarding the financial burden of large-scale deployment, the complexity of regulatory approval, and stringent data security requirements. Maintaining the confidentiality and ethical handling of patient data remains the cornerstone of building public trust in these connected systems.

Ultimately, this analysis underscores the expanding influence of RF microelectronics in the evolution of personalized and digital medicine. By refining treatment adherence, expanding observational capabilities, and safeguarding the global drug supply, RF technology is positioned to serve as a cornerstone of future pharmacy practice and patient-centered healthcare.

Keywords: Radiofrequency (RF) Microchips, Digital Health Technologies, Hospital Inventory Management, Real-Time Health Analytics, AI-Driven Healthcare Systems, Data Privacy & Cybersecurity.

AI-021

TITLE: Pharmacist-Driven Predictive Epidemiology: Integrating Community Data and AI for Early Outbreak Detection

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ABSTRACT

Background:
Pharmacists are often the first healthcare professionals to encounter symptomatic individuals, making their data invaluable for early disease detection. Their accessibility and trusted role in communities position them as critical nodes in health surveillance networks.

Methods:
A predictive epidemiology framework was conceptualised using anonymised pharmacy transaction data, symptom reports, and AI based clustering algorithms. The model integrates temporal and spatial analytics with machine learning to forecast potential outbreak zones. It also incorporates feedback loops with public health authorities to refine predictions and ensure ethical data use.

Results:
The framework demonstrated promising potential in identifying early outbreak signals at the community level, with improved timeliness compared to conventional reporting systems. Anticipated outcomes include enhanced accuracy of localised disease forecasts, reduced delays in public health response, and strengthened collaboration between pharmacists and epidemiologists. By embedding pharmacists into digital health ecosystems, the model is expected to improve resilience against emerging infectious threats.

Conclusion:
Integrating pharmacists into predictive epidemiological networks can transform community health surveillance, enabling data driven preparedness and redefining the pharmacist's role in global health resilience. This approach highlights the untapped potential of pharmacy data in shaping proactive public health strategies.

Keywords:

Pharmacist, Predictive Epidemiology, AI, Public Health, Disease Surveillance

AI-022

TITLE: AI-Supported Medication Error Detection in Prescriptions

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Abstract:

Medication errors are a common yet preventable cause of patient harm, especially in busy clinical settings where prescriptions are reviewed under time pressure. This study proposes a

practical, AI-supported model to assist in the early detection of medication errors during prescription screening.

The system is designed to analyse prescription details using established drug databases and clinical guidelines. It focuses on identifying common issues such as drug–drug interactions, incorrect dosing, duplicate therapies, and contraindications. Basic patient parameters, including age and relevant clinical information, are incorporated to improve the accuracy of risk identification. Based on predefined decision rules, the system generates simple, graded alerts that help prioritise potential risks.

Importantly, this model does not aim to replace the pharmacist. Instead, it functions as a decision-support tool, enabling faster and more consistent screening while allowing pharmacists to retain full control over clinical decisions. The workflow is designed to fit seamlessly into routine practice, making it suitable even for high-volume or resource-limited settings.

By supporting timely identification of medication-related risks, the proposed model has the potential to reduce errors, improve patient safety, and enhance the overall quality of care. This approach highlights how thoughtfully integrated digital tools can strengthen existing clinical practices without adding unnecessary complexity.

Keywords: Medication errors, artificial intelligence, clinical decision support, patient safety, Prescriptions

AI-023

TITLE: From Genes to Treatment: AI-Enabled Pharmacogenomic Decision Support in Clinical Practice.

Field: Translational Medicine & Clinical Investigation

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Abstract:

The traditional "universal" approach to prescribing medication is being replaced by personalized medicine, a transformative strategy that utilizes an individual's unique genetic profile to dictate treatment. By integrating pharmacogenomics, healthcare providers can move away from trial-and-error prescribing, instead focusing on selecting the most effective drugs and precise dosages. This transition not only boosts the success rate of interventions but also significantly mitigates the danger of toxic drug reactions.

Practical applications are already reshaping specialty care. In oncology, for instance, genetic screenings are now utilized to identify which patients will benefit most from specific anti-cancer agents, thereby preventing the administration of ineffective and harmful treatments. Similarly, genomic insights in cardiovascular medicine help doctors manage the diverse ways patients metabolize heart medications, allowing for more accurate clinical decisions.

While rapid developments in DNA sequencing and computational biology have increased the feasibility of these methods, several roadblocks remain. High implementation costs, complex ethical dilemmas, and a lack of seamless integration into hospital workflows continue to limit

progress. Furthermore, a deficiency in technical infrastructure and professional training in emerging economies prevents the global scaling of these innovations.

This analysis examines the vital role of genetic-based prescribing in improving long-term health outcomes. By fostering a model of targeted therapy, personalized medicine offers a dual benefit: it enhances patient recovery and reduces the financial burden of the healthcare system by avoiding the costs associated with failed treatments. As this field evolves, it is set to become an essential pillar of modern medicine, leading the way toward a more precise, patient-centric future.

Keyword: Personalized medicine, Pharmacogenomics, Genomic pharmacology, Precision therapeutics, Targeted therapy, Genetic profiling.

AI-024

TITLE: AI-Based Cost-Effectiveness Analysis of Pembrolizumab Monotherapy vs Combination Therapy in PD-L1 Positive Non-Small Cell Lung Cancer

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Abstract:

Non-Small Cell Lung Cancer (NSCLC) accounts for the majority of lung cancer cases and imposes a substantial economic burden in India, necessitating value-based treatment strategies. Expression of PD-L1 guides immunotherapy decisions, with Pembrolizumab used either as monotherapy or in combination with chemotherapy. This study evaluated the cost-effectiveness of these approaches using an AI-integrated Markov model over a 10-year horizon from an Indian healthcare payer perspective, incorporating clinical data from KEYNOTE trials and cost inputs from PMJAY, NPCDCS, and hospital tariffs. Outcomes were measured in quality-adjusted life years (QALYs) and incremental cost-effectiveness ratio (ICER), with sensitivity analyses to assess robustness. Pembrolizumab monotherapy yielded 2.9 QALYs at a total cost of ₹18.5 lakhs, whereas combination therapy produced 3.8 QALYs at ₹32.8 lakhs, resulting in an ICER of ₹15.88 lakhs per QALY gained, exceeding commonly accepted willingness-to-pay thresholds in India (~₹5–10 lakhs/QALY). Overall, pembrolizumab monotherapy emerged as the more cost-effective strategy, while combination therapy provided additional clinical benefit at a substantially higher cost; integration of artificial intelligence improved predictive accuracy and supported data-driven, economically sustainable treatment decisions.

Keywords:
NSCLC, PD-L1, Pembrolizumab, Cost-Effectiveness, ICER, QALY, Artificial Intelligence .

AI-025

TITLE: AI-Driven Pharmacovigilance: Enhancing Adverse Drug Reaction Detection in Clinical Practice

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Abstract:

Background: Traditional pharmacovigilance relies heavily on spontaneous reporting, which is often hindered by significant under-reporting and data fragmentation. With the rapid digital transformation in healthcare, Artificial Intelligence (AI) offers a transformative approach to monitoring drug safety by analyzing large-scale clinical data in real-time. This study explores the efficacy of AI-driven algorithms in detecting and documenting Adverse Drug Reactions (ADRs) compared to conventional methods.

Methods: A systematic review was conducted focusing on natural language processing (NLP) and machine learning models integrated into electronic health records (EHR). Data from pharmacy practice databases and clinical trial registries were analyzed to evaluate the sensitivity of AI in identifying signals of rare adverse events. The study assessed the accuracy of signal detection and the reduction in time required for causality assessment.

Results: Preliminary findings indicate that AI-integrated systems can identify potential ADRs with 85% higher efficiency than manual reporting. NLP models successfully extracted relevant clinical narratives from unstructured physician notes, identifying secondary side effects that were previously overlooked. Furthermore, the integration of digital health tools facilitated a more patient-centric approach to safety monitoring, allowing for immediate intervention in chronic disease management.

Conclusion: The implementation of AI in pharmacovigilance significantly enhances the methodological rigor of drug safety monitoring. It bridges the gap between clinical research and real-world evidence, ensuring better patient outcomes. As regulatory affairs evolve, adopting these digital health innovations becomes essential for modern pharmacy practice and public health safety.

Keywords: Artificial Intelligence, Pharmacovigilance, Digital Health, Drug Safety, Adverse Drug Reactions

AI-026

TITLE: Evaluating AI Chatbots in Asthma Patient Education

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Abstract:

Asthma is a chronic respiratory disease that requires continuous patient education for effective self-management, including proper medication use, trigger avoidance, and regular symptom monitoring. In recent years, artificial intelligence (AI)-powered chatbots have emerged as innovative digital tools to address these challenges and enhance patient-centred care. This study evaluates the role of AI chatbots in improving patient education and engagement in asthma

management. AI chatbots provide round-the-clock access to health information, enabling patients to receive instant responses to their queries. They offer personalized guidance based on individual symptoms and conditions, simplify complex medical information, and support better understanding of inhaler techniques and preventive strategies. Additionally, chatbots assist in medication adherence through reminders and enable continuous monitoring by helping patients track symptoms and recognize warning signs. Despite these advantages, certain limitations must be considered. AI chatbots may occasionally provide inaccurate or incomplete information and lack the clinical judgment required for complex decision-making. In conclusion, AI chatbots demonstrate considerable potential as supplementary tools for asthma patient education. Their integration into healthcare systems can improve accessibility and patient engagement; however, they should be used alongside healthcare professionals and supported by proper validation and regulatory frameworks to ensure safety and reliability.

Keywords:
Asthma, Artificial Intelligence, Chatbots, Patient Education, Self-Management, Digital Health

AI-027

TITLE: "Revolutionizing Healthcare Management Through AI-Based Medicine ATMs." Field: Healthcare Management

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Abstract:
Limited access to essential medicines, particularly during emergencies and in underserved or semi-urban areas, remains a significant challenge in healthcare delivery. Advancements in digital health technologies have introduced innovative solutions such as automated medicine dispensing systems, commonly known as Medicine ATMs, to address this gap. These smart systems enhance healthcare accessibility while supporting efficient and patient-centred service delivery.

Medicine ATMs are automated kiosks integrated with digital healthcare platforms that dispense medications based on valid electronic prescriptions. They utilize technologies such as secure authentication, real-time inventory management, and AI-based decision support systems. Artificial intelligence enables prescription validation, detection of potential drug interactions, and optimization of stock levels, thereby improving safety and accuracy in dispensing.

From a healthcare management perspective, these systems reduce patient waiting time, minimize the workload on healthcare professionals, and ensure round-the-clock availability of essential medicines. Integration with telemedicine services further enhances their effectiveness by allowing patients to consult healthcare providers remotely and receive prescribed medications instantly. This contributes to improved treatment adherence, patient satisfaction, and timely care.

Despite their benefits, challenges such as regulatory compliance, data security concerns, and infrastructure limitations must be addressed for successful implementation. AI-enabled Medicine ATMs represent a transformative advancement in digital healthcare management, offering an efficient, accessible, and scalable solution to improve medicine availability and strengthen patient-centred healthcare systems.

Keywords: Medicine ATMs, Digital Health, Healthcare Management, Artificial Intelligence, Patient centred care.

AI-028

TITLE: AI/ INNOVATION IN PHARMACY

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Abstract:

Artificial Intelligence (AI) is reshaping the field of pharmacy, introducing a more efficient, precise, and patient-focused approach to healthcare. This paper highlights the role of AI-driven innovations across key areas such as drug discovery, formulation development, clinical research, and pharmacy practice. By utilizing advanced technologies like machine learning and predictive analytics, AI accelerates the identification of potential drug candidates, enhances formulation strategies, and improves overall research productivity, leading to faster and more refined therapeutic solutions.

In clinical and community pharmacy settings, AI supports personalized medicine by integrating patient-specific data, enabling tailored treatment plans that improve safety and effectiveness. It also enhances clinical trial processes by assisting in patient selection, monitoring progress, and analyzing outcomes with greater accuracy. Furthermore, AI-powered tools, including automated dispensing systems and virtual health assistants, contribute to smoother workflows, improved medication management, and better patient interaction.

The adoption of AI in pharmacy also encourages continuous learning, innovation, and collaboration among healthcare professionals, fostering a more adaptive and forward-thinking environment. With ongoing advancements and supportive frameworks, AI continues to strengthen the quality of pharmaceutical care.

In conclusion, AI represents a promising and progressive force in pharmacy, enhancing every stage of the drug lifecycle while supporting a more personalized and efficient healthcare system. Its growing integration marks a significant step toward a smarter and more responsive future in pharmaceutical sciences.

AI-029

TITLE: AI-Driven Early Screening and Clinical Risk Stratification of Iron Deficiency in Young Women Using Simple Indicators

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ABSTRACT

Background:

Iron deficiency remains one of the most prevalent nutritional disorders among young women, often going undetected until symptoms become severe. Early identification is essential to prevent complications such as fatigue, reduced cognitive performance, and decreased quality of life. However, routine screening methods are not always accessible or cost-effective in Low-resource settings.

Objective:
This study aims to explore the potential of an artificial intelligence-based model to enable early screening of iron deficiency risk using simple, non-invasive clinical indicators.
Methodology:
A conceptual AI-based screening framework was developed using commonly observed parameters such as fatigue levels, dietary patterns, menstrual history, and basic haemoglobin estimates. These inputs are analyzed using a predictive algorithm to classify individuals into low, moderate, or high-risk categories. The model emphasizes accessibility and ease of use for preliminary screening without the need for advanced diagnostic tools.
AI Models Used:
A supervised machine learning approach such as Logistic Regression or Decision Tree is proposed to classify individuals into different risk categories based on input indicators.
AI Framework:
The proposed framework consists of four stages:
1.Data Collection - Fatigue, diet, menstrual history, Hb
2.Data Processing- Input normalization and pattern recognition
3. AI Model Prediction - Classification into risk categories
4. Clinical Output - Risk level + suggested intervention
Results:
The proposed model demonstrates the potential to identify individuals at risk of iron deficiency at an early stage, allowing timely intervention. By utilizing easily obtainable data, the approach can improve screening coverage, especially among populations with limited healthcare access.
Conclusion:
AI-driven early screening tools offer a promising, cost-effective solution for addressing iron deficiency among young women. This approach can support preventive healthcare strategies, improve early diagnosis..
Keywords: Artificial Intelligence, Iron Deficiency, Early Screening, Women's Health, Digital Health.

AI-030

TITLE: AI-Assisted Identification of Potentially Inappropriate Medications in Geriatrics

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Abstract:
Polypharmacy is a growing concern among the geriatric population, increasing the risk of adverse drug reactions, drug interactions, and medication-related complications. Potentially inappropriate medications (PIMs), as defined by established criteria such as the Beers Criteria, pose significant threats to patient safety in older adults. The integration of Artificial Intelligence (AI) into healthcare offers a promising solution to address these challenges by enhancing medication review and clinical decision-making processes.
This study explores the role of AI in identifying PIMs in geriatric patients through advanced data analysis and predictive modelling. Machine learning algorithms can analyze electronic health records, medication histories, and patient-specific factors to detect high-risk

prescriptions and suggest safer alternatives. AI-assisted systems can also support clinicians by providing real-time alerts, reducing prescribing errors, and improving therapeutic outcomes. Furthermore, the application of AI in this domain can contribute to personalized medicine by tailoring drug regimens based on individual patient profiles, thereby minimizing adverse effects and improving adherence. Despite its potential, challenges such as data privacy concerns, algorithm transparency, and integration into existing healthcare systems must be addressed.

In conclusion, AI-assisted identification of PIMs represents a significant advancement in geriatric pharmacotherapy. By improving medication safety and optimizing treatment strategies, this approach has the potential to enhance the quality of care and overall health outcomes in the elderly population.

Keywords:
Artificial Intelligence, Geriatrics, Polypharmacy, Potentially Inappropriate Medications, Patient Safety

Guide –
Mohammed Ashfaq Hussain

AI-031

TITLE: Revolutionizing Pharmaceutical Sciences Through Artificial Intelligence: A Paradigm Shift in Drug Discovery and Global Healthcare Delivery

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Abstract:

The rapid evolution of Artificial Intelligence (AI) is catalyzing an unprecedented paradigm shift in pharmaceutical sciences, redefining drug discovery, clinical research, and global health delivery. This paper examines AI's strategic integration across three transformative pillars.

— molecular optimization, precision therapeutics, and health equity — illustrated through landmark real-world applications.In drug discovery, AlphaFold 2 modeled over 200 million protein structures in months, compressing decades of conventional crystallography. Insilico Medicine's INS018_055, an AI-generated candidate for idiopathic pulmonary fibrosis, reached Phase II trials in under four years — less than half the traditional timeline — exemplifying AI's power to accelerate novel therapeutic development.

In clinical research, FDA-endorsed decentralized clinical trial (DCT) frameworks, operationalized through platforms like Medidata Rave, are redefining GCP-compliant, patient-centric research. AI-analyzed real-world evidence (RWE) from electronic health records is increasingly informing regulatory decisions and pharmacovigilance signal detection.

Precision medicine represents AI's most consequential frontier. Oncotype DX, combined with machine learning, predicts chemotherapy benefit in breast cancer patients with over 90% accuracy, minimizing unnecessary treatment exposure. AI-driven pharmacogenomics further

enables individualized dosing based on CYP450 polymorphisms, transforming population prescribing into truly personalized care.

Beyond clinical settings, AI is dismantling healthcare disparities. Google Health's retinopathy screening AI, deployed in rural India, and MSF's AI-assisted TB diagnostics in Sub-Saharan Africa demonstrate that digital health is a scalable equity tool, not an exclusive privilege.

This evolution also demands professional transformation — roles such as Clinical Data Scientists and AI Pharmacovigilance Analysts are now critical, reflecting industry-wide shifts at Pfizer, Novartis, and Janssen. The synergy between human expertise and machine intelligence is the defining force of next-generation pharmaceutical excellence, promising accelerated pipelines, reduced attrition, and equitable global health outcomes.

Keywords: Artificial Intelligence, Drug Discovery, Precision Medicine, Decentralized Clinical Trials, Real-World Evidence, Pharmacogenomics, Global Health Equity, Digital Transformation.

AI-032

TITLE: ROLE OF AI AND DIGITAL INNOVATION IN EARLY DISEASE DETECTION- CANCER.

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ABSTRACT

Intelligence (AI) and digital innovation are rapidly transforming modern healthcare, particularly in the early detection of diseases. AI utilizes advanced algorithms, machine learning, and deep learning techniques to analyze vast amounts of medical data, including diagnostic images, electronic health records, and laboratory reports. By identifying hidden patterns and Artificial subtle abnormalities, AI can detect diseases at an early stage, often before clinical symptoms become visible.

Early detection is essential for improving patient outcomes, reducing mortality rates, and minimizing the severity of diseases. AI-based systems are increasingly used to identify conditions such as cancer through imaging techniques, predict cardiovascular diseases using patient data and risk factors, and detect neurological disorders like Alzheimer's disease through brain imaging and cognitive analysis. In addition, digital innovations such as wearable devices, mobile health applications, and telemedicine platforms enable continuous monitoring of patients, allowing timely identification of potential health risks and early medical intervention.

These technologies enhance diagnostic accuracy, reduce human error, and save valuable time for healthcare professionals. They also contribute to cost-effective healthcare by preventing disease progression and reducing the need for complex treatments. However, challenges such as data privacy concerns, high implementation costs, and the requirement for skilled professionals remain significant barriers.

Despite these limitations, AI and digital innovation have immense potential to revolutionize early disease detection. With ongoing advancements, these technologies are expected to play a

crucial role in preventive healthcare, personalized medicine, and improving overall quality of life.

Keywords: Machine learning, Mortality rates, Wearable devices, Human error, Telemedicine, Personalized medicine.

AI-033

TITLE: AI-Powered Pharmacovigilance: Improving ADR Detection and Clinical Decision-Making Using Machine Learning, Natural Language Processing and Real-World Evidence

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ABSTRACT

Background

Pharmacovigilance is vital for ensuring drug safety through the monitoring, evaluating and preventing of adverse drug reactions (ADRs) in clinical practice. However, traditional spontaneous reporting systems are often limited by under-reporting, delayed signal detection, and reliance on structured datasets, restricting comprehensive safety monitoring in real-world settings.

Objective

To explore the role of Artificial Intelligence (AI), particularly machine learning (ML) and natural language processing (NLP), integrated with real-world evidence (RWE) for early detection of ADRs and improving clinical decision-making in pharmacovigilance.

Methods

We conducted a narrative review of literature published between 2019-2025 from PubMed and Embase. Search terms included “machine learning”, “natural language processing”, “pharmacovigilance”, “adverse drug reactions”. Relevant articles were selected for relevance to AI applications in ADR detection using real-world evidence.

Results

Three themes emerged. First, machine learning algorithms identify hidden patterns and associations between drugs and adverse outcomes by analyzing large-scale datasets, enabling earlier signal detection. Second, natural language processing models (BioBERT & BioGPT) extracts meaningful clinical information from unstructured text such as physician notes and patient records which are often missed by traditional approaches. Third, integration with real-world evidence (data from electronic health records, clinical narratives, and adverse event reporting databases) improve the speed, sensitivity, and accuracy of ADR signal detection compared to conventional methods.

Conclusion

AI-driven pharmacovigilance represents a promising advancement toward proactive, data-driven drug safety monitoring and improved patient care in modern digital healthcare systems. This approach supports identification of high-risk patient populations, drug-drug interactions, and early safety signals, thereby aiding clinicians in informed decision-making and promoting safer therapeutic outcomes. Addressing privacy concerns, data standards and interpretability barriers is essential to integrate AI into routine for improved pharmacovigilance.

AI-034

TITLE: FROM HUMAN ERROR TO SMART SAFETY: AI IN ADDRESSING PEDIATRIC DOSING CHALLENGES FROM CALCULATIONS TO EVIDENCE GAPS

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INTRODUCTION: Paediatric dosing errors remain a significant clinical concern due to the need for individualized doses and routes of administration based on weight, age, and developmental pharmacokinetics, as physiological parameters continuously change throughout childhood. In addition, many medications are used off-label in a practice, increasing the risk of adverse drug reactions (ADRs) and therapeutic uncertainty. Paediatric clinical trial studies represent only 38.2% of adult clinical trial studies, highlighting a substantial evidence gap that may limit accurate and standardized dosing recommendations. Emerging use of artificial intelligence offers new opportunities to address paediatric dosing challenges through predictive modelling and evidence-based decision support.

OBJECTIVE: To evaluate the potential role of artificial intelligence in reducing paediatric dosing errors by improving calculation accuracy, supporting evidence-based prescribing, and enhancing medication safety.

METHODOLOGY: A narrative literature review was conducted using Google Scholar, PubMed, and web-based sources to collect data using keywords including paediatric dosing errors, AI in preventing medication errors, and medication adherence.

FINDINGS: AI-based predictive models can estimate individualized doses using age, weight, organ function, and disease status, improving over traditional one-size-fits-all weight dosing. AI can support clinical decision-making and help prevent issues in each step of paediatric dosing, including prescribing, dose calculation, route of administration, therapeutic monitoring, and dosage changes according to the patient's condition.

A 3-month cross-sectional study (June–August 2024) using a 9-question survey compared 101 nurses with AI models. Claude-3.0 and ChatGPT-4o showed 100% accuracy, while experienced nurses showed 93.14% accuracy. LLMs completed calculations in 76 seconds, whereas nurses took around 27 minutes, showing the potential usefulness of AI in emergency settings.

AI may also support special paediatric populations such as neonates and children with hepatic or renal impairment. It can assist in personalized dosing through pharmacogenomics by predicting drug response and reducing ADRs. AI tools have shown reduction of errors from 39% to 24% through personalized dosage adjustments based on individual patient factors. Bayesian monitoring, a dynamic statistical method, can use prior information, expert opinion, and new evidence to support faster and smaller clinical trials while monitoring drug safety and efficacy. PBPK and simulation models can predict dosing in paediatric groups where direct clinical trial data may be limited.

CONCLUSION: AI-driven models such as Machine Learning (ML), Deep Learning, Natural Language Processing (NLP), Large Language Models (LLMs), Bayesian modelling, Pharmacogenomics, and Reinforcement Learning can be highly reliable, improve work speed, and support clinical judgment, leading to better accuracy and reduced risk. Paediatricians may also predict drug efficacy and toxicity more effectively using AI. Underrepresentation of paediatric clinical trials may be partially addressed using virtual simulation models for off-label drugs, providing greater accuracy and effectiveness.me

AI-035

TITLE: ARTIFICIAL INTELLIGENCE FOR PERSONALIZED NANOMEDICINE

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ABSTRACT

Artificial intelligence (AI) is revolutionizing the area of nano-medicine because it studies new nanomaterials that will enable the creation of highly efficient treatment methods. AI operates on a larger scale, searching for required nano-properties to meet various therapeutic purposes and ultimately increasing the safety and efficacy of nanomaterials. In this regard, this paper highlights the current use of AI in drug delivery and personalized nano-medicine in addition to the role of AI in healthcare based on nanotechnologies. Nowadays, AI makes it possible by continuous glucose monitoring (CGM) devices that use AI-powered nanosensors, such as Abbott's FreeStyle Libre, which combines machine learning (ML) and AI to provide individualized glucose management insights, help manage diabetes. Real-time data feeds from these wearable gadgets assist patients in self-managing chronic illnesses and physicians in making well-informed decisions AI-driven nano-medicine is at the forefront of a new 'Nano-medicine as a Service' (NaaS) paradigm in which patients use a subscription-like platform to get customized nano-medicine treatments.

However, the challenges like ethical considerations, data protection, imbalances in data sets need to be discussed. The potential directions for future research include implementing AI and quantum computing and using telemedicine, namely, applying an Internet-of-Medical-Things (IoMT) strategy that allows for personalizing treatment through proper decision making. Thus, it should be stated that the impact of artificial intelligence (AI) on personalized nanomedicine is a crucial breakthrough in healthcare. AI contributes to the discovery of novel nanomaterials tailored specifically to a medical purpose.

AI-036

TITLE: Improving Medication Adherence in Elderly Polypharmacy Patients Using a Smart Prescription-Based Management and Delivery System.

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Abstract: Polypharmacy and medication non-adherence represent significant challenges in elderly patient care, often resulting in poor therapeutic outcomes, increased hospitalizations, and reduced quality of life. Elderly individuals frequently depend on caregivers for medication management; however, caregivers may experience confusion due to complex drug regimens and limited pharmacological knowledge, leading to missed, repeated, or incorrect dosing. This study aims to assess the extent of these challenges through a community-based survey

conducted among 20 participants in a residential neighbourhood.

Our Findings indicate that 21% of participants reported missing doses, while 42% experienced difficulty managing multiple medications. Approximately 71% depended on caregivers, of whom 14% reported confusion every time and 21% sometimes in accurately following prescriptions and 49% used non-standardized measuring tools such as household spoons for liquid medications, increasing the risk of dosing inaccuracies.

The system enables users to upload prescriptions, which are then analyzed to generate organized, time-specific medication schedules. It integrates professionally prepared weekly or monthly medication kits, labeled according to dosage timing, thereby minimizing confusion. Additionally, a calibrated dispensing mechanism for liquid dosage forms is conceptualized to ensure accurate measurement and administration, reducing the risk of underdosing or overdosing. The involvement of pharmacists in the preparation of medication kits under controlled conditions further enhances accuracy and safety.

This integrated approach aims to improve medication adherence, enhance dosing accuracy, and reduce caregiver burden in elderly patients.

Keywords: Polypharmacy, Dispensing, Application.

AI-037

TITLE: NDA Real-Time Vigilance Network (NDA-RTVN)

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Abstract

The NDA Real-Time Vigilance Network (NDA-RTVN) is a digital healthcare solution designed to bridge the communication gap between patient, prescriber, pharmacist, pharmaceutical manufacturing companies and PVPI by enabling real-time reporting of medication side effects. Adverse drug reactions (ADRs) are a major concern in public health, often going underreported due to lack of awareness, accessibility issues, and inefficient reporting systems. This application addresses these challenges by providing a user-friendly platform where patients can directly record their experiences with prescribed medications.

The system allows users to input details such as drug name, dosage, duration of use, and observed side effects. This information is securely transmitted to the respective pharmaceutical companies and PVPI, enabling faster identification of potential drug-related risks. By using digital connectivity, the app enhances pharmacovigilance practices and promotes patient participation in drug safety monitoring.

Additionally, the platform can incorporate features such as symptom tracking, alert notifications, and data analytics to identify patterns in adverse reactions. This not only supports manufacturers in improving drug safety and quality but also assists regulatory bodies (PVPI) in making informed decisions. The NDA Real-Time Vigilance Network (NDA-RTVN) ultimately aims to create a transparent, efficient, and responsive ecosystem for medication safety, empowering patients while strengthening the healthcare system.

Keywords:

Pharmacovigilance, Adverse Drug Reactions, Patient Reporting, Healthcare Technology, Drug Safety

AI-038

TITLE: NATURAL LANGUAGE PROCESSING IN ADVERSE DRUG REACTION REPORTING FOR PHARMACOVIGILANCE

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Abstract:

Natural Language Processing (NLP) is becoming an important method in pharmacovigilance for improving the detection and reporting of adverse drug reactions (ADRs). A large amount of useful safety information is present in unstructured clinical text, including electronic health records, case reports, patient notes, and other narrative sources. However, this information is difficult to review manually because it is scattered, lengthy, a nd written in different styles. NLP helps convert this unstructured text into structured data by identifying drug names, symptoms, outcomes, and relationships between medicines and reactions. This makes it easier to detect possible ADRs earlier and support better drug safety monitoring. NLP also reduces manual workload, saves time, and improves the efficiency of signal detection in pharmacovigilance systems. In addition, it can support researchers and healthcare professionals in analyzing large volumes of text data that would otherwise be difficult to manage. Despite these advantages, challenges remain, such as inconsistent medical terminology, limited data quality, and the need for accurate validation before clinical use. Even so, NLP has strong potential to strengthen ADR reporting, improve drug surveillance, and contribute to patient safety. Therefore, the use of NLP in pharmacovigilance is a promising approach for more effective and timely identification of adverse drug reactions in healthcare settings.

Keywords:

Natural Language Processing, Pharmacovigilance, Adverse Drug Reaction, Drug Safety, Text Mining.

AI-039

TITLE: DIGITAL THERAPEUTICS: THE SOFTWARE - DRIVEN REVOLUTION IN CHRONIC DISEASE MANAGEMENT

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Abstract:

Digital therapeutics (DTx) are an innovative class of evidence-based medical interventions delivered through software to prevent, manage, or treat diseases. Distinct from general wellness applications, DTx solutions undergo clinical validation and are often integrated into standard healthcare practices. Their growing relevance is particularly evident in the management of chronic diseases such as diabetes, hypertension, and mental health disorders, which require continuous monitoring, long-term adherence, and personalized care strategies.

Advancements in technology have enabled the development of DTx platforms that leverage mobile applications, artificial intelligence (AI), and wearable devices to collect real-time health data and deliver tailored interventions. These technologies facilitate remote monitoring, behavioural modification, and timely clinical decision-making. As a result, patients are more actively engaged in their care, leading to improved adherence to treatment plans and better clinical outcomes. Additionally, digital therapeutics enhance accessibility by extending healthcare services beyond traditional clinical settings, thereby reducing costs and addressing gaps in healthcare delivery.

However, the widespread adoption of DTx is accompanied by notable challenges. Regulatory approval processes remain complex and inconsistent across regions, posing barriers to large-scale implementation. Concerns regarding data privacy, cybersecurity, and ethical use of patient information further complicate integration. Moreover, disparities in digital literacy and access to technology may limit the reach of these solutions among underserved populations.

In conclusion, digital therapeutics represent a transformative approach to chronic disease management by combining clinical evidence with advanced technology. With continued innovation, stronger regulatory frameworks, and improved accessibility, DTx have the potential to significantly enhance healthcare systems and patient outcomes worldwide.

Keywords: Digital therapeutics, chronic diseases, artificial intelligence, wearable devices, patient-centred care

AI-040

TITLE: Cost vs Care: The Hidden Impact of Diagnostic Errors.
Field: Pharmaeconomic and Health Economics and Outcome Research [HEOR]

Student Name: Gulnaaz Parveen
College name: Sultan-ul-Uloom College of Pharmacy

Abstract:

Artificial Intelligence (AI) is rapidly reshaping healthcare diagnostics by improving speed, accuracy, and efficiency. This study evaluates the cost-effectiveness of AI-based diagnostic tools using a pharmacoeconomic approach, comparing them with traditional diagnostic methods in terms of cost, accuracy, and patient outcomes.

AI systems have demonstrated higher diagnostic accuracy (approximately 81–91%) compared to conventional methods (71–86%), along with improved sensitivity for early disease detection. Early diagnosis of conditions such as cancer and tuberculosis plays a crucial role in reducing disease progression, minimizing complications, and lowering overall treatment costs. Although AI requires a high initial investment for implementation, it significantly reduces long-term healthcare expenditure by decreasing unnecessary tests, avoiding diagnostic errors, and shortening hospital stays.

Evidence from multiple studies indicates that AI-based diagnostics are either cost-saving or cost-effective in nearly 89% of cases. Large-scale real-world data further support these findings, highlighting the ability of AI to optimize resource utilization and improve healthcare

efficiency. Additionally, reduced workload for healthcare professionals contributes to indirect economic benefits.

However, certain limitations exist, including high setup costs, data dependency, limited accessibility in low-resource settings, and concerns related to data privacy and technical expertise. Despite these challenges, the overall economic and clinical advantages outweigh the limitations.

In conclusion, AI-based diagnostic tools are not necessarily cheaper initially but provide better health outcomes at a lower overall cost, making them a valuable and cost-effective innovation in modern healthcare systems.

Keywords: Artificial Intelligence, Pharmacoeconomics, Cost-Effectiveness, Early Diagnosis, Healthcare Economics

AI-041

TITLE: "Digital Transformation in Healthcare Management: Enhancing Patient Cantered Care".

Field: Healthcare Management

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College Name: Sultan Uloom College of Pharmacy

Abstract:

Digital Transformation is particularly focuses and rapidly redefining healthcare management by enabling efficient, data-driven and enhancing patient centred delivery. Modern healthcare systems face multiple challenges, including increasing patient demands, limited resources, and inefficiencies in traditional practices. These challenges highlight the need for innovative, technology-driven management approaches.

The integration of advanced technologies includes health care digitalization such as electronic health records (EHR), telemedicine, online appointment systems, digital prescriptions, and mobile health applications. These digital interventions streamline healthcare processes, reduce medical errors, and enhance coordination among healthcare professionals. Furthermore, digital platforms empower patients by improving access to healthcare services, promoting engagement, and supporting personalized care delivery. These tools replace conventional paper-based systems and enable real-time access to patient information, improving clinical decision-making and coordination among healthcare professionals.

A significant paradigm shift towards patient-centred care is observed, where healthcare systems prioritize individual needs, preferences, and outcomes. This approach not only improves patient satisfaction and adherence but also contributes to better clinical outcomes and overall healthcare quality. Additionally, strategic healthcare management practices, including workforce optimization and quality assurance frameworks, play a critical role in maximizing the benefits of digital transformation.

Digital transformation serves as a key enabler in advancing healthcare management towards a more efficient, accessible, and patient-focused model. Embracing technology-driven strategies is essential for developing resilient and sustainable healthcare systems in the evolving global landscape.

Keywords: Digital Transformation, Healthcare Management, Health -Cantered care.

AI-042

TITLE: Leveraging Natural Language Processing for Detection of Adverse Drug Reactions from social media Data.

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Abstract: Adverse drug reactions (ADRs) are a significant public health issue and are often underreported in traditional pharmacovigilance systems. The rapid expansion of social media platforms has led to an abundance of user-generated health-related data that can provide a valuable source of real-time ADR monitoring. In this study, we developed a comprehensive pipeline that involves data collection from publicly available social media platforms, pre-processing (removal of noise, tokenization, and normalization), and advanced NLP models (transformer-based architectures, such as BERT) to identify drug mentions, extract potential adverse reactions, and classify relevant posts. NER and sentiment analysis were incorporated into the pipeline to further classify posts.

The model demonstrated promising performance in identifying ADR-related content, including early signals of previously unreported reactions. Temporal analysis further enabled tracking of emerging safety trends. These findings highlight the potential of integrating social media analytics into pharmacovigilance frameworks.

However, challenges such as data variability, misinformation, and privacy concerns must be addressed. Overall, NLP-driven approaches offer a scalable and efficient strategy for enhancing drug safety monitoring and supporting timely public health interventions.

Keywords: Adverse Drug Reactions, NLP, Pharmacovigilance, social media, Machine Learning

AI-043

TITLE: "Biometric Based E-Prescription System for Control and Prevention of Narcotic Drug Misuse and Duplication."

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Under the Guidance of S.K Syed Hussain

Abstract:
The increasing misuse of narcotic drugs and prescription fraud poses a significant challenge to modern healthcare systems, necessitating the development of secure and reliable prescription mechanisms. This proposes a novel e-prescription system integrated with biometric authentication to enhance the safety, accuracy, and accountability of prescribing practices. The system leverages unique biometric identifiers, such as fingerprint or iris recognition, to verify both healthcare providers and patients, ensuring that prescriptions are issued and accessed only by authorized individuals.

By digitizing prescriptions and linking them with biometric data, the system effectively reduces the risk of forgery, duplication, and unauthorized access to controlled substances. It

also enables real-time monitoring and tracking of prescribed narcotic drugs, allowing regulatory authorities to detect suspicious patterns and prevent abuse. Additionally, the integration of centralized electronic health records facilitates better clinical decision-making, minimizes medication errors, and ensures continuity of care.

The proposed solution not only addresses the critical issue of drug misuse but also improves overall patient outcomes by promoting safe medication practices, enhancing transparency, and streamlining healthcare workflows. Furthermore, it reduces administrative burdens on healthcare providers and supports data-driven policy implementation.

In conclusion, the adoption of a biometric-based e-prescription system represents a promising advancement in healthcare technology, offering a secure, efficient, and patient-centric approach to managing prescriptions, particularly for high-risk narcotic drugs.

Keywords:
E-prescription, Biometric authentication, Narcotic drug control, Prescription security, Patient outcomes.

AI-044

TITLE: Digital Twin Technology in Clinical Pharmacology for Simulating Patient Specific Drug Response Using Artificial Intelligence

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Abstract:

The digital twin technology is progressively emerging as a groundbreaking concept in clinical pharmacology. This technology creates dynamic and patient-specific virtual models that mirror the real-time physiological conditions of individuals. By integrating Al capabilities with multi-omics data, electronic health records, and PK-PD modeling, digital twins offer an innovative platform to simulate individualized drug responses with impressive accuracy. The use of the digital twins is a departure from the current population-centric approach in medication dosing by capturing inter-individual variability in metabolism, genetics, disease progression, and environmental influences. With continuous fine-tuning of the virtual models by Al systems based on patient data, clinicians can predict therapeutic outcomes, optimize dosing regimens, and anticipate adverse drug reactions before actual drug administration. The predictive capability offered by the technology is particularly valuable in complex conditions like oncology, cardiovascular diseases, and polypharmacy scenarios, where treatment responses are highly heterogeneous.

Furthermore, digital twins present an opportunity to revolutionize clinical trials. In silico simulation and analysis reduce reliance on large cohorts, accelerate drug development timelines, and enhance safety profiling the combination of machine learning, real-world evidence, and mechanistic models is paving the way towards adaptive therapy and is perfectly aligned with the goals of precision medicine.

However, challenges such as data integration, model validation, ethical considerations, and regulatory acceptance remains critical barriers to widespread implementation. Addressing these issues will require interdisciplinary collaboration and robust validation frameworks. This

article gives an overview of the current landscape, technological foundations, and the future implications of digital twin technology in clinical pharmacology.

Keywords: digital twin technology, artificial intelligence, precision medicine, personalized therapeutics, drug response prediction

AI-045

TITLE: Artificial Intelligence in Drug Delivery for Better Patient Care

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Collage: Shadan women's college of pharmacy

Abstract:

In recent years, Artificial Intelligence (AI) has started playing an important role in improving drug delivery systems. Traditional methods often face problems such as poor targeting, side effects, and differences in how patients respond to treatment. Because of this, there is a growing need for smarter and more patient-focused approaches.

AI helps by analyzing large amounts of data and predicting how drugs will behave in the body. This makes it easier to design better formulations and improve the effectiveness of treatments. When combined with technologies like nanotechnology, AI can support targeted drug delivery, ensuring that medicines reach the right place in the body while reducing harm to healthy tissues.

Another important advantage of AI is its ability to support personalized medicine. By using patient-specific information, treatments can be adjusted according to individual needs. AI is also useful in clinical research and data management, helping to improve decision-making and patient outcomes.

Although there are some challenges, AI has strong potential to improve drug delivery systems and make healthcare more effective, safe, and patient-centred in the future.

AI-046

TITLE: AI IN PHARMACY AND DIGITAL HEALTH

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Abstract:

Artificial Intelligence (AI) is increasingly transforming the pharmaceutical and digital health sectors by improving efficiency, accuracy, and decision-making across healthcare systems. In pharmaceutical research, AI is primarily used to assist—not replace—traditional drug discovery processes. Machine learning models can analyze large chemical and biological datasets to identify potential drug targets, predict molecular properties, and prioritize compounds for further testing. This helps reduce early-stage research time and cost, although experimental validation and clinical trials remain essential. AI is also applied in clinical development to support trial design, patient recruitment, and data analysis, potentially improving trial efficiency and success rates.

In digital health, AI supports clinical practice through applications such as medical imaging analysis, risk prediction, and remote patient monitoring. Algorithms trained on medical data can help detect patterns associated with diseases, assisting healthcare professionals in diagnosis

and treatment planning. Wearable devices and mobile health platforms collect real-time health data, enabling continuous monitoring of conditions like heart rate and physical activity. Additionally, natural language processing is used to structure and analyze electronic health records, reducing administrative burden and improving data accessibility.

However, the use of AI in healthcare requires careful consideration of limitations. Model performance depends heavily on data quality, and issues such as bias, lack of transparency, and data privacy concerns must be addressed. Regulatory oversight and clinical validation are necessary to ensure safety and effectiveness.

Overall, AI serves as a supportive tool that can enhance, but not replace, human expertise in pharmaceutical development and digital healthcare.

Keywords: Artificial Intelligence, Drug Discovery, Digital Health, Machine Learning, Clinical Trials, Data Privacy.

AI-047

TITLE: Artificial Intelligence-Powered Cervical Cancer Screening: Bridging Gaps in Women's Healthcare

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Abstract:

Cervical cancer remains one of the leading causes of cancer- related complications and mortality among women globally, particularly in low- and middle- income countries. Even though it can mostly be prevented through early screening and vaccination many cases are found at advanced stages due to limited access to healthcare facilities, lack of awareness, and shortage of trained professionals. There is clear need for new and accessible screening methods to improve early screening methods to improve early detection and lessen the impact of the disease. Recent advancements in artificial intelligence (AI) show a lot of promise for changing cervical cancer screening in transforming cervical cancer screening. AI systems can analyze cervical images, Pap smear results, and human papillomavirus (HPV) data with high accuracy. This allows for the early detection of precancerous lesions.

Machine learning algorithms have shown good results in assisting healthcare providers by improve diagnostic accuracy and lessen human error. Additionally, AI-based screening tools can work with portable devices. This makes them especially value in low-resource and rural settings. They can make large-scale screening programs and make it easier for underserved populations. Early detection through AI not only improves patient outcomes but also help reduce the financial burden linked to late-stage treatment and long-term care. However, challenges such as data privacy concerns, need for standardized datasets, and ethical considerations must be addressed.

In conclusion, AI-powered cervical cancer screening is a promising advancement in women's healthcare, offering an effective approach to bridge existing gaps in access to cervical cancer screening and to enhance early detection of cervical cancer.

Keywords:

Artificial Intelligence, Cervical Cancer, Machine Learning, Screening, Early Detection

AI-048

TITLE: ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING MEDICATION ADHERENCE AND OPTIMIZING PATIENT CARE OUTCOMES

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ABSTRACT

- Medication adherence is a critical determinant of therapeutic success; however, non-adherence remains a widespread challenge in healthcare, resulting in poor clinical outcomes and increased economic burden. This study aims to evaluate the role of Artificial Intelligence (AI) in improving medication adherence and optimizing patient care.
- A narrative review approach was employed to analyze recent advancements in AI-driven healthcare technologies. Interventions such as mobile health applications, smart pill dispensers, and predictive analytics systems were assessed for their effectiveness in monitoring adherence and supporting patient engagement.
- AI-enabled systems facilitate personalized reminders, real-time adherence tracking, and early identification of patients at risk of non-adherence, enabling timely clinical interventions. Furthermore, these technologies assist healthcare professionals in data-driven decision-making and enhancing patient-centred care.
- The findings indicate that AI has significant potential to reduce medication errors, improve adherence rates, and enhance overall healthcare outcomes. In conclusion, the integration of AI into pharmaceutical and clinical practice represents a promising and scalable approach to addressing medication adherence challenges in modern healthcare systems.

AI-049

TITLE: Accelerating Innovation: The Role of Artificial Intelligence in Next-Generation Drug Discovery

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ABSTRACT

The traditional drug discovery process is famously slow and expensive, often taking over a decade and billions of dollars to bring a single molecule to market. Artificial Intelligence (AI) is fundamentally disrupting this timeline by shifting the paradigm from trial-and-error experimentation to predictive, data-driven modelling. This abstract explores the transformative impact of AI across the early-stage pharmaceutical value chain.

At the forefront of this revolution is the use of machine learning (ML) and deep learning to navigate the astronomical "chemical space." AI algorithms can now predict the binding affinity

of millions of small molecules to target proteins in silico, identifying high-potential leads in a fraction of the time required by traditional high-throughput screening. Furthermore, generative AI is being utilized to design entirely novel "de novo" molecules with optimized pharmacological properties, such as improved solubility and reduced toxicity.

Beyond molecular design, AI enhances target identification by analyzing massive multi-omic datasets—including genomics, Proteomics, and transcriptomics—to uncover hidden disease pathways. This enables the discovery of biomarkers that facilitate precision medicine and more accurate patient stratification for future clinical trials.

While challenges remain regarding data quality and "black box" algorithmic transparency, the integration of AI into drug discovery promises to drastically reduce attrition rates and R&D costs. By bridging the gap between computational biology and clinical success, AI is not merely an incremental improvement but a foundational shift toward a more efficient and personalized era of medicine.

AI-050

TITLE: A Narrative Review of opportunities, challenges, and future directions of Artificial Intelligence in Clinical Trials

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Abstract: -

Background: Persistent inefficiencies plague clinical trials: 80% experience recruitment delays, annual pharmaceutical R&D costs exceed $200 billion, success rates languish below 12%, and half of all datasets suffer quality issues. Meanwhile, restrictive eligibility criteria and outdated protocol designs limit generalizability to real-world patient populations.

Objective: This review assesses current capabilities, future promise, and implementation hurdles of artificial intelligence (AI) across the clinical trial lifecycle—encompassing machine learning, large language models (LLMs), adaptive designs, and digital twins—while providing guidance for responsible integration.

Methods: A structured narrative synthesis was conducted following established review guidelines. Databases including PubMed, Embase, IEEE Xplore, and Google Scholar were searched from January 2015 to December 2024. Findings were organized thematically by trial phase: design, recruitment, conduct, and analysis.

Key Findings: AI applications yielded measurable improvements. Enrolment tools boosted recruitment by 65%; predictive models forecast trial outcomes with 85% accuracy. Timeline acceleration ranged from 30–50%, with cost reductions up to 40%. Eligibility optimization using machine learning (e.g., Trial Pathfinder) doubled eligible patient pools without altering hazard ratios for survival. Reinforcement learning enabled adaptive trial modifications in real time while preserving statistical validity. Digital biomarkers achieved 90% sensitivity for detecting adverse events. Despite these advances, significant barriers remain: data interoperability gaps, regulatory ambiguity under frameworks such as the EU AI Act, infrequent algorithmic bias assessments, and limited trust among stakeholders. Most evidence

derives from retrospective or single-centre studies, underscoring a lack of prospective validation.

Conclusion: AI holds transformative potential to improve trial efficiency, lower costs, and enhance patient outcomes. Achieving this promise will depend less on technical innovation alone than on prospective validation, transparent and explainable systems, harmonized global regulation, and sustained collaboration among developers, researchers, and regulators.

Keywords: Clinical trial design; Artificial intelligence; Adaptive clinical trials; Machine learning.

AI-051

TITLE: Can Machines Think Like Scientists? The Role of Artificial Intelligence in Modern Drug Discovery

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Abstract:

Bringing a single drug to market takes, on average, over ten years and costs upward of a billion dollars — and still, more than 90% of candidates fail before they ever reach a patient. These numbers are not just statistics; they represent years of scientific effort, enormous financial burden, and, most importantly, patients still waiting for treatments that have not yet arrived. Something about how we discover drugs needs to change and artificial intelligence (AI) may be the most promising catalyst for that change.

This short communication explores how AI is reshaping the early stages of drug discovery — not by replacing scientists, but by giving them sharper tools. Machine learning models can now scan millions of molecular compounds in hours, predict how a drug will behave in the body before it is ever synthesised, and flag safety concerns that would otherwise surface only after costly trials. Generative AI is even designing entirely new molecules from scratch, guided by desired therapeutic properties. What once took years of lab work can, in some cases, now take weeks.

Perhaps most excitingly, when AI is combined with genomics and precision medicine, the question shifts from "what drug works?" to "what drug works for this person?" By analysing genetic, clinical, and real-world data together, AI is enabling researchers to identify targets specific to patient subgroups — opening real possibilities for diseases that have long been overlooked or poorly treated. Several AI-assisted drug candidates have already entered clinical trials, which tells us this is no longer a futuristic concept. That said, it would be naive to see AI as a cure-all. Questions around data bias, model transparency, and regulatory readiness are real and deserve honest discussion. As pharmacy and life sciences professionals, we are in a unique position — trained in both the science of medicines and the needs of patients. Engaging with AI not as passive observers but as informed contributors will shape how responsibly and effectively this technology is adopted. This communication invites that conversation.

Keywords: Artificial Intelligence; Drug Discovery; Machine Learning; Precision Medicine;

Pharmaceutical Innovation

Presentation Category: Poster Presentation

Abstract Type: Short Communication

AI-052

TITLE: AI-Driven Proteomics in Precision Medicine for Atherosclerosis

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Atherosclerosis is a chronic inflammatory disease characterized by the accumulation of lipids and immune cells within arterial walls, leading to plaque formation, vascular narrowing, and reduced blood flow. It is a major cause of cardiovascular disorders such as coronary artery disease, myocardial infarction, and stroke, contributing significantly to global morbidity and mortality. Its onset and progression vary among individuals due to differences in genetics, lifestyle, metabolism, and inflammatory responses, highlighting the need for precision medicine approaches.

Precision medicine aims to tailor prevention, diagnosis, and treatment according to the unique biological profile of each patient. In atherosclerosis, this approach can improve risk prediction, enable early detection, and support personalized therapy. Proteomics, the large-scale study of proteins and their interactions, plays an important role by providing real-time insights into disease activity, endothelial dysfunction, lipid metabolism, inflammation, and plaque instability. Protein biomarkers identified through proteomic analysis can help monitor disease progression.

However, proteomic datasets are highly complex and require advanced computational tools for interpretation. Artificial intelligence (AI), including machine learning and deep learning techniques, enables rapid analysis of large-scale protein data, discovery of novel biomarkers, prediction of cardiovascular events, and patient stratification based on disease risk. The integration of AI and proteomics can advance precision medicine in atherosclerosis by guiding individualized treatment, improving preventive care, and enhancing long-term cardiovascular outcomes. Continued advances in this field hold promise for future personalized vascular health care

Keywords: Atherosclerosis, Proteomics, precision medicine, cardiovascular disorder, machine learning, patient stratification

AI-053

TITLE: ARTIFICIAL INTELLIGENCE IN PHARMACOVIGILANCE: ADVANCING DRUG SAFETY THROUGH REAL-TIME SIGNAL DETECTION AND DATA INTEGRATION.

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Abstract:

Pharmacovigilance is essential for monitoring the safety of pharmaceutical products and minimizing the risks associated with adverse drug reactions (ADRs). Conventional pharmacovigilance systems rely heavily on spontaneous reporting, which is often associated with underreporting, delayed signal detection, and limited utilization of real-world data. In

recent years, Artificial Intelligence (AI) has emerged as a powerful tool to overcome these limitations and enhance the efficiency and accuracy of drug safety monitoring systems. This study examines the role of AI technologies, including machine learning (ML), deep learning, and natural language processing (NLP), in transforming pharmacovigilance practices. AI algorithms enable automated processing and analysis of large and complex datasets obtained from electronic health records (EHRs), clinical trial data, pharmacovigilance databases, and social media platforms. NLP techniques facilitate the extraction of relevant safety information from unstructured text, improving the identification and classification of ADRs. Additionally, predictive modelling approaches allow early detection of potential safety signals and risk factors associated with drug use. The integration of AI with real-world evidence (RWE) frameworks supports continuous monitoring of drug performance in diverse patient populations, thereby improving clinical decision-making and regulatory evaluations. Several studies indicate that AI-based systems significantly enhance signal detection speed, reduce manual workload, and improve reporting accuracy. However, challenges such as data quality issues, algorithm interpretability, ethical concerns, and regulatory compliance must be addressed to ensure reliable implementation. In conclusion, AI-driven pharmacovigilance represents a significant advancement in healthcare by enabling proactive, data-driven drug safety surveillance. The adoption of standardized methodologies and robust regulatory frameworks will be crucial for maximizing its potential and ensuring patient safety.

AI-054

TITLE: HARNESSING ARTIFICIAL INTELLIGENCE FOR NEXT-GENERATION DRUG DISCOVERY AND ONCOLOGY THERAPEUTICS: OPPORTUNITIES AND EMERGING FRONTIERS

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Keywords: Artificial Intelligence, Drug Discovery, Oncology, Digital Health, Precision Medicine

Background: The global burden of cancer continues to pose a formidable challenge to healthcare systems, necessitating rapid advancements in therapeutic development. Conventional drug discovery pipelines are time-intensive, costly, and marked by high attrition rates, particularly in oncology, were tumour heterogeneity and treatment resistance remain persistent obstacles. The convergence of artificial intelligence (AI) and digital health technologies presents a transformative opportunity to redefine the drug discovery paradigm and accelerate the identification of targeted anti-cancer therapies.

Objective: This review aims to critically examine the current and emerging applications of AI-driven methodologies in oncology-focused drug discovery and development, with emphasis on precision medicine, genomics integration, and real-world evidence utilization within a digital health framework.

Methods: A structured narrative review was conducted encompassing peer-reviewed literature, clinical trial data, and industry reports published between 2019 and 2024. Databases including PubMed, Scopus, and ClinicalTrials.gov were systematically searched using terms such as "AI in oncology," "machine learning drug discovery," and "digital health cancer therapeutics." Relevant studies focusing on deep learning, natural language processing, and predictive biomarker modelling was included.

Results: AI platforms have demonstrated significant potential in target identification, molecular docking simulation, and virtual screening, substantially reducing early-stage discovery timelines. In oncology, machine learning models have shown high accuracy in predicting drug resistance mechanisms and patient-specific therapeutic responses through genomic and proteomic data integration. Digital health tools, including AI-powered diagnostic imaging and wearable biosensors, are further enabling decentralized, patient-centric clinical trials aligned with GCP standards. Notable innovations include generative AI models for de novo molecular design and multi-omics-driven precision oncology pipelines.

Conclusion: AI represents a pivotal advancement in the landscape of oncology drug discovery and digital health. Its integration with precision medicine, real-world evidence, and pharmacovigilance frameworks holds the potential to significantly improve clinical outcomes, optimize healthcare delivery, and foster innovation in anti-cancer therapeutic development. Collaborative efforts across academia, industry, and regulatory bodies are essential to responsibly translate these advancements into clinical practice.

AI-055

TITLE: THE PHARMACOGENOMIC BLUEPRINT: USING PREDICTIVE AI TO MITIGATE DRUG REACTIONS

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Abstract:

Adverse Drug Reactions (ADRs) represent a significant burden on global healthcare, accounting for approximately 7% of hospital admissions. This critical challenge stems from the persistence of the traditional “one-size-fits-all” dosing model, which frequently results in sub-therapeutic outcomes or avoidable toxicity. To address this, the “Pharmacogenomic Blueprint” proposes a narrative shift by integrating Pharmacogenomics (PGx) with Artificial Intelligence.

This framework employs sophisticated deep learning algorithms to analyze complex genomic data, specifically focusing on single nucleotide polymorphisms within the cytochrome P450 (CYP) enzyme superfamily. By processing high-dimensional genetic inputs, these Al models can predict individual metabolic phenotypes with high accuracy before treatment begins. This transition from reactive prescribing to Al-driven proactive dosing allows for “Precision Dosing,” ensuring that medical interventions are specifically tailored to a patient’s unique genetic code.

The adoption of this blueprint minimizes toxic side effects and maximizes effic acy, particularly for “rapid” or “poor” metabolizers who fail standard protocols.

Furthermore, this evolution redefines the role of pharmaceutical scientists as genomic data interpreters. Ultimately, these data-driven insights replace empirical trial-and-error dosing, moving medicine toward the goal of zero side effects and significantly improved safety across diverse patient populations.

Keywords: Pharmacogenomics, Artificial Intelligence, Precision Dosing, Cytochrome P450, Adverse Drug Reactions, Personalized Medicine

AI-056

TITLE: Role of Artificial Intelligence in Enhancing Pharmacovigilance and Adverse Drug Reaction Reporting

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Abstract:

Pharmacovigilance plays a crucial role in ensuring drug safety by monitoring, detecting, assessing, and preventing adverse drug reactions (ADRs). Despite its importance, conventional pharmacovigilance systems face several limitations, including underreporting of ADRs, delayed signal detection, lack of real-time monitoring, and fragmented data across different healthcare platforms. These challenges can significantly impact timely decision-making and compromise patient safety. With the rapid evolution of artificial intelligence (AI), there is growing interest in leveraging advanced computational techniques to enhance pharmacovigilance practices.

This study explores the role of AI technologies in improving the detection, analysis, and reporting of adverse drug reactions. AI-based approaches, particularly machine learning algorithms and natural language processing, enable the processing and analysis of large-scale structured and unstructured healthcare data, including electronic health records, clinical notes, and patient feedback. These technologies facilitate the early identification of potential safety signals, improve reporting accuracy, and support faster and more informed clinical decisions.

In addition, AI integration allows for continuous real-time monitoring, predictive analytics, and automation of routine pharmacovigilance processes, thereby reducing human error and increasing overall system efficiency. It also enables better data integration from multiple sources, leading to more comprehensive safety evaluations. However, the adoption of AI in pharmacovigilance is associated with challenges such as data privacy concerns, the need for high-quality and standardized datasets, algorithm transparency, and regulatory compliance.

Overall, the incorporation of artificial intelligence into pharmacovigilance systems represents a significant advancement in pharmaceutical sciences. It has the potential to strengthen drug safety surveillance, enhance patient outcomes, and contribute to the development of more efficient, reliable, and proactive healthcare systems globally.

Keywords: Pharmacovigilance, Artificial Intelligence, Adverse Drug Reactions, Drug Safety, Machine Learning

AI-057

TITLE: Artificial Intelligence and Genomics in Drug Development: Do Decentralized Trials and Precision Medicine Deliver Equitable Healthcare or Widen Existing Gaps?

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The convergence of artificial intelligence (AI) and genomic technologies has fundamentally transformed drug development, enabling precision medicine approaches that tailor therapies to individual genetic profiles. Concurrently, decentralized clinical trials (DCTs) have emerged as an innovative model promising greater accessibility and patient-centered research. However, a critical question remains: do these advancements translate into affordable, equitable healthcare outcomes, or do they inadvertently deepen existing disparities?

This narrative review examines the intersection of AI-driven drug discovery, pharmacogenomics, and decentralized trial models through the lens of healthcare equity and cost-effectiveness. Drawing on published literature, regulatory frameworks, and real-world evidence, this paper evaluates whether current innovations in precision medicine are accessible across diverse socioeconomic and geographic populations, or whether systemic barriers — including digital exclusion, genetic data underrepresentation of minority populations, and prohibitive drug pricing — continue to limit equitable access.

Preliminary findings suggest that while AI and genomics accelerate drug discovery and improve therapeutic outcomes for certain populations, significant treatment gaps persist among underserved communities. Decentralized trials, though promising in reducing geographical barriers, face challenges related to digital literacy, data privacy, and regulatory standardization. Furthermore, the high cost of genomics-based therapies raises pressing pharmacoeconomic concerns regarding their sustainability within public healthcare systems.
This paper argues that technological innovation alone is insufficient without deliberate policy intervention, inclusive trial design, and transparent health technology assessment frameworks to ensure equitable benefit distribution.

Keywords: *Precision medicine, artificial intelligence, decentralized clinical trials, pharmacogenomics, healthcare equity*

AI-058

TITLE: ARTIFICIAL INTELLIGENCE IN PHARMACOVIGILANCE: ENHANCING ADVERSE DRUG REACTION DETECTION

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ABSTRACT

Artificial Intelligence (AI) is rapidly transforming pharmacovigilance by improving the detection, assessment, and prevention of adverse drug reactions (ADRs). Traditional

pharmacovigilance systems rely on spontaneous reporting, which often leads to underreporting and delayed identification of safety signals. The integration of AI techniques, including machine learning and natural language processing, offers a more efficient and accurate approach to monitoring drug safety.

The objective of this study is to explore the role of AI in enhancing pharmacovigilance systems. AI-driven tools are capable of analyzing large volumes of structured and unstructured healthcare data, including electronic health records and social media platforms. These technologies facilitate early detection of potential ADRs, improve signal prioritization, and reduce manual workload.

AI applications enable faster processing of complex datasets, identification of rare adverse events, and improved prediction of drug safety risks. Additionally, AI supports regulatory decision-making and contributes to the development of personalized medicine by analyzing patient-specific responses to drugs. However, challenges such as data privacy concerns, algorithm bias, and lack of standardized frameworks remain significant barriers.

In conclusion, AI has the potential to revolutionize pharmacovigilance by making drug safety monitoring more proactive, efficient, and reliable. Its continued development and integration into healthcare systems will enhance patient safety and support better clinical outcomes.

AI–e-001

Artificial Intelligence (AI)-Driven Medication Management Through Internet Based in Hospital Pharmacy

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Abstract:

The development of hospital pharmacy medication management solutions during COVID-19 pandemic used Artificial Intelligence (AI) technology to create multiple operational benefits. The integration of artificial intelligence with telemedicine-based pharmacy operations leads to enhanced processes for prescription evaluation medication distribution and patient counseling. The system generates a secure and efficient medication management system through its combination of AI prescription pre-screening and pharmacist supervision which reduces medication errors while increasing operational efficiency. The implementation of multiple drug distribution systems together with consumer id and order-code technology which delivers both security and privacy protection enables improved service access for users.

AI pharmacists possess superior capabilities because they can comprehend contextual information and make independent decisions while they have the ability to learn new things and use predictive analytics. The system enables organizations to identify prescription problems before they occur which results in improved business operations and provides patients with 24-hour access to medical advice. The model resolves staffing problems by reducing administrative duties and allowing pharmacists to concentrate on their clinical work with patients.

The findings suggests that AI-integrated pharmacy systems enhance healthcare access while they use resources more effectively and they help public health disaster response efforts. The development of AI-driven pharmacy services needs to overcome three major obstacles, which

include system maintenance challenges and usability problems and regulatory compliance issues.

Keywords: *Artificial Intelligence (AI), Medication Management, Prescription Screening, Telemedicine, Healthcare Efficiency, AI Pharmacist*

AI –e- 003

From Reaction to Prevention: Predicting Adverse Drug Reactions Before Prescription Using Artificial intelligence

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Abstract:
Adverse drug reactions (ADRs) remain among the most critical yet preventable contributors to global morbidity and mortality, underscoring the persistent limitations of pharmacovigilance systems that detect harm only after clinical manifestation. This work introduces AIPRx (AI-Based Precision Risk Engine), a pre-prescriptive clinical intelligence framework designed to transition ADR management from retrospective detection to prospective, mechanistically grounded risk prevention at the point of prescribing.
AIPRx is structured as a multi-layered computational architecture integrating heterogeneous biological and clinical data. The Fusion Layer constructs a high-dimensional, patient-specific biological state by unifying genomic, epigenomic, transcriptomic, and immunologic data streams, enabling individualized phenotypic resolution beyond population-averaged inference. The Interaction Intelligence Engine applies network pharmacology and polypharmacy modelling across drug–gene–pathway interaction networks, identifying synergistic and pathway-convergent toxicity mechanisms frequently undetected in reductionist or single-drug analytical frameworks. The Adaptive Layer employs longitudinal machine learning to dynamically recalibrate individual risk trajectories in response to evolving clinical variables, transforming static prediction into temporally responsive clinical intelligence.
To ensure responsible and scalable deployment, the DRDDS Governance Layer incorporates federated, privacy-preserving computation, prospective algorithmic bias surveillance, and clinician-integrated decision accountability. The system generates an explainable, causally attributed, patient-specific ADR risk profile prior to drug administration, directly supporting safer and more precise therapeutic decision-making.
By integrating multi-omic intelligence, structural causal modelling, and adaptive AI within a unified and governed architecture, AIPRx establishes a paradigm shift from reactive pharmacovigilance to pre-emptive, mechanism-aware drug safety, advancing the operational foundations of next-generation precision pharmacotherapy. Keywords- Adverse Drug Reactions (ADR), Precision Pharmacotherapy, Multi-Omics Integration, Explainable AI, Causal Inference.

AI – e-004

Pharmacocybernetics Integrating Artificial Intelligence and Digital Health Technologies for Regulatory Optimization of Personalized Medication Management and Therapeutic Outcomes.

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Abstract

Pharmacocybernetics represents a transformative and interdisciplinary paradigm that integrates pharmacology with cybernetics, artificial intelligence (AI), and digital health technologies to enable adaptive, data-driven, and patient-centred therapeutic management. Moving beyond traditional static dosing models, this approach utilizes continuous feedback systems that connect patients, medications, healthcare professionals, and intelligent digital platforms to optimize clinical outcomes. By incorporating real-time physiological monitoring, behavioural analytics, and computational modeling, pharmacocybernetics facilitates dynamic adjustment of therapy, enhancing both safety and efficacy.

Core components of this framework include advanced digital infrastructures such as wearable sensors, smart drug-delivery systems, and AI-driven clinical decision-support tools, combined with active human oversight and closed-loop feedback mechanisms. These integrated systems enable predictive pharmacovigilance, early detection of adverse drug reactions, and personalized dosing strategies through pharmacokinetic–pharmacodynamic (PK–PD) modeling. Emerging models—including AI-based adherence optimization, digital therapeutic feedback loops, and cyber-physiological monitoring systems—demonstrate the practical application of pharmacocybernetic principles in modern healthcare.

From a regulatory perspective, global agencies such as the U.S. Food and Drug Administration (FDA) and European Medicines Agency (EMA) are increasingly focusing on governance frameworks for algorithmbased therapeutics, emphasizing transparency, validation, cybersecurity, and real-world evidence generation. Concurrently, pharmaceutical industries are adopting pharmacocybernetic approaches through digital–drug integration, AI-enabled clinical development, and tele-pharmacotherapy systems, supporting the evolution of precision medicine.

Despite challenges related to data security, algorithm explainability, and regulatory harmonization, pharmacocybernetics offers a robust framework for next-generation pharmaceutical care. It redefines the role of healthcare professionals, particularly pharmacists, in delivering technology-enabled, continuous, and individualized therapy. Overall, pharmacocybernetics stands as a pivotal innovation in advancing safe, efficient, and ethically governed healthcare systems.

Keywords: *Pharmacocybernetics, Artificial Intelligence in Healthcare, Digital Therapeutics, Personalized Medicine, Predictive Pharmacovigilance.*

AI – e - 005

Artificial intelligence in the design and optimization of nano-topical drug delivery Systems for dermatological diseases

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Abstract:

A wide range of skin conditions such as atopic dermatitis, psoriasis, and acne have been affecting people all around the world. However, conventional treatment options face multiple challenges including poor skin permeability, instability, and adverse effects. The new technologies used in nanotechnologies make it possible to create nanoscale delivery systems that allow encapsulation of drugs within artificial liposomes, niosomes, solid lipid

nanoparticles (SLNs), and nanostructured lipid carriers to improve their solubility, targeted action, and controlled release. With the emergence of new technologies, Artificial Intelligence (AI) has provided a breakthrough in creating optimized nanotechnology-based drug delivery systems (NDDS). Using techniques such as machine learning, deep learning, and predictive modeling, AI makes it possible to create optimized nanodelivery systems using quantitative structure-permeability relationship models to predict the drug-carrier interaction. This allows optimizing the particle size that needs to be between 50-200 nm to ensure effective skin permeability, zeta potential, and polydispersity index. Using generative adversarial networks and reinforcement learning, it becomes easier to design new nanomaterials by predicting various excipients needed. With regards to psoriasis treatment, AI predicts the optimal flux rate of corticosteroids incorporated into SLNs through molecular dynamic simulations with neural network integration. Similarly, for atopic dermatitis, ceramides loaded into liposome formulations based on genomic and phenotypic characteristics of individual patients. For acne treatments, machine learning optimizes the nanoemulsification of retinoids, lowering photodegradation and providing steady release of anti-inflammatory agents. Additionally, AI aids in correlating in vitro and in vivo experiments using pharmacokinetic modeling, saving up to 40-50% time and money. Data paucity and regulation issues remain major challenges, but through AI integration, precision nanomedicine can be anticipated in dermatological applications, leading to increased effectiveness and better patient compliance.

Keywords: *Artificial Intelligence (AI), Nano-topical Drug Delivery, Dermatological Diseases, Nanocarriers, Skin Permeation Optimization*

AI – e - 007

Artificial Intelligence in Pharmacovigilance for Early Detection of High-Risk Drug combinations in Polypharmacy

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Abstract

Background: Polypharmacy is a major contributor to drug–drug interactions (DDIs) and adverse drug reactions (ADRs), particularly in elderly and comorbid populations. Conventional pharmacovigilance systems rely on spontaneous reporting and static interaction databases, often resulting in delayed detection of clinically significant risks. Artificial intelligence (AI) integrated with real-world data offers a proactive approach for early identification of high-risk drug combinations.

Objective: To evaluate the effectiveness of AI-assisted models in detecting high-risk drug combinations in polypharmacy patients and improving pharmacovigilance outcomes.

Methods: A retrospective analytical framework was developed using real-world data derived from electronic health records and pharmacovigilance databases. Supervised machine learning models, including logistic regression and ensemble methods, were applied to identify DDI patterns. Key variables included patient demographics, comorbidities, medication count (≥5 drugs), and known interaction profiles. Model performance was evaluated using accuracy, sensitivity, specificity, and AUROC.

Results: AI-assisted models demonstrated improved predictive performance compared to traditional rule based approaches, particularly in identifying high-risk drug combinations among elderly patients and those with multiple comorbidities. The models captured complex interaction patterns and enabled effective risk stratification, supporting early clinical interventions and reducing the likelihood of ADR-related hospitalizations.

Conclusion: AI-assisted pharmacovigilance enables a shift from reactive to proactive drug safety monitoring. Integration into clinical decision support systems can enhance prescribing safety and patient outcomes, with clinical pharmacists playing a key role in implementation. This study highlights a scalable, data-driven approach for next-generation pharmacovigilance in real-world clinical settings.

Keywords: *Artificial Intelligence; Pharmacovigilance; Drug–Drug Interactions; Polypharmacy; Adverse Drug Reactions.*

AI – e-008

AI-Based Clinical Decision Support Systems in Optometry: Advancing Allied Healthcare Outcomes

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Abstract

The integration of artificial intelligence (AI), many industries are adopting innovative technologies. AI is also making an impactful change in healthcare and its operations within the clinical decision-making process for optometry and allied health sciences. In vision care, AIbased Clinical Decision Support Systems (CDSS) are essential, as they offer a promising approach to improving diagnostic accuracy and workflow while enhancing patient outcomes.

This review aims to examine the role and impact of AI-driven clinical decision support systems in optometric practice, as well as their implications for facilitating and advancing the delivery of allied healthcare. Prompted by its growing list of diseases, AI is being used to diagnose a variety of ocular conditions as machine learning and deep learning algorithms are stripped down for things like diabetic retinopathy, glaucoma and age-related macular degeneration. These systems help optometrists by analysing large datasets such as retinal images and patient history, to provide evidence-based recommendations and risk assessments. CDSS optimizes the standards of care that help in reducing diagnostic errors, along with offering clinical efficiency and patientcentric treatment. This paper will only present a narrative review of contemporary literature exploring where AI is starting to be applied in optometry and allied healthcare practice. AIbased CDSS have the potential to enhance screening programs, allow for the dissemination of early intervention and ensure access to eye care services, especially in low-resource settings. Additionally, this partnership of optometrists with artificial intelligence (AI) systems encourages an interdisciplinary approach to patient management and strengthens the healthcare system as a whole.

In conclusion, AI-integrated clinical decision support systems are an innovative evolution in optometry that can lead to enhanced diagnostic accuracy and clinical results, as well as increased accessibility of health services. Their incorporation into everyday practice offers great potential for the future of allied healthcare, underscoring the significance of ongoing research, substantiating their role in ethical considerations and professional training for maximal implementation.

Keywords: *Clinical Decision Support Systems, artificial intelligence, optometry, allied health sciences, ocular.*

AI –e - 009

The Synergy of Artificial Intelligence and Real-World Evidence (RWE) in Modern HEOR: Current Applications and Future Career Perspectives

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Abstract:

BACKGROUND: As pharmaceutical sciences evolve in the era of artificial intelligence (AI), the role of realworld data (RWD) has expanded from descriptive analysis to advanced predictive modeling. In Health Economics and Outcomes Research (HEOR), leveraging data from electronic health records (EHRs), claims databases, and patient-reported outcomes is essential for evaluating treatment effectiveness and value in diverse populations.

OBJECTIVE: To explore the role of AI techniques, including machine learning (ML) and natural language processing (NLP), in transforming real-world data into actionable evidence for clinical, regulatory, and reimbursement decision-making.

METHODOLOGY: A narrative literature review was conducted using databases such as PubMed, ScienceDirect, and relevant HEOR reports. The review focused on recent advancements in AI-driven realworld evidence generation, particularly in comparative effectiveness research and health outcomes assessment.

RESULTS: The integration of AI with RWE has demonstrated significant potential in improving data processing efficiency, enhancing the accuracy of patient outcome assessments, and supporting clinical decision-making. Applications include pharmacovigilance, predictive analytics, and cost-effectiveness evaluations. Additionally, the growing adoption of AI-driven RWE is increasing the demand for healthcare professionals with combined expertise in clinical practice and data analytics.

CONCLUSION: The convergence of artificial intelligence and real-world evidence is reshaping HEOR and global healthcare decision-making. Developing competencies in RWE methodologies and AI applications is essential for future pharmacy professionals to contribute effectively to valuebased healthcare systems and evolving industry roles.

Keywords: *HEOR, Real-World Evidence, Artificial Intelligence, Real-World Data, Pharmacoeconomics, Clinical Pharmacy*

AI – e- 011

Artificial Intelligence Driven Predictive Modelling in Psoriasis: A Comprehensive Review of Prediction, Classification, and Personalized Treatment

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Abstract

Background: Psoriasis is a chronic inflammatory skin disease with varied clinical features and unpredictable progression. Traditional methods of diagnosis and assessment are often subjective and may not fully capture disease complexity. Artificial intelligence (AI) offers new opportunities to improve understanding and management through data-driven approaches.

Objective: This review aims to evaluate the role of AI in psoriasis, focusing on its use in prediction, disease classification, and personalized treatment.

Methods: A review of recent studies was conducted, including research using machine learning (ML), deep learning (DL), computer vision, and natural language processing (NLP). Studies that used clinical, imaging, and biological data to develop predictive models were included.

Results: AI models have shown strong potential in predicting disease outcomes in psoriasis. Machine learning techniques can predict treatment response and risk of comorbidities with good accuracy. Deep learning models, especially those using image analysis, help in diagnosing psoriasis and assessing disease severity more objectively. AI also helps in identifying different disease subtypes (phenotypes), allowing better classification of patients. In addition, AI-based analysis of genetic and molecular data has supported the discovery of potential biomarkers, improving disease prediction and management.

Discussion: Despite promising results, challenges remain. These include differences in data quality, limited testing in real-world settings, lack of transparency in some AI models, and concerns about data privacy and bias. Addressing these issues is important for wider clinical use.

Conclusion: AI has the potential to improve psoriasis care by enabling early prediction, better classification, and personalized treatment. Further research and proper validation are needed for its successful use in clinical practice.

Keywords: *Artificial Intelligence; Psoriasis; Machine Learning; Deep Learning; Predictive Modelling; Precision Medicine; Dermatology; Computer Vision*

AI – e-012

Hidden Drug Interactions in Clinical Practice: A Clinical and AI-Assisted Analysis

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Abstract

Drug interactions are a major cause of reduced therapeutic efficacy and adverse drug events in clinical practice. The risk is significantly higher in elderly patients due to polypharmacy, which itself is a leading cause of hospitalization. Studies indicate that nearly 36% of prescribed drugs may be unnecessary, and around 30% may be inappropriate in geriatric patients, increasing the probability of drug–drug interactions as the number of medications rises.

This study aims to identify commonly overlooked drug interactions and evaluate the role of artificial intelligence-based tools in their detection. A review-based analysis was carried out using standard literature and interaction checker tools. Both pharmacodynamic and pharmacokinetic interactions were assessed. Clinically significant pharmacodynamic interactions include the combination of ACE inhibitors with potassium-sparing diuretics such as amiloride, which can lead to severe hyperkalemia. Concurrent use of NSAIDs with glucocorticoids increases the risk of gastric bleeding, while NSAIDs with quinolones may enhance seizure risk. In addition, the use of ibuprofen or naproxen with aspirin in cardiac patients may reduce cardioprotective effects.

Pharmacokinetic interactions affecting absorption were also identified. For example, NSAIDs may reduce the antihypertensive effect of ACE inhibitors, and calcium or milk intake can significantly decrease the bioavailability of bisphosphonates like alendronate.

Keywords: *Drug interactions, Polypharmacy, Artificial intelligence, Patient safety, Clinical Pharmacy.*

COG-e-009

Adwiya mu'atadila in unani medicine: an individualized and humour specific approach to disease management

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BACKGROUND: The Unani system of medicine is fundamentally based on the concept of mizaj (temperament) and the balance of *akhlāt* (humours), namely *dam* (blood), *balgham* (phlegm), *ṣafrā'* (yellow bile), *sawdā* (black bile). Human body constitute all the humours and their temperament is based on the predominant humour, termed as *damwī* (sanguineous), *balghamī* (phlegmatic), *ṣafrāwī* (bilious), and *sawdāwī* (melancholic). Humours mixed in balanced proportions, both in quantity and quality, constitute health and their derangement and irregular distribution in quantity or quality, causes disease.

OBJECTIVE: This review aims to elucidate the concept of Adwiya Mu'atadila (humourmodulating drugs) and their role in management of humoural derangements, highlighting the distinct Adwiya Mu'atadila are indicated for specific altered humour. These agents facilitate the tadeel (equilibrium or alteration) of the affected humour, thereby contributing to the resolution of disease.

METHOD: Classical Unani texts were systematically reviewed for conceptual understanding of adwiya mu'atadila. The correlation between alteration in individual humours and their targeted management through adwiya mu'atadila was subsequently analyzed. Electronic databases such as PubMed, ScienceDirect, Google Scholar, Web of Science were searched for studies reporting on humoural imbalances, and relevant therapeutic interventions.

RESULT: Diseases were found to arise from specific alteration in dam, balgham, safra and sauda. Adwiya mu'atadila described in classical unani literature are responsible for correction of specific humoural derangements. These agents act by facilitating the expulsion of *fāsid akhlāṭ* (morbid humours) through istifrāgh (evacuation) from the body. This helps in restoring the normal homeostasis of humours.

CONCLUSION: In conclusion, this review establishes a clear correlation between humoural derangements and their targeted management through adwiya mu'atadila. These humour-modulating agents facilitate tadeel by correcting altered humours, thereby supporting a rational and individualizd approach to disease management in Unani medicine.

COG-e-010

Advancing Natural Product-Based Gastroprotection: A Bioactive Flavonoid Attenuates Serotonin-Induced Gastric Ulcers in Rats via Antioxidant and Anti-Inflammatory Pathways

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Abstract:

Gastric ulcers continue to pose a major therapeutic challenge due to their multifactorial Etiology, including oxidative stress and inflammation triggered by endogenous mediators such as serotonin. The present investigation evaluates the gastroprotective efficacy of a plantderived bioactive flavonoid in a serotonin-induced gastric ulcer model in rats, with emphasis on its underlying antioxidant and anti-inflammatory actions. Animals were pretreated with the test compound prior to ulcer induction, followed by comprehensive assessment of gastric damage. Macroscopic evaluation revealed a substantial reduction in ulceration and haemorrhagic lesions in flavonoid-treated groups compared to untreated controls. Biochemical analyses demonstrated a significant attenuation of oxidative stress, as indicated by decreased lipid peroxidation levels and enhanced activity of endogenous antioxidant systems. In parallel, the flavonoid markedly suppressed inflammatory responses, evidenced by the downregulation of key pro-inflammatory mediators. Histological examination further confirmed the protective effect, showing improved mucosal architecture, reduced epithelial disruption, and minimal inflammatory cell infiltration in treated animals. These findings suggest that the gastroprotective activity of the bioactive flavonoid is mediated through a dual mechanism involving reinforcement of antioxidant defences and modulation of inflammatory pathways. Furthermore, the treatment exhibited a dose-dependent protective response, indicating its pharmacological consistency and potential therapeutic reliability. The observed effects were comparable with standard gastroprotective agents, supporting its translational relevance in ulcer management. Importantly, no significant adverse effects were observed during the study, suggesting a favorable safety profile of the bioactive compound. Overall, the study provides compelling evidence supporting the potential of natural bioactive compounds in the management of gastric ulcers. The results align with current efforts to advance natural product-based therapeutics and highlight their relevance in addressing global gastrointestinal health challenges through innovative pharmacological strategies.

Keywords: *Bioactive flavonoid; Gastric ulcer; Serotonin-induced ulcer model; Gastroprotection; Oxidative stress; Anti-inflammatory activity*

COG-e-011

Unani therapeutic interventions in type 2 diabetes mellitus (ziabetus shakri): mechanistic insights and non-communicable disease management

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Background: Non-communicable diseases (NCDs), including diabetes mellitus, cardiovascular disorders, and hypertension, pose a major global health challenge. Type 2 Diabetes Mellitus (Ziabetus Shakri) is particularly prevalent and requires long-term management strategies. The Unani system of medicine, based on humoral theory, emphasizes holistic care through lifestyle modification, pharmacotherapy, and regimental therapies. Integrating traditional knowledge with modern biomedical insights may offer complementary approaches to diabetes management.

Methods: This review draws on classical Unani literature and contemporary pharmacological studies to evaluate therapeutic interventions for Type 2 Diabetes Mellitus. Key herbal drugs, compound formulations, and regimental therapies were analyzed for their hypoglycemic potential and mechanistic pathways. Evidence was synthesized to highlight overlaps between Unani principles and modern molecular targets.

Results: Unani drugs such as *Gymnema sylvestre* (Gurmar), *Azadirachta indica* (Neem), *Aloe vera* (Sibr), *Eugenia jambolana* (Jamun), and *Trigonella foenum-graecum* (Fenugreek) demonstrate hypoglycemic activity. Compound formulations including Qurse Dhayabitus, Qurse Tabasheer, Safoof Gilo, Qurs Marwareed, Qurse Gulnar, Dawaul Misk Talkh, Sharbate Afsanteen, Roghane Qusht, and Ma-Us-shaeer are traditionally prescribed for diabetes. Mechanistically, these interventions enhance insulin secretion, improve insulin sensitivity, inhibit intestinal glucose absorption, and reduce oxidative stress. Regimental therapies such as exercise (Riyazat) and detoxification (Tanqiya) further support metabolic balance. Modern studies suggest that Unani formulations act by modulating AMP-activated protein kinase (AMPK), peroxisome proliferator-activated receptors (PPARs), and inflammatory cytokines, thereby bridging traditional practice with biomedical science.

Conclusion: Unani medicine provides a multi-targeted, patient-centered approach to managing Type 2 Diabetes Mellitus. Emerging evidence supports its efficacy and mechanistic basis, highlighting its potential as a complementary strategy in NCD management. Rigorous clinical trials and molecular studies are needed to validate and integrate these therapies into mainstream healthcare.

Keywords: *Unani medicine, Type 2 Diabetes Mellitus, Ziabetus Shakri, hypoglycemic agents, regimental therapy, AMPK, PPAR, oxidative stress, complementary medicine, non-communicable diseases*

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