SHARDA UNIVERSITY AGRA

VasCoS

Sharda School of Pharmacy
Sharda University Agra

Organises

INTERNATIONAL CONFERENCE

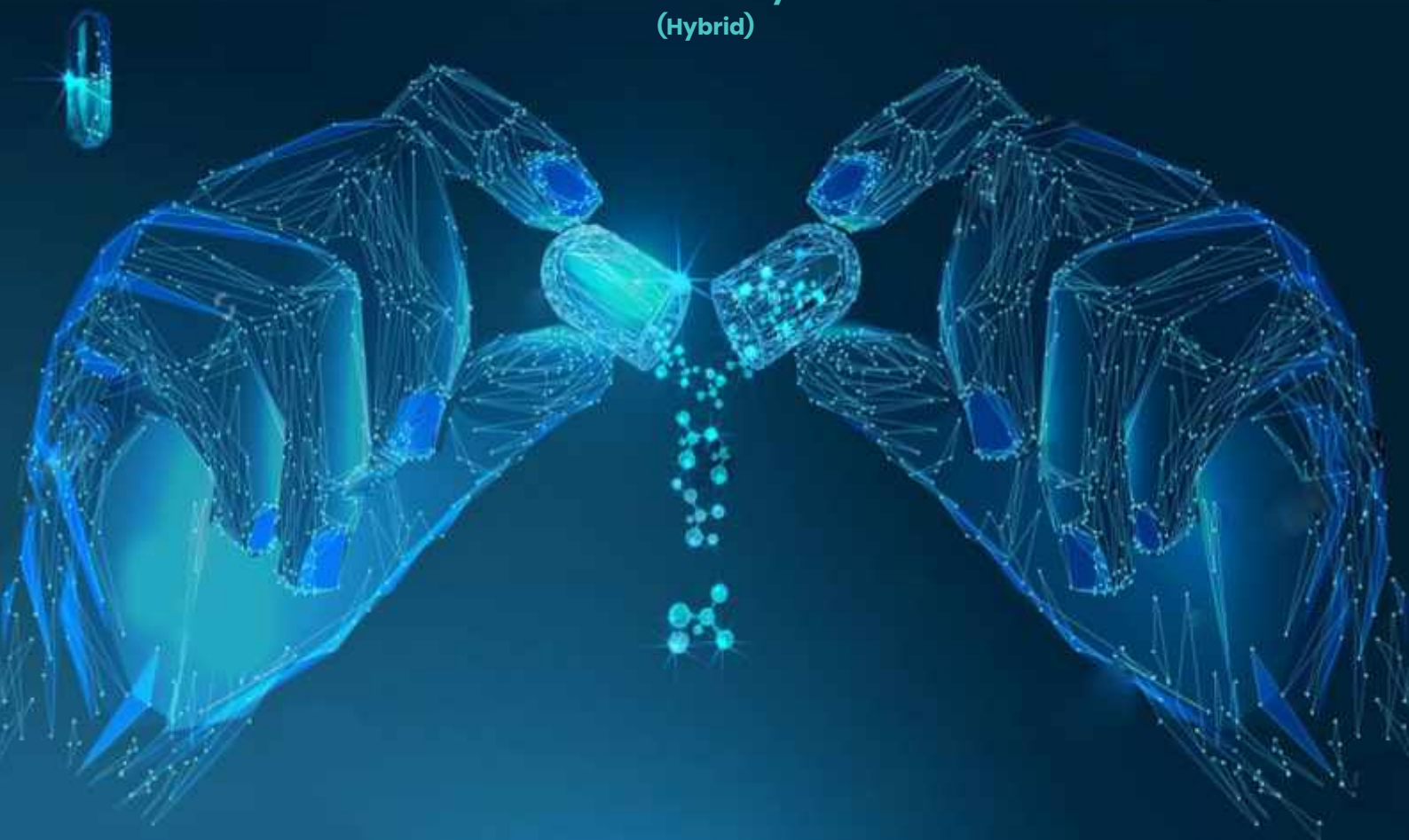
on

Digital Transformation in Pharmacy
Advancing Learning and Professional Excellence

Sponsored by

SHARDA UNIVERSITY AGRA & INDIAN PHARMACY GRADUATES ASSOCIATION (IPGA)

14th– 15th February 2026
(Hybrid)



SOUVENIR - CUM - ABSTRACT BOOK

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About the Sharda University Agra

Sharda University Agra (SUA), Uttar Pradesh, is a multidisciplinary institution of higher learning recognized by the University Grants Commission (UGC), committed to academic excellence, research innovation, and global engagement. A venture of the renowned Sharda Group, The University has established itself as a high quality education provider with prime focus on holistic learning and imbibing competitive abilities in students. The name of University, 'Sharda' is synonymous to 'Goddess of knowledge and learning - Saraswati'. The University offers a wide spectrum of undergraduate, postgraduate, and doctoral programs across health sciences, engineering, management, sciences, and humanities, with a strong emphasis on outcome-based education, experiential learning, and research-led teaching. Supported by modern infrastructure, digitally enabled classrooms, advanced laboratories, libraries, and innovation facilities, the University fosters an inclusive and intellectually stimulating academic environment. With a team of experienced faculty members, active industry partnerships, and growing national and international collaborations, SUA offers a vibrant, AI-enabled smart campus that blends cutting-edge technology with value-based education, providing students with a future-ready and immersive learning experience. Sharda University Agra promotes interdisciplinary research, entrepreneurship, and skill development. The University is dedicated to nurturing ethically grounded, globally competent graduates who are well prepared to address contemporary professional challenges and contribute meaningfully to societal and economic development. One of the university's key strengths lies in its commitment to Skill-based Learning and Sustainable Development Goals (SDGs). The university further distinguishes itself through global collaborations, strong placement support, entrepreneurship incubation, and a student-centric approach to education Sharda University Agra is shaping the leaders of tomorrow and contributing actively to the vision of Viksit Bharat - a developed and self-reliant India.

About the Sharda School of Pharmacy

Sharda School of Pharmacy, Sharda University, Agra, was established in the year 2024 and was formerly known as Anand College of Pharmacy, which was established in 2006 under the aegis of the Sharda Group of Institutions (SGI). During this tenure, the college has made rapid strides of progress to become one of the premier institutes of pharmacy in the northern region of India. Sharda School of Pharmacy is a center of excellence in pharmaceutical education and research. The School offers Pharmacy Council of India (PCI)- approved diploma, undergraduate, postgraduate, and doctoral programs aligned with national regulatory requirements and international standards. It features 21 state-of-the-art laboratories, a well-stocked library, a CCSEA-approved animal house for research, and a vast herbal garden with medicinal plants. Here is the grammatically correct and refined sentence:

Our highly qualified and dedicated faculty members, who hold or are pursuing Ph.D. degrees, foster all-round development through academic excellence, extracurricular activities, and personality development. With strong industry–academia collaboration, the School emphasizes the integration of theoretical knowledge, practical training, and digital learning approaches to develop globally competent pharmacy professionals capable of contributing effectively to healthcare, research, and the pharmaceutical industry. Sharda School of Pharmacy includes a diverse community of scholars who work together and inspire one another in pharmaceutical research, practice, and service with an aim to enhance the quality of academics and research. The school aims to provide brand-new, cutting-edge facilities to its students that serve as ideal resources for learning, growth, and the practical implementation of ideas.. The School is under a constant accreditation process. Sharda School of Pharmacy is a vibrant hub where knowledge converges with innovation, and aspiring pharmacists embark on a transformative journey towards professional excellence.

About Sharda Group of Institutions (SGI)

The Sharda Group was established in 1996, with the vision to respond to the higher level of expectations from professional education in response to the overall effects of globalization and growth. It has been phenomenally successful in establishing benchmarks in academic excellence and holistic grooming of students to meet the career challenges in increasingly globalized economic market conditions. The Sharda Educational Trust has earned goodwill by delivering the promised performance and by adopting best practices and systems.
All the Sharda colleges carry the necessary statutory and regulatory approvals/affiliations. Currently, there are many campuses under the Sharda Group of Institutions at Agra, Mathura, and Greater Noida. The various colleges under the umbrella of SGI are as follows:

- **HINDUSTAN CAMPUS**
- Hindustan College of Science & Technology (HCST) established in 1996
- Hindustan Institute of Management & Computer Studies (HIMCS) established in 1997
- Hindustan Institute of Technology & Management (HITM) established in 1999
- ANAND CAMPUS (SHARDA UNIVERSITY AGRA in 2024)
- Anand Engineering College Technical Campus (AEC) established in 1998
- Anand College of Education (ACE) established in 2002
- Anand College of Pharmacy (ACP) established in 2006
- Anand College of Architecture (ACA) established in 2011
-
- **GREATER NOIDA CAMPUS**
- Sharda University, Noida established in 2009
- UZBEKISTAN CAMPUS
- Sharda University, Uzbekistan established in 2019

About the Indian Pharmacy Graduates Association

Established in 1973, the Indian Pharmacy Graduates Association (IPGA) is a national-level professional organization registered under the Societies Registration Act, 1860, and affiliated with the Indian Pharmaceutical Congress Association (IPCA), the federal body comprising IPGA, IPA, IHPA, APTI, and AIDCOC. Recognized for its contribution to the pharmacy profession, IPGA holds income tax exemption under Section 80G(5)(VI) of the Income Tax Act, 1961, and represents over 6,100 life members across 21 state branches nationwide. For nearly five decades, IPGA has been committed to advancing the professional development, recognition, and status of pharmacy graduates in India through workshops, seminars, annual conferences, and other knowledge-sharing initiatives.

Guided by its mission to improve the professional standing of pharmacy graduates and secure their rightful place in pharmacy and allied professions, IPGA envisions quality pharmacy professionals delivering pharmaceutical services for the global healthcare system. The association promotes education and training, professional ethics, collaborative engagement among members, and advocacy with policymakers to ensure equitable recognition and opportunities for pharmacy professionals. The governance and strategic direction of IPGA are led by a distinguished Executive Council, including Prof. (Dr.) Atul Nasa (President), Prof. (Dr.) Arun Garg (General Secretary), Prof. (Dr.) Vijay Bhalla (Treasurer), Dr. Deependra Singh (Vice President – Central), Mr. Tapan Kumar Choudhary (Vice President – East), Dr. Nitin Deore (Vice President – West), Dr. Ajay Sachan (Vice President – North), Dr. Nishith MC (Vice President – South), Mr. Sudhir Kumar Singh Shastradhar (Joint Secretary – Central), Dr. Sudarsan Biswal (Joint Secretary – East), Dr. Jeyabalan Govindasamy (Joint Secretary – North), Dr. B. Kumudhaveni (Joint Secretary – South), Mr. Rajesh Chaudhari (Joint Secretary – West) and Prof. (Dr.) Pranay Wal (President–U.P. Branch), all of whom actively drive the association's objectives and initiatives across India.

With a legacy of excellence and a forward-looking vision, the Indian Pharmacy Graduates Association (IPGA) serves as a unifying platform for pharmacy professionals nationwide. Through dynamic conferences, impactful academic programs, and sustained professional engagement, IPGA continues to inspire innovation, leadership, and excellence in pharmacy education and practice. The association warmly invites academicians, researchers, industry professionals, and students to actively participate in its initiatives and collectively contribute toward strengthening the pharmacy profession and advancing global healthcare outcomes.

Chief Patron
Message

Dear Participants,

It is a privilege to extend my warm greetings to all participants of the International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence." This conference arrives at a defining phase in the evolution of pharmaceutical sciences, where digital innovation is reshaping education, research, healthcare delivery, and professional practice.

The integration of technology into pharmacy has opened new avenues for precision, efficiency, and patient-centric care. Platforms such as artificial intelligence, data analytics, telepharmacy, and digital learning tools are redefining how pharmacists learn, collaborate, and serve society. This conference provides a valuable opportunity to deliberate on these advancements and envision their responsible and impactful implementation.

Sharda School of Pharmacy, Sharda University Agra, remains dedicated to nurturing innovation, critical thinking, and global collaboration. By hosting this conference, we reaffirm our commitment to creating a knowledge-driven ecosystem that bridges academia, industry, and healthcare systems, with a shared goal of strengthening the pharmaceutical profession.
I am confident that the interactions, deliberations, and research exchanges during this event will inspire new ideas, encourage interdisciplinary partnerships, and contribute meaningfully to addressing emerging healthcare challenges. I encourage all participants to take full advantage of this platform, share insights, and work collectively toward shaping a resilient and future-ready pharmacy sector.

"Progress in healthcare is driven by innovation, collaboration, and the courage to envision change"

P. K. GUPTA
Founder, Sharda Group
Chancellor, Sharda University
Chairman,
Sharda Hospital & Sharda Care – The Health City

Chief Patron
Message

Dear Esteemed Participants,

I am delighted to welcome you to the International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence." This forum reflects our collective commitment to embracing change and preparing the pharmaceutical profession for a future driven by innovation, technology, and global collaboration.

As digital tools continue to revolutionize healthcare systems worldwide, pharmacy stands at the forefront of this transformation. From smart manufacturing and data-driven research to digital education and patient-centered services, the scope for advancement is immense. This conference offers an important platform to exchange ideas, share best practices, and explore solutions that can strengthen professional competencies and improve healthcare outcomes.

Sharda School of Pharmacy, Sharda University Agra, takes pride in facilitating academic dialogue that encourages excellence, integrity, and forward-thinking approaches. By bringing together academicians, researchers, clinicians, and industry leaders, this conference aims to cultivate meaningful partnerships and inspire innovative strategies that address both present and future challenges in pharmacy and healthcare.

I encourage all delegates to actively participate in the sessions, engage in thoughtful discussions, and contribute their perspectives toward shaping a progressive and inclusive pharmaceutical ecosystem. May this conclave serve as a catalyst for learning, collaboration, and impactful transformation.

With best wishes for the success of the conference.

"The future of pharmacy belongs to those who innovate with purpose and vision"

Y. K. GUPTA

Co-Founder, Sharda Group
Pro-Chancellor, Sharda University
Vice Chairman, Sharda Hospital & Sharda Care - The Health City

Patron
Message

Dear Distinguished Delegates,

It is a pleasure to welcome you to the International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence." This conference represents an important academic initiative that aligns with our institutional vision of fostering innovation, interdisciplinary learning, and global engagement in higher education.

The rapid integration of digital technologies into pharmaceutical sciences is transforming the way knowledge is created, disseminated, and applied. From advanced research methodologies and virtual learning environments to data-driven healthcare solutions, digitalization is redefining professional roles and responsibilities. This conference offers a timely opportunity to examine these developments and to deliberate on their implications for education, research, and clinical practice.

At Sharda University Agra, we believe that universities play a pivotal role in preparing future-ready professionals who are adaptable, ethical, and socially responsible. Through platforms such as this conference, we aim to encourage critical inquiry, collaborative research, and meaningful dialogue between academia and industry.

I am confident that the scholarly discussions, expert sessions, and research presentations will contribute significantly to the enrichment of knowledge and inspire innovative approaches to addressing contemporary healthcare challenges. I extend my best wishes to the organizers and participants for a successful and intellectually stimulating conference.

"The strength of the pharmacy profession in the digital era depends on how wisely we blend technology with human expertise"

Prof. (Dr.) JAYANTHI RANJAN
Vice-Chancellor,
Sharda University Agra.

Convener
Message

Dear Colleagues,

It is my great pleasure to welcome you to the International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence." The enthusiastic response to this conference reflects a shared commitment among academicians, researchers, professionals, and students to explore the evolving landscape of pharmaceutical sciences in the digital era.

The pharmacy profession is undergoing a significant transition, driven by technological innovation, interdisciplinary research, and global healthcare demands. This conference has been carefully designed to provide a dynamic platform for scholarly exchange, professional interaction, and the presentation of innovative ideas that can contribute to academic growth and healthcare advancement.

At Sharda School of Pharmacy, Sharda University Agra, we strive to create meaningful opportunities that bridge theory with practice and encourage collaboration across disciplines. Through expert lectures, research presentations, and interactive sessions, this conference aims to inspire critical thinking and foster partnerships that extend beyond institutional boundaries.

I encourage all participants to actively engage in the sessions, share their insights, and make the most of the learning and networking opportunities offered during the conference. I am confident that the deliberations and outcomes of this event will add significant value to your academic and professional journey.

I extend my sincere gratitude to the organizing committee, speakers, and contributors for their dedication and support in making this conference possible. Wishing you all a productive and enriching conference experience.

With best wishes,

Prof. (Dr.) GYANENDRA KUMAR SHARMA

Dean,
Sharda School of Pharmacy,
Sharda University Agra.
Joint Secretary IPGA, Uttar Pradesh.

Chief Guest
Message

It gives me immense pleasure to learn that the Sharda School of Pharmacy, Sharda University, Agra, is organizing an International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence." I extend my heartfelt appreciation to the institution for taking this timely and forward-looking initiative.

The rapid integration of digital technologies has significantly transformed pharmaceutical education, research, healthcare delivery, and professional practice. Innovations such as artificial intelligence, big data analytics, e-learning platforms, telepharmacy, and digital health solutions are reshaping the way pharmacists learn, collaborate, and serve society. In this context, the present conference provides an excellent platform for academicians, researchers, industry experts, and students to exchange ideas, share experiences, and explore emerging trends that will define the future of pharmacy education and practice.

I am confident that this international forum will foster meaningful discussions, promote interdisciplinary collaboration, and contribute to capacity building among participants. Such initiatives play a crucial role in nurturing professional excellence and preparing future-ready pharmacy professionals capable of addressing global healthcare challenges.

I compliment Prof. (Dr.) Gyanendra Kumar Sharma, Convener, and the management of Sharda University Agra, for taking this commendable initiative. I also congratulate the organizing committee for their dedicated efforts and meticulous planning.

I wish the conference a grand success and extend my best wishes to all the delegates and participants for a highly enriching and fruitful academic experience.

Prof. (Dr.) ATUL KUMAR NASA

President, IPGA
Hon'ble Pro Vice-Chancellor
SGT University, Gurugram (Haryana)

Guest of Honor
Message

I am glad to know that Sharda School of Pharmacy, Sharda University Agra, is conducting a National Conference on “Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence.” This timely initiative reflects the institution's commitment to embracing innovation and excellence in pharmaceutical education and practice.

The rapid advancement of digital technologies has significantly transformed the pharmacy profession. Tools such as artificial intelligence, big data analytics, e-learning platforms, telepharmacy, and digital health solutions are redefining teaching–learning methodologies, research approaches, and patient care services. This conference provides an excellent platform for researchers, academicians, industry experts, and healthcare professionals to deliberate on emerging trends, share research outcomes, and explore collaborative opportunities in the field of health sciences.

I extend my sincere congratulations to the organizing team for their dedicated efforts in conceptualizing and organizing this academic event. I also compliment Prof. (Dr.) Gyanendra Kumar Sharma and the management of Sharda University Agra, for taking this commendable and forward-looking initiative.

I convey my best wishes to the organizing committee, participants, and resource persons for the successful conduct of the conference and hope that the deliberations will contribute significantly to advancing learning, research, and professional excellence in pharmacy.

Prof. (Dr.) ARUN GARG
General Secretary- IPGA
Hon'ble Vice-Chancellor
MVN University, Palwal, Haryana

Guest of Honor
Message

Dear All,

I am delighted to know that the Sharda School of Pharmacy, Sharda University Agra, in association with the Indian Pharmacy Graduates Association (IPGA), is organizing an International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence."

The pharmacy profession today stands on the threshold of a digital renaissance. Algorithms are becoming allies, data is turning into direction, and technology is redefining the boundaries of learning and professional practice. In such a dynamic era, the true challenge is not merely adopting digital tools, but cultivating professionals who can blend scientific intelligence with human sensitivity and professional ethics.

This conference emerges as a beacon of academic foresight—bringing together young minds, seasoned scholars, and industry leaders to explore how digital transformation can elevate pharmaceutical education, research innovation, and healthcare delivery. By creating a platform for dialogue and discovery, this initiative will help shape pharmacists who are prepared not only for the future of technology but also for the future of patient care.

I sincerely applaud the Organizing Committee for envisioning this conference in a hybrid mode, ensuring inclusivity and global academic participation. I am confident that the deliberations and collaborations fostered here will ignite new ideas, strengthen partnerships, and leave a lasting imprint on the pharmacy fraternity.

I extend my heartfelt best wishes for the grand success of this conference and for its continued contribution toward building a digitally empowered and socially responsible pharmacy profession.

"When knowledge meets technology with purpose, excellence becomes inevitable"

With warm regards and best wishes,

Dr. NEERAJ UPMANYU
Pro Vice Chancellor
SAGE University, Bhopal (Madhya Pradesh)

Guest of Honor
Message

Dear Colleagues,

It is a privilege to extend my warm greetings to all participants of the International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence." Organized by Sharda School of Pharmacy, Sharda University Agra, in collaboration with the Indian Pharmacy Graduates Association (IPGA).

The pharmacy profession is undergoing a remarkable transition driven by digital technologies such as artificial intelligence, data analytics, tele-health, and integrated healthcare platforms. These innovations are reshaping pharmaceutical education, research, and industry practices, while creating new opportunities for skill development and professional growth. In this context, it becomes imperative for academia and industry to work hand in hand to nurture a workforce that is not only technologically competent but also ethically grounded and socially responsible.

This conference serves as a vital platform for students, academicians, researchers, and industry professionals to exchange ideas and explore how digital transformation can be effectively aligned with experiential learning, industry collaboration, and patient-cantered healthcare delivery. Such initiatives strengthen the bridge between academic knowledge and real-world application, ensuring that future pharmacists are prepared to meet the evolving demands of the healthcare sector.

I sincerely commend the Organizing Committee, Sharda University Agra for their thoughtful vision in conducting this conference in a hybrid mode, enabling broader participation and international interaction. I am confident that the deliberations and outcomes of this conference will inspire innovation, foster collaboration, and contribute significantly to professional excellence in pharmacy education and practice.

I extend my warmest wishes for the grand success of this conference and for its lasting impact on the pharmacy fraternity.

"Digital transformation becomes meaningful when it empowers professionals, enriches learning, and ultimately improves patient care"

With best regards and warm wishes,

Prof. (Dr.) VIJAY BHALLA
Dean – Industry Collaboration & Internship Affairs
SGT University, Gurugram
Treasurer, IPGA

Guest of Honor
Message

It is indeed a matter of immense pleasure and encouragement to learn that the Sharda School of Pharmacy, Sharda University Agra, in association with the Indian Pharmacy Graduates Association (IPGA), is organizing an International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence."

The chosen theme reflects the evolving dynamics of the pharmacy profession in the era of rapid technological advancement. Digital innovations such as artificial intelligence, big data, virtual learning environments, telepharmacy, and advanced healthcare technologies are transforming pharmaceutical education, research methodologies, and professional practice. In such a progressive landscape, it becomes essential for academic institutions and professional organizations to collaboratively foster digital competencies and innovative thinking among future pharmacists.

I am confident that this conference will serve as a vibrant forum for scholars, researchers, industry experts, and students to engage in meaningful dialogue, exchange knowledge, and explore emerging trends that are shaping the future of pharmacy. Such academic initiatives play a pivotal role in enhancing professional standards and strengthening the foundation of pharmaceutical education at national and international levels.

I extend my sincere congratulations to the organizers and offer my best wishes for the resounding success of this significant academic endeavor.

With warm regards and best wishes,

Prof. (Dr.) AKASH VED
Associate Dean (Pharmacy)
Dr. APJ Abdul Kalam Technical University, Lucknow
Central Council Member, PCI, New Delhi

Special Guest
Message

Dear Colleagues,

I am delighted to know that the Sharda School of Pharmacy, Sharda University Agra, in association with the Indian Pharmacy Graduates Association (IPGA), is organizing an International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence."
The theme of this conference is both contemporary and visionary. Digital technologies are redefining the way pharmaceutical sciences are taught, researched, and practiced. From virtual laboratories and intelligent learning platforms to digital therapeutics and technology-driven healthcare systems, pharmacy education is entering a new era that demands adaptability, innovation, and academic rigor.

Such a forum provides an excellent opportunity for educators, researchers, and students to critically reflect on how digital tools can be integrated into curriculum design, research methodologies, and professional training without compromising core professional values. The focus on advancing learning alongside professional excellence highlights the importance of preparing pharmacists who are not only skilled in technology but also deeply committed to ethical practice and patient welfare.
I commend the Organizing Committee for their initiative in conducting this conference in a hybrid format, enabling participation from a wider academic and professional community across geographical boundaries. I strongly believe that the deliberations and scholarly exchanges at this conference will meaningfully strengthen pharmacy education and inspire the next generation of professionals.

I extend my sincere congratulations to the organizers and wish the conference every success in achieving its objectives and leaving a lasting academic and professional imprint.

"Digital progress in pharmacy must be guided by knowledge, responsibility, and a vision for better healthcare"

With warm regards and best wishes,

Prof. (Dr.) DEVENDER PATHAK
Professor, School of Pharmacy
MVN University, Palwal
Former Dean (Pharmacy),
Dr. A.P.J. Abdul Kalam Technical University, Lucknow

Special Guest
Message

It is a matter of great satisfaction and optimism to know that the Sharda School of Pharmacy, Sharda University Agra, in collaboration with the Indian Pharmacy Graduates Association (IPGA), is organising an International Conference on "Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence".

We are witnessing a defining shift in the pharmacy profession, where artificial intelligence, digital health ecosystems, data science, and smart regulatory frameworks are transforming not only how medicines are developed and delivered, but also how pharmacists think, lead, and serve society. In this evolving landscape, technical competence must be complemented by ethical judgment, leadership mindset, and a deep commitment to patient-centric care. This conference offers a timely and meaningful platform for students, researchers, academics, and industry professionals to explore how digital innovation can be responsibly harnessed to enhance healthcare outcomes and professional excellence. By fostering dialogue across disciplines and generations, such forums cultivate future leaders who can bridge the gap between science, technology, and humanity.

I sincerely appreciate the vision and dedication of the Organizing Committee for conceptualizing this conference in a hybrid mode, ensuring wider accessibility and global engagement. I am confident that the ideas exchanged here will inspire innovation, collaboration, and purposeful leadership in pharmacy education and practice.

I extend my heartfelt best wishes for the grand success of the conference and for its enduring impact on the pharmacy profession.

"The future of pharmacy belongs to those who can blend digital intelligence with human compassion-and lead change with purpose"

With warm regards and best wishes,

Prof. (Dr.) PRANAY WAL
Professor & Director
PSIT Pharmacy, Kanpur
President, IPGA (UP State Branch)
Vice President, APTI (UP State Branch)

Ref. No: NSK/SU/02/2025-26 Date: 05/02/2026

On behalf of **Vasant Consultancy Services (VasCoS)**, I would like to express our sincere appreciation for the opportunity to be associated with the upcoming International Conference on **"Digital Transformation in Pharmacy Advancing Learning and Professional Excellence,"** scheduled for February 14th–15th, 2026.

At **VasCoS**, we believe that excellence has no boundaries. While our roots are firm in construction and management, our vision extends into the future of Research and Development.

We are proud to be associated with the **International Conference on Digital Transformation in Pharmacy** at Sharda University Agra. As the world moves toward a digital-first approach in healthcare, VasCoS is honored to support the dialogue between learning and professional excellence.

We believe this collaboration serves as a testament to our shared goal of driving innovation across industries. We look forward to a successful conference and for exploring further avenues where our consultancy's R&D capabilities can support the visionary initiatives of Sharda University.

Thank you for your leadership in organizing this global platform.

S/d

Dr. Sharad V. Khandare

CEO, VasCoS

ORGANIZING COMMITTEE

Chief Patrons
Shri Pradeep Kumar Gupta
Founder, Sharda Group
Chancellor, Sharda University Agra
Chairman, Sharda Hospital & Sharda Care - The Health City

Shri Yatendra Kumar Gupta
Co-Founder, Sharda Group
Pro Chancellor, Sharda University Agra
Vice Chairman, Sharda Hospital & Sharda Care - The Health City

Patron
Prof. (Dr.) Jayanthi Ranjan
Vice-Chancellor, Sharda University Agra

Convener
Prof. (Dr.) Gyanendra Kumar Sharma
Dean, Sharda School of Pharmacy
Joint Secretary IPGA, Uttar Pradesh

Organizing Secretary
Dr. Vikash Sharma

Joint Organizing Secretaries
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Ms. Ashini Singh
Mr. Aniruddh Pratap Singh

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Ms. Ashita Jain
Mr. Rajesh Yadav
Mr. Rajesh Kumar

Local Tour Committee
Mr. Umakant
Mr. Vikrant Singh
Mr. Prabhat Saraswat

Disciplinary Committee
Dr. Rekha Rajput
Dr. Ritesh Kumar
Dr. Manish Kumar Shakya
Dr. Gurvinder Pal Singh

ABSTRACTS

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3	SSP/OP/103	Prachee Raje Bisht, Prabhakar Vishwakarma	NAFLD and Sarcopenia: Shared Pathways, Clinical Interplay, and Future Therapeutic Directions
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17	SSP/OP/117	Tapasya Rawat, Sarika Gupta	Analytical Method Development and Physicochemical Investigation of Venlafaxine HCl in Pure Form.
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ORAL PRESENTATION

SSP/OP-101

Green Synthesis, *In-Vitro* Antiglycation Potential, and Molecular Docking Simulations of Polyhydroxy Pyrrolidine Derivatives

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ABSTRACT

The present investigation describes the rational design, green synthesis, and biological evaluation of a novel series of polyhydroxy-conjugated pyrrolidine derivatives as multifunctional agents targeting glycation- and oxidative stress-mediated diabetic complications. The synthesized derivatives were efficiently obtained under eco-friendly conditions and fully characterized by physicochemical parameters and advanced spectroscopic techniques, supported by computational validation. In vitro biological assessment included α-glucosidase inhibition, antiglycation activity, and antioxidant potential evaluated by the DPPH radical scavenging assay. Among the series, compounds 4c and 4d displayed pronounced α-glucosidase inhibitory activity with IC_{50} values of 127.17 ± 15.88 µM and 151.96 ± 11.36 µM, respectively, outperforming the reference inhibitor rutin. These compounds also significantly inhibited advanced glycation end-product (AGE) formation, preserved protein thiol groups, and markedly reduced fructosamine and protein carbonyl levels, indicating effective suppression of both early and late stages of glycation. Furthermore, compounds 4c and 4d exhibited strong antioxidant activity with IC_{50} values of 29.56 ± 0.07 µM and 33.85 ± 0.75 µM, comparable to ascorbic acid. The enhanced biological performance is attributed to electron-donating substituents that promote radical stabilization and favorable protein interactions. Molecular docking studies against human serum albumin (PDB ID: 1AO6) revealed stable binding conformations, supported by key hydrogen-bonding and hydrophobic interactions, in good agreement with experimental results. Overall, polyhydroxy-conjugated pyrrolidine derivatives emerge as promising scaffolds for the management of postprandial hyperglycemia and oxidative stress associated with diabetes mellitus.

Keywords: Green synthesis, Polyhydroxy pyrrolidine derivatives, α-Glucosidase, Antiglycation activity, *In silico.*

SSP/OP-102

Role of Probiotics in the Prevention and Management of Gastric Ulcers: A Review

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ABSTRACT

Gastric ulcers are a common digestive condition. Current therapy regimens are mostly based on Western medicine. *H. pylori* infection and frequent long-term use of non-steroidal anti-inflammatory medicines are important factors involved in stomach ulcer formation. Additionally, lifestyle choices such as alcohol consumption and cigarette smoking, stress, and exposure to cold environments can also contribute to non-infectious gastric ulcers. Various treatments are available for gastric ulcers, including antibiotics, anticholinergics, and antacids. However, in recent decades, the growing evidence of antibiotic resistance and the adverse effects of antibiotics and acid inhibitors has drawn attention to the potential role of probiotics in the prevention and treatment of stomach ulcers. Probiotics, which are live microorganisms that provide health advantages to the host, have emerged as a possible therapeutic alternative for treating stomach ulcers. Probiotics appear to exert gastroprotective effects through a variety of mechanisms, including inhibition of *H. pylori* colonization, enhancement of mucosal barrier integrity, modulation of inflammatory responses, regulation of oxidative stress, and stimulation of cytoprotective factors such as mucus and prostaglandins. Probiotic supplementation has been shown in preclinical and clinical research to expedite ulcer healing, reduce ulcer severity, and enhance treatment results when administered alone or in combination with traditional therapy. Additionally, Probiotic bacteria and yeasts could heal gastric ulcers by regulating the immune response, reducing inflammation, and restoring the balance between defensive and aggressive factors of the gastric layer. This abstract emphasizes probiotics' potential function as a safe, cost-effective, and biologically relevant strategy to the prevention and treatment of stomach ulcers, hence promoting their incorporation into future therapeutic methods.

Keywords: Gastric ulcer, Probiotics, *Helicobacter pylori*, Mucosal protection, Gut microbiota, Inflammation, Oxidative stress.

SSP/OP-103

NAFLD and Sarcopenia: Shared Pathways, Clinical Interplay, and Future Therapeutic Directions

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ABSTRACT

Both Non-Alcoholic Fatty liver disease (NAFLD) and sarcopaenia are disorders that are related metabolically, together causing an increase in morbidity and increasing the rate of progress of the disease. This review will use the following topics to integrate our understanding of these two inter-related diseases and how they affect one another: epidemiology; pathogenesis/pathological processes; molecular/genetic research; clinical connections; diagnostic evaluations and treatment options. The same metabolic abnormalities (insulin-Resistance, mitochondrial Dysfunction, Chronic Inflammation and Gut/Liver Axis disruption) that are shared factors that drive both NAFLD and sarcopaenia create a pathological cycle for these disorders that drives both the accumulation of lipids in the liver and wasting of muscles. There are several genetic polymorphisms that modify susceptibility to NAFLD and sarcopaenia, including the PNPLA3 and TM6SF2 genes. The use of molecular knowledge (i.e., genetic information) is extremely important for providing the best care for these patients. Advances in imaging modalities, biomarker panels, and Functional Assessment allow us to identify earlier the presence of the combined burdens of NAFLD and sarcopaenia. Increasingly, multiple therapeutic approaches are emphasised in order to achieve an optimal outcome for patients afflicted with either or both of these disorders. These include: lifestyle changes; resistance training; optimise nutrition; and pharmacological agents. Nutraceuticals may provide additional therapeutic benefit for both conditions by decreasing oxidative stress and promoting an anabolic response to exercise. The future of NAFLD and sarcopaenia may be in the area of Precision medicine which utilises multi-omic information and personalized medicine approaches to develop treatment plans that will optimize liver health and muscle fitness at the same time.

Keywords: NAFLD, Sarcopenia, Neutraceuticals.

SSP/OP-104

Digital Transformation in Pharmacy: A Review of AI, Digital Health, and Emerging Technologies for Professional Excellence

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ABSTRACT

Digital transformation is rapidly reshaping pharmacy education and professional practice by enabling data-driven decisions, personalized care, and more efficient medication-use systems. This review summarizes current evidence on artificial intelligence (AI), digital health, and emerging technologies that are influencing pharmacy services and training. Key AI applications include clinical decision support for dose optimization, drug–drug interaction screening, antimicrobial stewardship, and pharmacovigilance signal detection, with growing use of predictive analytics to identify medication-related risks. Digital health tools such as telepharmacy, mobile health applications, wearable-linked monitoring, and electronic health record integration are expanding pharmacist-led services, improving continuity of care, and supporting adherence and patient engagement, especially in rural and resource-limited settings. Automation and smart pharmacy systems (robotic dispensing, barcode verification, and inventory analytics) enhance accuracy and workflow efficiency, while technologies like blockchain and track-and-trace platforms strengthen supply-chain transparency and reduce counterfeit risks. In pharmacy education, e-learning platforms, virtual simulations, and analytics-based assessments support competency development and standardized skill training. Despite these benefits, implementation challenges persist, including data quality and interoperability gaps, algorithmic bias and limited explainability, privacy and cybersecurity concerns, infrastructure and cost barriers, and evolving regulatory requirements. This review proposes a practical roadmap emphasizing governance, ethical AI, secure interoperable systems, and continuous upskilling to ensure that digital transformation advances learning outcomes and professional excellence in pharmacy.

Keywords: Artificial intelligence; Digital health; Telepharmacy; Clinical decision support; Pharmacy education.

SSP/OP-105

Integrating Ayurvedic and Modern Pharmacology

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ABSTRACT

Ayurveda is one of the oldest systems of medicine and has been practiced for centuries for the prevention and treatment of various diseases. Modern pharmacology, on the other hand, is based

on scientific experimentation, evidence-based drug development, and clinical validation. Integrating Ayurveda with modern pharmacology offers a promising approach for the development of safe, effective, and holistic therapeutic strategies. Traditional Ayurvedic formulations contain multiple bioactive compounds that act on different biological targets. Modern pharmacological tools help in identifying these active principles, understanding their mechanisms of action, pharmacokinetics, and safety profiles. Scientific validation of Ayurvedic drugs through in vitro, in vivo, and clinical studies enhances their global acceptance and clinical applicability. The integration also supports personalized medicine, as Ayurvedic emphasizes individual constitution (Prakriti), which aligns with modern concepts of precision medicine. Advanced techniques such as molecular biology, bioinformatics, and artificial intelligence further assist in standardization, quality control, and drug discovery from Ayurvedic sources. Despite its advantages, challenges such as lack of standardization, herb–drug interactions, and regulatory issues need to be addressed. A collaborative approach involving traditional knowledge and modern scientific research can overcome these limitations. In conclusion, integrating Ayurvedic and modern pharmacology bridges traditional wisdom with contemporary science, leading to innovative therapeutic solutions and improved healthcare outcomes.

Keywords: Ayurveda, Modern pharmacology, healthcare.

SSP/OP-106

Design, Synthesis, and Antidiabetic Activity of Benzotriazole Derivatives: An In-Silico and Biological Approach

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ABSTRACT

This research aims to develop new benzotriazole-based compounds with potential antidiabetic activity through a combination of computational and laboratory-based approaches. Initially, computer-aided techniques such as molecular docking and virtual screening will be used to explore how the designed compounds interact with important biological targets involved in diabetes. Compounds showing promising interactions will then be synthesized using efficient and environmentally friendly methods, followed by detailed structural characterization. The synthesized derivatives will be evaluated for their antidiabetic activity using various in vitro assays. By integrating molecular modeling, organic synthesis, and biological evaluation, this study seeks to identify lead compounds with meaningful antidiabetic potential and suitable pharmacological properties. The findings from this work may contribute to the development of new therapeutic options for the management and treatment of diabetes mellitus.

Keywords: Antidiabetic Activity, Benzotriazole, In-silico, Molecular Docking, Synthesis, Drug design etc.

SSP/OP-107

Evaluation of Anti-Ulcer Activity on Ethanolic Extract of Vinca Rosea Flower & Leaf of Plant by Using Screening Model on Albino Wistar Rats

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ABSTRACT

Peptic ulcer is caused due to imbalance between the aggressive factor and the defensive factors which may lead to ulcer in gastric areas. The term "peptic" refers to the enzyme pepsin that is found in the stomach and is responsible for breaking down proteins. When the ulcers are located in stomach is called peptic ulcer however ulcer associated with duodenum is called duodenal ulcer. In this present research we have used the indomethacin induced ulcer model to evaluate the antiulcer effect of ethanolic extracts of *Vinca rosea* leaves and flower parts by using Pantoprazole as a standard drug. Indomethacin is a non selective nonsteroidal anti-inflammatory drug (NSAID) which can inhibits the COX1 as well as COX2 receptors, as a result the PGs synthesis is inhibited and results into mucosal damage. This may leads to ulcerogenic effects on stomach. Here in this study we utilized the both the leaves and flower parts of *Vinca rosea* as these parts contains high amount of alkaloids namely Vindoline and Vincamine as a bioactive phytoconstituents which could be responsible for its antiulcer effects. In this present research we have extracts the plant parts by using 75% ethanol for extraction of alkaloids rich phytochemicals. From the preliminary phytochemical evaluation of the extract it was confirmed that the extract contains alkaloids together with flavonoids, saponins, and Terpenoids as a bioactive phytoconstituents. From the above research it was concluded that the ethanolic extracts of both leaves and flower (each 100 mg/kg) as well as the combination of both the extract (100 mg/kg) showed significant effect on healing of ulcer which was created by indomethacin on inner wall of the stomach as compared to untreated ulcerogenic animals. Dose of the drugs were decided based on acute toxicity study report.

Keywords:-Peptic ulcer, COX1, COX 2, prostaglandins, Indomethacin, *Vinca rosea*, Vindoline and Vincamine.

SSP/OP-108

Recent Approaches in Treatment of Hypertension

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ABSTRACT

Hypertension continues to be one of the most common and preventable contributors to cardiovascular disease and mortality globally. Conventional management—centered on lifestyle changes and antihypertensive drugs such as thiazide diuretics, ACE inhibitors, angiotensin receptor blockers, calcium channel blockers, and beta-blockers—has substantially lowered disease-related complications. Nonetheless, challenges including drug resistance, adverse effects, poor adherence, and the multifactorial nature of hypertension highlight the need for newer therapeutic strategies. Contemporary management increasingly emphasizes personalized, mechanism-based treatment approaches, the use of digital health technologies, and innovative interventional methods. Precision medicine, informed by genetic profiling and biomarkers, allows individualized drug selection and dosing, thereby enhancing treatment effectiveness and minimizing side effects. New pharmacological options targeting alternative pathways—such as non-steroidal mineralocorticoid receptor antagonists, endothelin receptor antagonists, and novel vasopeptidase inhibitors—offer additional solutions for resistant hypertension. Interventional therapies, including renal denervation and baroreceptor activation, show promise for patients unresponsive to conventional medications. Moreover, digital health innovations—such as mobile health applications, wearable blood pressure devices, and telemedicine—support continuous monitoring, improve adherence, and foster patient engagement. While lifestyle modification remains a cornerstone of hypertension care, it is increasingly reinforced through structured programs, behavioral strategies, and remote coaching. The integration of these emerging approaches with standard therapy may improve blood pressure control, lower cardiovascular risk, and enhance patient-centered outcomes. Ongoing research is essential to validate long-term efficacy and to overcome barriers related to cost, accessibility, and implementation.

Keywords: Hypertension, Blood Pressure Management, Precision Medicine, Personalized Therapy,

SSP/OP-109

Transdermal Polyherbal Therapeutic Approaches for Psoriasis and Eczema: A Review

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ABSTRACT

Psoriasis and Eczema are chronic dermal disorders that affect millions of people worldwide Psoriasis is primarily characterized by immunological dysregulation, excessive keratinocyte proliferation, and persistent inflammation, leading to thick, scaly plaques on the skin. Eczema is a skin condition linked to an hypersensitivity immune responses, weak skin barrier function, intense itching, and repeated inflammation. Although conventional treatments like corticosteroids, immunosuppressants, and biologics are widely used, but they usually give short term temporary symptomatic relief and may cause adverse effects with long-term use.

Therefore, there is a growing need for safer, plant-based treatment option that can give sustained efficacy with minimal side effects. Herbal medicines are gaining increasing attention because they have rich phytochemical composition.

With many benefits of herbal extracts into transdermal drug delivery systems (TDDS) represents a promising approach for achieving localized, controlled, and prolonged therapeutic effects while minimizing adverse reactions. Transdermal patches gives sustained drug release and targeted delivery to the affected skin layers. Overall, the use of polyherbal transdermal patches presents a natural, patient-friendly, and effective strategy for improving the management of chronic inflammatory skin disorders such as psoriasis and eczema.

Keywords: Psoriasis, Eczema, TDDS

SSP/OP-110

Pharmacognostic Standardization and Phytochemical Screening of *Bauhinia Variegata* and *Dillenia Indica* in Aspect of Diabetes

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder that requires sustained therapeutic management. Medicinal plants continue to attract attention as alternative treatment options owing to their safety profile and diverse pharmacological actions. *Bauhinia variegata* and *Dillenia indica* are traditionally employed in the management of diabetes; however, systematic pharmacognostic and phytochemical evaluation is necessary to ensure their identity, quality and scientific relevance. The present study was undertaken to establish pharmacognostic standards and to carry out preliminary phytochemical screening of *Bauhinia variegata* and *Dillenia indica* with reference to diabetes mellitus. The plant materials were subjected to macroscopic and microscopic evaluation, powder microscopy and physicochemical analysis including determination of ash values and loss on drying. Preliminary phytochemical screening of various

extracts was performed using standard qualitative chemical tests to identify major classes of phytoconstituents. Pharmacognostic investigations revealed characteristic diagnostic features such as cork cells, calcium oxalate crystals, fibers and starch grains in *Bauhinia variegata*, while *Dillenia indica* showed anomocytic stomata, mucilage cells, vascular tissues and oil globules. Physicochemical parameters were found to be within acceptable limits, indicating the purity and quality of the crude drugs. Phytochemical screening confirmed the presence of flavonoids, phenolic compounds, tannins, saponins, glycosides and alkaloids in both plants. The findings provide authenticated pharmacognostic and phytochemical profiles of *Bauhinia variegata* and *Dillenia indica*, supporting their traditional use and indicating their relevance in the development of herbal formulations for diabetes management.

Keywords: Bauhinia variegata; Dillenia indica; Pharmacognostic standardization; Phytochemical screening; Diabetes mellitus; Medicinal plants.

SSP/OP-111

Target Drug Delivery System

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ABSTRACT

Targeted drug delivery systems represent a cutting-edge advancement in pharmaceutical science, designed to deliver therapeutic compounds specifically to diseased cells or tissues while limiting exposure to healthy organs. This approach enhances treatment efficiency, minimizes systemic side effects, and improves patient adherence. In contrast to traditional drug delivery methods, targeted systems employ advanced carriers such as nanoparticles, liposomes, dendrimers, microspheres, and polymeric materials to ensure controlled and site-specific drug transport and release. Targeting strategies are broadly categorized into passive, active, and physical approaches. Passive targeting exploits biological features such as the enhanced permeability and retention effect, whereas active targeting relies on ligand–receptor interactions to facilitate improved cellular internalization. Physical targeting uses external forces such as magnetic fields, temperature changes, or ultrasound to direct drugs to specific locations.

These modern delivery platforms have demonstrated considerable promise in managing cancer, genetic disorders, cardiovascular diseases, and neurological conditions. They contribute to improved drug stability, enhanced bioavailability, and protection of sensitive therapeutic agents from enzymatic degradation. Despite notable advancements, obstacles including biological barriers, immune reactions, toxicity issues, formulation stability, and challenges in large-scale production continue to limit widespread clinical application. Current research efforts focus on developing safer, more effective, and economically viable delivery systems. With ongoing technological progress, targeted drug delivery systems are expected to become a fundamental

component of personalized medicine, leading to better therapeutic outcomes and enhanced patient quality of life.

Keyword: Targeted Drug Delivery, Drug Targeting, Site-Specific Drug Delivery, Controlled Drug Release.

SSP/OP-112

In vitro study on flower extract of *Oroxylum indicum* targeting α-Amylase and α-glucosidase for the evaluation of anti-diabetic effect

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ABSTRACT

Oroxylum indicum is a medicinally important plant known for its diverse pharmacological properties, largely attributed to its rich phytochemical profile. The present study aims to investigate the in-vitro antidiabetic potential of flower extracts of Oroxylum indicum through targeted enzyme inhibition assays. Flower material was extracted using a methanol–water solvent system (70:30) by standardized extraction techniques to obtain bioactive constituents. The antidiabetic activity of the extract was assessed by evaluating its inhibitory effects on α-amylase and α-glucosidase, two key enzymes involved in carbohydrate digestion and glucose metabolism. Inhibition of these enzymes represents an effective strategy for delaying carbohydrate breakdown and reducing post-prandial glucose absorption. The extract demonstrated a pronounced, concentration-dependent inhibitory effect against both enzymes, indicating its potential role in modulating glycemic response. This inhibitory potential is likely attributed to the presence of bioactive phytochemicals, particularly flavonoids and phenolic compounds, which are widely recognized for their antioxidant capacity and enzyme-modulating activity. These secondary metabolites may contribute to improved glycemic regulation by slowing the conversion of complex carbohydrates into absorbable sugars and limiting the rapid release of glucose into systemic circulation. The study highlights the therapeutic promise of Oroxylum indicum flower extract as a natural antidiabetic agent. Its ability to interfere with key carbohydrate-digesting enzymes suggests potential applicability in the management of post-prandial hyperglycemia associated with type-2 diabetes mellitus. Further pharmacological validation, including in-vivo investigations and molecular characterization of active constituents, is necessary to confirm its efficacy and to elucidate the mechanisms underlying its antidiabetic activity.

Keywords: Oroxylum indicum, Antidiabetic activity, Flower extract, α-Amylase inhibition, α-Glucosidase inhibition, Phenolics, Flavonoids.

SSP/OP-113

A Comprehensive Review on Enhancement of Solubilization and Bioavailability of Poorly Soluble Drugs by Physical and Chemical Modifications

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ABSTRACT

This review's objective was to increase the solubility and bioavailability of poorly soluble medications by a variety of methods, including physical, chemical, and other alterations. The maximum amount of a solute that may dissolve in a given amount of solvent or solution at a given temperature is known as the solute's solubility. One of the key factors in achieving the required drug concentration in the systemic circulation for the pharmacological response to be demonstrated is solubility. Poor water solubility can significantly reduce a drug's effectiveness, and certain medicines exhibit adverse effects as a result. The aqueous solubility can be improved using a variety of methods. For some medications, the capacity to improve water solubility can therefore be a useful tool for boosting effectiveness and/or lowering negative effects. This holds true for solutions given orally, topically, and parenterally. The solubility of highly soluble medications such as dolargin, loperamide, tubocurarine, doxorubicin, ibuprofen, griseofulvin, diazepam, naproxen, carbamazepine, nifedipine, phytosterol, etc. can be increased by physical modification techniques such as media milling/nanocrystal technology, cryogenic technology, supercritical fluid process, modification of the crystal habit, complexation, micellar technologies, chemical modifications, and hydrotrophy. Pharmacoactive compounds poor water solubility restricts their pharmacological potential, but as the solubility criterion cannot be compromised, many strategies are used to increase their bioavailability. Low solubility of pharmaceutically active compounds increases the likelihood that medication development and innovation will fail. Their solubility has a significant impact on pharmacokinetics, pharmacodynamics, and a number of other factors, including drug distribution, protein binding, and absorption.

Keywords: Bioavailability, Solubilization, chemical modifications, Pharmacoactive compounds, absorption.

SSP/OP-114

Phytochemical Profile and Therapeutic Potential of Bryophyllum pinnatum: A Comprehensive Review of its Pharmacological Diverse Activities

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ABSTRACT

Bryophyllum pinnatum (Lam.) Oken, commonly known as "Patharchatta" or "Miracle Leaf," is a medicinal plant widely used in traditional systems of medicine such as Ayurveda, Siddha, and folk remedies across tropical regions.The present review aims to comprehensively summarize the phytochemical profile and therapeutic potential of Bryophyllum pinnatum, highlighting its diverse pharmacological activities supported by experimental and clinical studies. Phytochemical investigations reveal the presence of bioactive constituents including flavonoids, bufadienolides, alkaloids, glycosides, triterpenoids, phenolic compounds, and organic acids, which contribute to its broad spectrum of biological effects. Pharmacological studies have demonstrated significant anti-inflammatory, antioxidant, antimicrobial, anti-ulcer, anti-diabetic, hepatoprotective, nephroprotective, wound- healing, immunomodulatory, and anticancer activities. Additionally, the plant shows promising therapeutic potential in the management of kidney stones, respiratory disorders, and cardiovascular conditions. The review also discusses possible mechanisms of action underlying these effects and emphasizes the correlation between traditional uses and modern scientific findings. Despite substantial preclinical evidence, further well-designed clinical trials and toxicity evaluations are required to establish its safety, efficacy, and standardization for pharmaceutical applications. Overall, Bryophyllum pinnatum represents a valuable natural source of bioactive compounds with significant potential for future drug development.

SSP/OP-115

Digital Transformation in Pharmacy: Advancing Learning and Professional Excellence

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ABSTRACT

Digital transformation is reshaping the pharmacy profession by integrating advanced technologies into education, practice, and professional development. This transformation enhances learning experiences, strengthens clinical decision-making, and supports continuous professional excellence in an increasingly complex healthcare environment. Innovations such as e-learning platforms, artificial intelligence, big data analytics, telepharmacy, and simulation-based training are redefining how pharmacists acquire knowledge and apply skills. Digital tools enable personalized and flexible learning pathways, promote lifelong learning, and improve access to up-to-date clinical information. In professional practice, digital transformation supports medication management, pharmacovigilance, patient counselling, and interprofessional collaboration, leading to improved patient safety and healthcare outcomes. Furthermore, the use of digital health technologies empowers pharmacists to play an expanded role in public health,

chronic disease management, and precision medicine. However, successful digital transformation requires addressing challenges such as digital literacy gaps, data security, ethical considerations, and the need for curriculum redesign aligned with technological advancements. This abstract highlights the critical role of digital transformation in advancing pharmacy education and practice, emphasizing its potential to enhance competency, innovation, and professional excellence. By embracing digital solutions and fostering a culture of adaptability and continuous improvement, the pharmacy profession can better meet evolving healthcare demands and contribute effectively to patient-centered care in the digital age.

Keywords: Digital transformation; Pharmacy education; Professional excellence; Digital health; E-learning.

SSP/OP-116

Pharmacological Assessment of MK-AKS for Cardio protection in Experimentally Induced Myocardial Infarction in Wistar rats

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ABSTRACT

Background:MK-AKS tablets, a polyherbal formulation which is combination of various Indian medicinal plants, has garnered attention for its antidiabetic property, attributed to its diverse composition of primary and secondary metabolites.

Objective: The objective of this study is to evaluated the cardioprotective potential of the MK-AKS using established experimental models. The study aims to assessed its effect on key biochemical, histopathological, functional cardiac parameter. Ultimately, the study intends to establish MK-AKS as a potential natural therapeutic agent for cardiovascular disorders.

Methods: This study investigates the cardioprotective efficacy in an isoproterenol (ISOT)-induced MI rat model. Experimental groups were pretreated with MK-AKS, and its effects on various biochemical markers were evaluated. Phenolic and flavonoids content have been done by methods given in Pharmacopoeia

Results: The results demonstrated that MK-AKS markedly decreased oxidative stress markers by reducing malondialdehyde (MDA) levels and restoring key antioxidant enzymes, including superoxide dismutase (SOD), glutathione (GSH), and catalase. Histopathological examination further revealed diminished myocardial necrosis, oedema, and fibrosis in MK-AKS–treated groups compared with the ISOT control, reinforcing its cardioprotective effects. Additionally, the total phenolic and flavonoid contents were quantified as 10.598 ± 0.645 mg GAE/g and 2.033 ± 0.294 mg QE/g, respectively, underscoring its substantial phytochemical richness.

Conclusion: The findings underscore MK-AKS potential as a cardioprotective and antioxidant agent, supported by its phytochemical constituents and bioactivity against cardiovascular targets. These results provide scientific validation for traditional use, supporting its continued exploration as a natural cardioprotective formulation with strong antioxidant properties.

Key words: MK-AKS, antioxidant, ISOT, MDA, GSH.

SSP/OP-117

Analytical Method Development and Physicochemical Investigation of Venlafaxine HCl in Pure Form

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ABSTRACT

Venlafaxine HCl (VNLF) is an antidepressant of the serotonin-nor epinephrine reuptake inhibitor (SNRI) class. It is used to treat major depressive disorder, generalized anxiety disorder, panic disorder, and social anxiety disorder. It is rapidly absorbed orally and have a mean half-life of 5 hrs in humans. Venlafaxine belongs to BCS class I high solubility and high permeability. This study focuses on the determination of solubility, melting point, partition coefficient, development of an analytical method for the determination of venlafaxine HCl in its pure form and compatibility study of venlafaxine HCl with different excipients. The melting point and partition coefficient of Venlafaxine was determined to be 217℃ and 1.09, respectively. The λmax of venlafaxine HCl was found to be 225 nm. When compared to the reference venlafaxine HCl spectrum, FTIR spectrum of venlafaxine HCl showed distinctive peaks that validated its structure. The physical mixtures of FTIR spectrum confirm that sodium alginate, sodium CMC and Pectin are compatible with drug. Overall, the determination of λmax highlights the importance of solvent choice in UV spectrophotometry for venlafaxine HCl analysis. The compatibility studies highlight that while venlafaxine HCl can be effectively formulated with various excipients. The combination of quantitative analysis and compatibility assessments provides a robust framework for developing a stable venlafaxine HCl formulation.

Keywords: Pre-formulation parameters, Venlafaxine HCl, UV-visible spectroscopy, FTIR spectrum, Incompatibility assessment.

SSP/OP-118

Integrating Ayurvedic Prakriti and Pharmacogenomics for Precision Neurology: An Ayurgenomic Perspective

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ABSTRACT

Neurological disorders are characterized by wide variability in disease susceptibility, progression, and response to therapy, presenting a major challenge to conventional treatment approaches. Advances in pharmacogenomics have improved our understanding of genetic influences on drug metabolism and efficacy; however, genetic factors alone often do not fully explain individual differences in clinical outcomes. In this context, Ayurveda, through the concept of Prakriti, offers a constitution-based framework that categorizes individuals into Vata, Pitta, and Kapha phenotypes, reflecting inherent differences in nervous system function, inflammatory status, and metabolic regulation.

Recent advances in Ayurgenomics indicate significant associations between *Prakriti* types and molecular pathways relevant to neurological health. Vata Prakriti is linked to neuronal signalling and stress responsiveness, Pitta to inflammatory and oxidative processes, and Kapha to metabolic and anabolic regulation. These constitution-specific molecular patterns overlap with core mechanisms implicated in neurodegenerative disorders such as Alzheimer's and Parkinson's diseases, including altered neuroplasticity, chronic neuroinflammation, and impaired energy metabolism. Collectively, these findings highlight the potential of Ayurgenomics as a systems-based framework for understanding individual variability in neurodegeneration and for informing personalized preventive and therapeutic strategies.

Integrating *Prakriti*-based phenotyping with pharmacogenomics may enhance patient stratification, optimize neurological therapies, and reduce adverse drug reactions. This approach bridges traditional medicine with modern genomics, supporting personalized and culturally inclusive neuromedicine. Further multi-omics and clinical validation studies are needed for translation into practice.

Keywords: Prakriti, Ayurgenomics, Pharmacogenomics, Neurology, Personalized Medicine

SSP/OP-119

Nanosponges: The Molecular Sponges Soaking up the Future of Medicine

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ABSTRACT

For an effective course of treatment, the optimal drug delivery system should release the medication, solubilize the drug, and target the spot. Since they can hold both hydrophilic and hydrophobic medications, nano sponges are the innovative drug delivery systems that overcome the issues of drug toxicity and low bioavailability. Because of their extremely porous nature, nano sponges have the special capacity to entrap active molecules and provide the benefit of

programmable release. Applications for nano sponges include improving drug molecules bioavailability and delivering medications via parenteral, topical, and oral routes. Nano sponges are tiny sponges that can travel throughout the body and stick to surfaces, allowing for the controlled and predictable release of chemicals. A significant breakthrough in the management of certain biopharmaceutical issues has been the creation of a drug delivery system based on nano sponges. Medicine can be applied topically or taken orally using a polymer-based sphere known as a nano sponge. Nano sponges are tiny sponges that mimic viruses in size and have the potential to contain a variety of drugs. It is possible to add lipophilic or hydrophilic drugs to nano sponge. Another remarkable feature that enables them to be used more frequently for medications with limited solubility is their aqueous solubility, which also improves bioavailability, reduces drug toxicity, and stops drug breakdown. Clarifying the general introduction, characteristics, preparation method, characterization, and applications of nano sponges is the goal of this work.

Keywords: Nanotechnology, Nano sponge, bioavailability, drug delivery

SSP/OP-120

Artificial Intelligence in Drug Delivery

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ABSTRACT

Artificial intelligence (AI) is increasingly transforming drug development by addressing the limitations of traditional pharmaceutical research, which is time-consuming, costly, and associated with high failure rates. AI uses advanced techniques such as machine learning and deep learning to analyze large biological, chemical, and clinical datasets, enabling faster and more accurate decision-making across the drug development pipeline.

In early drug discovery, AI supports target identification, virtual screening, and rational drug design, helping researchers identify promising drug candidates with improved efficacy and safety. During preclinical and clinical stages, AI models predict pharmacokinetic properties, toxicity, drug–drug interactions, and clinical outcomes, thereby reducing late-stage failures. AI also enhances clinical trial efficiency through better patient selection, optimized trial design, and real-time data analysis.

Additionally, AI contributes to post-marketing surveillance by analyzing real-world data to monitor drug safety and effectiveness. Despite its advantages, challenges such as data quality, model transparency, ethical issues, and regulatory acceptance remain. Overall, AI holds great promise in making drug development faster, more cost-effective, and more precise, ultimately accelerating the delivery of safe and effective medicines to patients.

Keywords: Artificial Intelligence, Drug design, drug delivery, identification, drug.

SSP/OP-121

Gut Microbiota's Role in NAFLD- and HBV/HCV-Related Hepatocellular Carcinoma: Mechanisms and Therapeutic Implications

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ABSTRACT

Background

Hepatocellular carcinoma (HCC) is a major cause of cancer-related mortality and commonly arises from chronic liver diseases such as viral hepatitis and non-alcoholic fatty liver disease (NAFLD). Growing evidence highlights the gut microbiota as a key regulator of the gut–liver axis, influencing inflammation, fibrosis, and hepatocarcinogenesis.

Objective

This review aims to summarize the role of gut microbiota dysbiosis in HCC development and to highlight emerging microbiome-based therapeutic strategies.

Methods

A narrative review of recent preclinical and clinical studies was performed, focusing on microbiota-mediated mechanisms involved in NAFLD- and viral hepatitis–associated HCC, including immune modulation, intestinal barrier dysfunction, and microbial metabolite signaling.

Results

Gut dysbiosis contributes to HCC progression through increased intestinal permeability, endotoxemia, chronic inflammation, and metabolic disturbances. In NAFLD-related HCC, altered microbial composition promotes lipotoxicity and inflammatory signaling, whereas in HBV- and HCV-associated HCC, the microbiome influences immune surveillance and viral persistence. Shared pathogenic pathways include lipopolysaccharide–TLR4 signaling, bile acid dysregulation, and the development of immunosuppressive tumor microenvironments. Microbiome-targeted interventions such as dietary modification, probiotics, postbiotics, antibiotics, and fecal microbiota transplantation show promise in modulating disease progression. Postbiotics, including short-chain fatty acids and valeric acid, exhibit anti-inflammatory and pro-apoptotic effects. However, gaps remain regarding causal relationships, intrahepatic metastasis, and the roles of the mycobiome and virome.

Conclusion

Gut microbiota dysregulation plays a central role in HCC pathogenesis. Microbiome-based interventions offer promising strategies for risk stratification, prevention, and adjuvant therapy. Future studies should emphasize longitudinal designs, mechanistic validation, and multi-kingdom profiling to facilitate clinical translation.

Keywords: HCC, NAFLD.

SSP/OP-122

From Honey to Heart Health: The Cardioprotective Potential of Chrysin in Cardiovascular Complications

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ABSTRACT

Cardiovascular diseases (CVDs) continue to be the foremost cause of morbidity and mortality worldwide, underscoring the urgent need for novel cardioprotective agents with superior safety and efficacy. Chrysin (5,7-dihydroxyflavone), a naturally occurring flavonoid abundant in honey, propolis, and passion flowers, has attracted considerable interest for its potential cardiovascular benefits. Evidence from preclinical studies and limited clinical investigations indicates that chrysin exerts diverse protective effects against conditions such as myocardial infarction, atherosclerosis, hypertension, and cardiac hypertrophy.

Experimental in vitro and in vivo findings reveal that chrysin mitigates oxidative stress by scavenging reactive oxygen species and enhancing endogenous antioxidant systems, including superoxide dismutase, catalase, and glutathione. Its anti-inflammatory activity involves suppression of key pro-inflammatory mediators such as nuclear factor-κB (NF-κB), cyclooxygenase-2 (COX-2), and tumor necrosis factor-α (TNF-α). Additionally, chrysin improves endothelial function, reduces lipid peroxidation, regulates lipid metabolism, and prevents cardiomyocyte apoptosis through modulation of signaling pathways like PI3K/Akt and MAPK. In models of myocardial ischemia and cardiac hypertrophy, it has been shown to reduce infarct size, preserve myocardial structure, and enhance cardiac performance.

Although clinical evidence remains limited, flavonoid-rich interventions including chrysin have demonstrated improvements in lipid profiles, reductions in inflammatory markers, and better vascular health. Nonetheless, challenges such as poor oral bioavailability and the absence of large-scale clinical trials hinder its translation into therapeutic practice. Overall, chrysin emerges as a promising natural cardioprotective candidate, warranting further clinical validation and formulation strategies to optimize its potential in cardiovascular medicine.

Keywords: Chrysin, cardioprotection, flavonoid, antioxidant, oxidative stress, apoptosis, MAPK signaling, inflammation, cardiac injury.

SSP/OP-123

Evaluation of Antiparkinson's Profile of Phytochemical Curcumin and Thymoquinone on Rodent Models

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ABSTRACT

Parkinson's disease (PD) is a neurodegenerative disorder marked by the progressive loss of dopaminergic neurons in the substantia nigra, leading to motor dysfunctions. Despite advances in symptomatic treatments, there remains an unmet need for neuroprotective therapies that can slow or stop disease progression. Curcumin, a polyphenolic compound from Curcuma longa, and Thymoquinone, derived from Nigella sativa, have emerged as potential candidates for neuroprotection due to their antioxidant and anti-inflammatory properties. This study investigates the anti-Parkinson potential of Curcumin and Thymoquinone using both in vitro and in vivo models. To predict the binding interactions between the phytochemicals and the target proteins, several molecular docking software tools were employed. The biological targets for this study include proteins related to Parkinson's disease, such as α-synuclein and dopamine receptors. Swiss ADME was utilized to predict the Absorption, Distribution, Metabolism, Excretion, and Toxicity (ADMET) profiles of the phytochemicals. This tool helps in evaluating the pharmacokinetic properties of the compounds and their potential for drug development. Additionally, UV-Vis and FTIR spectroscopy were employed to characterize the chemical properties of the compounds. The findings reveal significant neuroprotective effects of Curcumin and Thymoquinone, suggesting their potential as therapeutic agents for PD.

Keywords: Parkinson's disease, neuroprotection, Curcumin, Thymoquinone, UV-Vis spectroscopy, FTIR spectroscopy.

SSP/OP-124

Digital Transformation in Pharmacovigilance: Role of Artificial Intelligence and Big Data in Drug Safety

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ABSTRACT

Pharmacovigilance is a critical component of the pharmaceutical system, focused on the detection, assessment, understanding, and prevention of adverse drug reactions to ensure patient safety. Conventional pharmacovigilance practices are largely dependent on manual data collection and spontaneous reporting systems, which often result in delayed signal detection and under-reporting of adverse events. The rapid advancement of digital technologies has led to a significant digital transformation in pharmacovigilance practices.

Artificial Intelligence (AI), machine learning, and big data analytics have emerged as powerful tools in modern pharmacovigilance systems. These technologies enable the efficient processing and analysis of large volumes of safety data obtained from clinical trials, electronic health records, spontaneous reporting databases, and real-world evidence. AI-based algorithms support automated case intake, data validation, signal detection, and risk assessment, thereby improving

accuracy and reducing operational burden. Natural language processing tools further assist in extracting relevant safety information from unstructured data sources.

Digital transformation facilitates real-time monitoring and predictive analysis, allowing early identification of potential safety signals and supporting timely regulatory decision-making. However, challenges such as data quality, ethical concerns, regulatory compliance, and the need for trained professionals must be addressed for successful implementation.

Keyword: Pharmacovigilance, Artificial Intelligence, Data safety, Adverse drug reactions

SSP/OP-125

Artificial Intelligence in Diabetes Management: From Early Prediction to Personalized Pharmacotherapy

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ABSTRACT

Diabetes mellitus represents a major global public health challenge, characterized by increasing prevalence, long-term complications, and high healthcare costs. Despite advances in pharmacotherapy, conventional diabetes management strategies often fail to achieve optimal glycemic control due to delayed diagnosis, inter-individual variability in drug response, and poor treatment adherence. The emergence of Artificial Intelligence (AI) offers new opportunities to enhance diabetes care through data-driven, personalized approaches.

The present study aims to critically evaluate the applications of Artificial Intelligence in diabetes management, with particular emphasis on early disease prediction, individualized pharmacotherapy, and clinical decision support, highlighting implications for pharmacy practice. A structured review of recent peer-reviewed literature, clinical trials, and real-world studies was conducted using databases such as PubMed, Scopus, and Google Scholar. AI techniques including machine learning algorithms, predictive modeling, and neural networks were analyzed for their role in diagnosis, treatment optimization, and patient monitoring.

Findings indicate that AI-based predictive models demonstrate high sensitivity and specificity in identifying individuals at risk of developing diabetes by integrating clinical, biochemical, and lifestyle data. In therapeutic management, AI systems enable personalized insulin dosing, optimized selection of antidiabetic agents, and dynamic treatment adjustments based on patient-specific responses. Furthermore, integration of AI with continuous glucose monitoring systems, wearable devices, and mobile health platforms improves real-time monitoring and medication adherence. Pharmacists contribute significantly by utilizing AI-driven decision support tools to enhance medication safety, patient counseling, and therapeutic outcomes.

In conclusion, Artificial Intelligence has substantial potential to improve diabetes management through precision-based interventions and enhanced clinical decision-making. However, issues

related to data quality, algorithm transparency, ethical considerations, and regulatory validation must be addressed to ensure safe and effective implementation in routine pharmacy practice.

Keywords: Artificial Intelligence, Diabetes Mellitus, Pharmacotherapy, Clinical Decision Support, Pharmacy Research.

SSP/OP-126

Organoids and Organ-on-Chip Systems: Replacing Animal Models in Drug Discovery

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ABSTRACT

Background

Animal testing has been the cornerstone of pharmacological studies but the variability of the species, ethical limitations and environmental cost have put into question the viability of animal testing. Combined with the increasingly popular focus on humane and accurate preclinical models, this has given rise to the emergence of organoid and organ-on-chip systems- novel human cell-based systems modeled after physiological and pathological processes in vitro. These technologies represent the ideas of Replacement, Reduction, and Refinement (3Rs) and correspond to UN Sustainable Development Goals (SDGs 3, 9 and 12).

Objective

To assess the potential of organoid and organ-on-chip technology as an alternative to animal testing in drug discovery and toxicity testing, which is ethical and sustainable.

Methods

Recent studies (2021-2025) in PubMed, ScienceDirect, and Nature Reviews were used to conduct an analytical review that is literature-based. Articles about the use of organoids or organ-on-chip in pharmacological screening, ADME screening, and toxicological prediction were considered. Representative case studies including liveron- chip to determine hepatotoxicity, heart-on-chip to determine cardiotoxicity and brain organoids to determine neurotoxicity were examined.

Results

Liver-on-chip models were found to have a correlation of more than 85 percent with human hepatotoxicity, whereas organoid models could generate organ-specific responses with a high level of reproducibility. These systems could replace between 30 and 40 percent of early animal testing, improving translation accuracy and reducing ethical and environmental harm. Because of regulatory advancements like the FDA Modernization Act 2.0 (2023), organ-based platforms are increasingly being accepted as non-animal tools in pharmacology.Although the challenges such as expensive fabrication, low vascularization rates are present, AI, microfluidics, and 3D bioprinting integration have high potential to be scalable to larger size in the future.

Conclusion

The development of organoid and organ-on-chip technologies is a breakthrough in the philosophy of ethical, sustainable, and human-relevant pharmacology, which is consistent with the world sustainability agenda.

Keywords: Organoids, Organ-on-chip, 3Rs Principle, Sustainable Development goals, Drug discovery

SSP/OP-127

Chabots in Pharmacy: Patient Engagement and Support

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ABSTRACT

AI chatbots are very helpful in the pharmacy and medical field because they give better information, answer queries, and provide 24/7 support. They reduce human error and give the best medicine for a disease. They reduce the workload of pharmacists and improve the healthcare system. These chatbots are exactly like ChatGPT and Gemini but give better direction and support in healthcare. The assistant uses Artificial Intelligence and Natural Language Processing to talk to a patient just like a human would. The chatbots show results that are safe for the patient and that are stored in the chatbot by the creator of chatbot. These AI-powered bots can analyze symptoms, suggest possible conditions, provide medication details, and direct users to the right healthcare provider. In emergencies, they enable quick responses and faster solutions. However, their effectiveness depends on accurate condition identification and reliable medical data.

Keywords: AI Chatbots, Healthcare, Medication, Virtual Medical Assistant.

SSP/OP-128

Pathological Cell Death Pathways Contributing to Parkinson's Disease Progression

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ABSTRACT

Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the selective degeneration of dopaminergic neurons in the substantia nigra, leading to motor impairments such as bradykinesia, rigidity, and resting tremors. Increasing evidence suggests that neuronal loss in Parkinson's disease is mediated by multiple regulated cell death pathways rather than a single degenerative mechanism. Apoptosis has been extensively implicated in

dopaminergic neuron death, primarily driven by mitochondrial dysfunction, oxidative stress, and activation of pro-apoptotic signaling cascades. In addition to apoptosis, emerging studies indicate the involvement of regulated necrotic pathways, including necroptosis, which may contribute to neuronal vulnerability under pathological conditions. Dysregulation of autophagy and lysosomal degradation pathways further disrupts cellular homeostasis, resulting in impaired clearance of misfolded proteins such as α-synuclein and promoting neuronal stress. Moreover, abnormal iron accumulation and enhanced lipid peroxidation within the substantia nigra create conditions favorable for ferroptosis, an iron-dependent form of regulated cell death increasingly associated with Parkinsonian neurodegeneration. The convergence of mitochondrial failure, oxidative damage, impaired proteostasis, and dysregulated cell death signaling establishes a pathogenic environment that accelerates disease progression. Understanding the interplay between these pathological cell death pathways provides valuable insight into the molecular basis of Parkinson's disease and highlights potential therapeutic targets aimed at neuroprotection and slowing neurodegenerative progression.

Keywords: Parkinson's disease; neuronal cell death; apoptosis; ferroptosis; neurodegeneration

SSP/OP-129

Design of a Thermoresponsive Acetazolamide–Poly-δ-Decalactone *In-Situ* Gel for Prolonged Ocular Retention

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ABSTRACT

Glaucoma is a chronic eye disease in which persistently elevated intraocular pressure (IOP), typically from inadequate aqueous humor drainage, progressively damages the optic nerve and can cause irreversible vision loss. Acetazolamide (ACZ), a carbonic anhydrase inhibitor, effectively lowers IOP, but its use is limited by low aqueous solubility and poor membrane permeability (BCS Class IV), along with significant systemic side effects when administered orally, which reduce treatment adherence.

This work set out to design a novel ACZ-loaded nanoemulsion-based in situ gel (NE-InG) to improve corneal penetration and maintain drug levels over time, thereby addressing the shortcomings of standard topical and oral preparations. The NE-InG was produced by nanoprecipitation with poly-δ-decalactone as the oily phase and Pluronic F68 plus hydroxypropyl methylcellulose as temperature-sensitive gelling polymers. Using a Box–Behnken Design, formulation NE-InG 16 was identified as optimal, with a droplet size of 246.4 nm, polydispersity index of 0.120, and zeta potential of −29.7 mV, reflecting a uniform, physically stable system suitable for ocular use.

On eye contact, NE-InG 16 quickly gels at ocular temperature, prolonging precorneal residence. It sustains ACZ release for 24 hours in vitro (non-Fickian Korsmeyer–Peppas model) and significantly enhances corneal permeability ex vivo. In vivo rabbit studies show good ocular safety and an IOP-lowering effect lasting up to 22 hours. Pharmacokinetics confirm higher bioavailability and longer ocular residence than marketed products. Overall, this ACZ-loaded NE-InG is a safe, long-acting topical system with strong potential to improve adherence and glaucoma control.

Keywords: Glaucoma, *in-situ* gel, poly-δ-decalactone, Box-Behnken design, acetazolamide.

SSP/OP-130

Datura Wrightii in Traditional and Indigenous Medicine: From Ethanobotany to Modern Pharmacology.

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ABSTRACT

Datura wrightii commonly known as sacred datura or sacred thorn-apple, occupies a unique position bridging indigenous healing traditions and contemporary pharmacology. Native American tribes, particularly the Chumash, Zuni, and Paiute, have utilized this potent Solanaceae species for millennia in sacred ceremonies and therapeutic applications. Modern science validates these ancestral applications. The anticholinergic alkaloids explain the ceremonial visions and anesthetic properties, while withanolides (e.g., withawrightolide) demonstrate potent antiproliferative activity against glioblastoma (U87, U251) and head/neck carcinoma cell lines (IC_{50} 1.4-4.9 μM). Anti-inflammatory flavonoids and phenolics substantiate traditional poultice efficacy. This presentation traces *D. wrightii's* remarkable journey from "Indian whiskey" of southwestern ethnomedicine to a phytopharmacological candidate, exemplifying how indigenous knowledge systems inform modern drug discovery while highlighting the critical need for culturally-sensitive validation studies and safety standardization. Datura wrightii exemplifies ethnopharmacology's dual promise: validating indigenous healing traditions while identifying novel anticancer pharmacophores for global oncology.

Keywords: *Datura wrightii*, ethanopharmacology, Chumas medicine, tropane alkaloids, withanolides, sacred datura.

SSP/OP-131

Intricate Association between Diabetes Mellitus and Ovarian Cancer

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ABSTRACT

Background: Ovarian cancer's high death rate and frequently asymptomatic early development make it a major clinical problem. Chronic hyperglycemia, hyperinsulinemia, and systemic inflammation are the hallmarks of diabetes mellitus, which produces a metabolic milieu that may potentially affect the development of cancers in tissues that respond to hormones. The current research on the relationship between different diabetes phenotypes and the risk of incident ovarian cancer is summarized in this review.

Discussion: Analysis of modern observational data suggests a minor but statistically significant elevation in ovarian cancer risk among people with diabetes, with a pooled relative risk of 1.14. Compared to type 2 or gestational subtypes, this connection is more noticeable in type 1 diabetes. Furthermore, geographic variations show that background reproductive and lifestyle factors in regions like Asia and Australia may combine with metabolic abnormalities to heighten risk. Although the connection between insulin dysregulation and carcinogenesis is supported by molecular mechanisms, such as the stimulation of PI3K-AKT-mTOR and MAPK signaling cascades, the absolute risk increase for the majority of people is still minimal.

Conclusion: Among the many factors that contribute to ovarian cancer, diabetes acts as a small, context-dependent risk signal. Although these results highlight the significance of metabolic health in cancer prevention programs, they do not yet call for changes to the present screening procedures for women at average risk. To improve clinical risk stratification, future studies should concentrate on histotype-resolved analysis and the effects of particular antidiabetic treatments.

Keywords: Diabetes Mellitus, Ovarian Cancer, Hyperinsulinemia, Epidemiology.

SSP/OP-132

Role of Herbal Medicines as Adjuvant Therapy in Gastric Ulcer Treatment; Experimental and Clinical Perspectives

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ABSTRACT

Gastric ulcer disease remains a significant clinical problem worldwide, despite the availability of effective conventional therapies such as proton pump inhibitors, H_2 receptor antagonists, and potassium-competitive acid blockers. Long-term use of these agents is often associated with adverse effects, recurrence, and incomplete mucosal healing, prompting the search for complementary therapeutic strategies. In this context, herbal medicines have gained increasing attention as adjuvant therapy in gastric ulcer management rather than as standalone treatments. Experimental studies using well-established animal models of gastric ulceration, including ethanol-, NSAID-, stress-, and pylorus ligation-induced ulcers, has demonstrated significant gastroprotective effects of various herbal extracts. These effects are mediated through multiple

mechanisms such as antioxidant activity, enhancement of mucosal defense, increased mucus and prostaglandin production, suppression of gastric acid secretion, and anti-inflammatory actions. Importantly, combination studies reveal synergistic effects when herbal medicines are administered alongside standard anti-ulcer drugs, leading to improved ulcer healing and reduced tissue damage. Clinical evidence, though limited, suggests that herbal formulations used as adjuncts to conventional therapy can accelerate ulcer healing, reduce symptom severity, lower recurrence rates, and minimize drug-related adverse effects. However, the lack of large-scale, well-designed randomized controlled trials remains a major limitation. Overall, the integration of herbal medicines as adjuvant therapy offers a promising complementary approach in gastric ulcer treatment. Further research focusing on standardization, safety evaluation, and clinical validation is essential to establish their role in evidence-based gastroenterology.

Keywords; Gastric ulcer; Herbal medicines; Adjuvant therapy; gastroprotection; Phytochemicals

SSP/OP-133

Furan-Based Molecular Hybrids in the Era of Multidrug Resistance

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ABSTRACT

The global rise of multidrug-resistant bacterial infections, including extensively drug-resistant tuberculosis, has substantially reduced the clinical effectiveness of conventional antibiotic monotherapies, highlighting an urgent need for alternative antimicrobial strategies. In recent years, furan-based molecular hybrids have regained attention as versatile scaffolds, owing to the electron-rich nature of the furan nucleus, its metabolic adaptability, and its suitability for rational hybrid drug design. This review critically summarizes progress reported between 2024 and 2026 on the design, synthesis and antimicrobial performance of furan-based hybrids, with particular focus on furan-thiazole, furan-chalcone and furan-oxadiazole. Emphasis is placed on their ability to overcome key resistance mechanisms, including efflux pump overexpression, enzymatic drug inactivation and target-site mutations. Structure activity relationship studies consistently identify C5-nitro substitution as a major contributor to antimicrobial potency, primarily through selective bioreductive activation by bacterial nitroreductases. Combined *in-silico* and *in-vitro* investigations reveal strong interactions with essential bacterial targets, including CYP51, InhA, FtsZ, 30S ribosomal P-site and the quorum sensing regulators like LasR or RhlR. Several furan hybrids display minimum inhibitory concentrations comparable to first-line antitubercular agents and exhibit notable activity against MRSA and VRE strains. Taken together, current evidence supports furan-based molecular hybrids as robust preclinical antimicrobial leads with multi-target profiles that may limit resistance development.

Keywords: Furan Hybrids; Multidrug Resistance; InhA Inhibitors; CYP51; Nitroreductase Activation; Antimicrobial Drug Discovery

SSP/OP-134

Clinical Outcomes of Classical Versus Newer Antiepileptic Drugs in Epilepsy: Effects on Cognition, Psychomotor Function, and Seizure Control

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ABSTRACT

Background: Epilepsy management extends beyond seizure control to preservation of cognitive, psychomotor, and functional abilities that directly influence patients' quality of life. Although classical antiepileptic drugs (AEDs) remain widely used, their cognitive and psychomotor adverse effects have raised clinical concerns, encouraging the use of newer AEDs with improved tolerability profiles.

Objective: This study aimed to compare classical and newer antiepileptic drugs with respect to cognitive, non-cognitive, and psychomotor outcomes, medication adherence, and seizure control in patients with epilepsy.

Methods: A six-month ambispective observational study was conducted at two tertiary care hospitals in Gujarat, India. Fifty patients aged ≥14 years and above, receiving antiepileptic therapy for 6–12 months, were enrolled and categorized into two groups: classical AEDs (phenytoin, valproate, carbamazepine; n=25) and newer AEDs (levetiracetam, lamotrigine, gabapentin; n=25). Functional outcomes were assessed using a validated 15-item questionnaire evaluating cognitive, non-cognitive, and psychomotor domains (Cronbach's alpha = 0.845). Statistical analysis was performed using SPSS software.

Results: Baseline demographic and clinical variables were comparable between the groups. Patients receiving newer AEDs demonstrated superior performance across cognitive, non-cognitive, and psychomotor domains compared to those on classical AEDs. Higher medication adherence, fewer adverse drug reactions, and improved seizure control were observed in the newer AED group. Classical AEDs were associated with a higher incidence of functional impairment and tolerability issues.

Conclusion: Newer antiepileptic drugs offer better functional safety and efficacy, supporting patient-centred epilepsy management approaches.

Keywords: Epilepsy; Antiepileptic drugs; Cognition; Psychomotor function; Seizure control

SSP/OP-135

A Molecular Review on Hemiplegic Migraine as a Genetic Model of Migraine Disorders

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ABSTRACT

Migraine is a prevalent neurovascular disorder often accompanied by transient neurological aura. Major advances in migraine pathophysiology have arisen from genetic studies of hemiplegic migraine, particularly Familial Hemiplegic Migraine (FHM), a rare polygenic subtype that serves as a key model for understanding disease mechanisms. This review summarizes current knowledge on the molecular genetic basis of hemiplegic migraine, focusing on pathogenic variants in CACNA1A (FHM1), ATP1A2 (FHM2) and SCN1A (FHM3). Functional evidence indicates that these mutations converge on disrupted ion homeostasis and neuronal hyperexcitability, leading to increased susceptibility to cortical spreading depression, the principal substrate of migraine aura. The expanding genetic spectrum, including PRRT2 and its overlap with childhood-onset paroxysmal disorders is discussed. Additionally, the contribution of rare variants in KCNK18 and the MTHFR C677T polymorphism to common migraine phenotypes is critically evaluated. Overall, hemiplegic migraine highlights both shared and distinct molecular pathways underlying migraine susceptibility.

Keywords: Familial Hemiplegic Migraine; Cortical Spreading Depression; CACNA1A; ATP1A2; SCN1A; KCNK18

SSP/OP-136

Unrevealing the Potential Role of Prebiotics and Probiotics against Diabetes Mellitus

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder marked by high blood glucose levels due to insulin resistance or insufficient insulin secretion. Serious side effects that impact the kidneys, heart, nerves, and eyes are linked to it. The development and progression of diabetes may be significantly influenced by changes in gut microbiota, according to recent research, which makes gut health a possible target for cutting-edge treatment strategies. Probiotics and prebiotics have drawn interest as helpful methods for managing diabetes. Probiotics are live microorganisms that offer health benefits when ingested in sufficient quantities, whereas prebiotics are indigestible

food ingredients that promote the growth of good gut bacteria. These medicines help enhance glucose metabolism by raising insulin sensitivity, reducing inflammation, strengthening intestinal barrier function, and increasing the generation of short-chain fatty acids. Supplementing diabetic patients with specific prebiotics and probiotics may improve their lipid profile, oxidative stress markers, and glycemic control, according to a number of experimental and clinical studies. They also help regulate immune responses and reduce low-grade inflammation, which is a significant cause of insulin resistance. The combination of prebiotics and probiotics (synbiotics) may offer greater benefits by more successfully restoring microbial balance. It shows the potential role of prebiotics and probiotics as safe, inexpensive, and complementary methods for the prevention and control of diabetes mellitus. Modulation of gut microbiota through these approaches may offer a promising strategy to promote metabolic health and assist traditional antidiabetic medications.

Keywords: Probiotics, Prebiotics, Diabetes mellitus, Insulin resistance, Metabolic health

SSP/OP-137

Current and Emerging Therapeutic Approaches for the Management of Parkinson's Disease

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ABSTRACT

Parkinson's disease is a chronic disorder of the nervous system that mainly affects body movements. The common symptoms include tremors, muscle stiffness, slow movement, and poor balance. This disease is caused by the loss of dopamine-producing nerve cells in the brain, leading to reduced dopamine levels.

Current pharmaceutical treatment mainly focuses on increasing dopamine levels or mimicking its action in the brain. Levodopa is the most effective and widely used drug and is usually combined with carbidopa or benserazide to reduce side effects. Other medicines such as dopamine agonists, MAO-B inhibitors, COMT inhibitors, and anticholinergic drugs are also used to control symptoms. Although these drugs are helpful, long-term treatment may lead to side effects like involuntary movements and reduced response to therapy.

Along with medicines, alternative therapies play an important role in disease management. Physical exercise, physiotherapy, yoga, tai chi, and speech therapy help improve movement, balance, and daily functioning. Natural products, antioxidants, and dietary supplements are being studied for their supportive and protective effects on brain cells. In advanced stages, deep brain stimulation has shown good results in improving motor symptoms.

Future perspectives of Parkinson's disease treatment focus on developing disease-modifying therapies that can slow or stop disease progression. Research is ongoing on gene therapy, stem cell therapy, neuroprotective drugs, and targeted drug delivery systems. Personalized medicine and early diagnosis using biomarkers may improve treatment outcomes in the future.

In conclusion, combining drug therapy with alternative approaches and future advanced treatments may provide better management and improved quality of life for Parkinson's disease patients.

Keywords: Parkinson's disease, Levodopa, Alternative therapy, Deep brain stimulation,

SSP/OP-138

Peptic Ulcer: Evolution of Pathophysiology and Pharmacological Management with Therapeutic Perspectives.

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ABSTRACT

Peptic ulcer disease (PUD) is a common gastrointestinal disorder in which open sores develop in the lining of the stomach or duodenum. It mainly occurs due to an imbalance between aggressive factors such as gastric acid and protective mechanisms of the gastric mucosa. Earlier, excessive acid secretion was considered the primary cause of peptic ulcers. However, with advances in research, *Helicobacter pylori* infection and prolonged use of non-steroidal anti-inflammatory drugs (NSAIDs) are now recognized as the major causative factors. These factors lead to inflammation, oxidative stress, reduced mucus production, impaired blood flow, and decreased prostaglandin synthesis, ultimately resulting in damage to the gastric mucosa and ulcer formation.

The pharmacological management of peptic ulcer disease has evolved significantly over time. Initially, antacids were used to neutralize gastric acid, followed by the introduction of histamine H_2-receptor antagonists and proton pump inhibitors (PPIs), which effectively suppress acid secretion. Currently, PPIs along with antibiotic therapy for *H. pylori* eradication are considered the standard treatment and have markedly reduced ulcer recurrence. Mucosal protective agents are also used to enhance gastric defense mechanisms. Despite these advancements, long-term use of conventional therapies may be associated with adverse effects and relapse in some patients.

Recent therapeutic strategies focus on the development of safer and more effective treatments, including novel acid-suppressing drugs, antioxidants, and herbal or natural products with gastroprotective activity. Personalized treatment approaches based on individual risk factors are also gaining importance. This review discusses the evolving pathophysiology of peptic ulcer disease, current pharmacological management, and future therapeutic perspectives.

Keywords: Peptic ulcer disease; *Helicobacter pylori*; NSAIDs; Proton pump inhibitors; Gastroprotective agents; Pharmacological management.

SSP/OP-139

Herbal Phytochemicals as Neuroprotective Agents Attenuating Huntington's Disease – Advantages over Synthetic Therapeutics

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ABSTRACT

Huntington's disease is a neurodegenerative hereditary disorder depict as motor control, cognitive impairment and psychiatric disturbances. Currently, there is no therapeutic approach exists that can cure or reverse Huntington's Disease progression. Conventional synthetic medications like levodopa, dopamine stimulants, tetrabenazine, and monoamine oxidase (MAO) inhibitors just ease symptoms for a while. These treatments often cause adverse effects such as jerky movements, dyskinesia, motor fluctuations, and long-term toxicity.

In comparison with synthetic medications, certain herbal compounds like centella asiatica, Bacopa monnieri, Ginkgo biloba, Panax ginseng, Withania somnifera, and Mucuna pruriens have reported to exhibit potent neuroprotective activity. Among these phytochemicals diapocynin, rosiridin, europindin, cordecypin, curcumin, naringenin, piperine, embelin, and barbigerone have also demonstrated as neuroprotective agent in genetic and pharmacological (3-Nitropropionic acid) HD model. Such natural substances can shown disease modifying potential, synergistic efficacy, improved behavioural outcomes and minimal adverse effects. Herbal compounds can simultaneously target multiple pathways and mechanisms at once, They combat oxidative stress, reduce pro-inflammatory cytokines, attenuate GABAergic neurotransmitter and microglial activation, preserve striatal neuronal integrity and dopamine pathways from degeneration. whereas synthetic medication only target single neurotransmitter pathway.

Existing evidences from preclinical models have demonstrated that herbal phytochemical compounds contain bioactive constituents that exhibit potency as multi-targeted neuroprotective agents and effectiveness in suppressing Huntington's Disease progression. These findings strongly support clinical translation of promising herbal-derived phytochemicals as disease-modifying therapies for Huntington's disease. turning certain herbs into therapies could give people better outcomes than standard medicine approaches which is more efficacious alternative to conventional synthetic drug regimens.

Keywords: Huntington's disease, 3-nitropropionic acid, antioxidants, neurotransmitter

SSP/OP-140

Antibacterial Activity of Molecular Hybrids and Conjugates Containing Imidazole Nucleus

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ABSTRACT

Among a variety of heterocyclic scaffolds, the imidazole moiety is the most malleable and is recognized as a gem in pharmaceutical chemistry due to its ability to interact with a wide range of biological targets. Hybrid molecules and conjugates that comprise an imidazole nucleus have demonstrated outstanding antibacterial action, especially against resistant species such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Klebsiella pneumoniae*. By merging imidazole with pharmacophores such as quinolones, triazoles, sulfonamides, and natural products, scholars have accomplished synergistic effects, enhanced pharmacokinetics, multitargeted effect, and reduced toxicity. The current review put forth research findings from recent studies on synthetic methods, structure-activity correlations (SAR), and mechanistic insights. The data points to imidazole-based hybrids as attractive options for next-generation antibiotics.

Keywords: Antibacterial, Imidazole, Hybrids, Congugates, SAR, Synergistic, Multitargeted.

SSP/OP-141

Modafinil: A Novel Wakefulness Promoting Agent with Unique Neurochemical Mechanism

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ABSTRACT

Modafinil is a novel wakefulness-promoting agent widely used in the management of sleep-related disorders. Chemically, modafinil is a diphenylmethyl sulfinyl acetamide derivative, structurally distinct from classical central nervous system (CNS) stimulants such as amphetamines. Due to this unique chemical nature, modafinil produces alertness with a lower risk of dependence and abuse. Pharmacologically, modafinil is primarily indicated for the treatment of narcolepsy, obstructive sleep apnea–associated excessive daytime sleepiness, and shift work sleep disorder. It enhances wakefulness, improves attention, vigilance, and cognitive performance without causing excessive stimulation.

The mechanism of action of modafinil is multifactorial and unique. It mainly acts by inhibiting the dopamine transporter (DAT), leading to increased extracellular dopamine levels in the brain. Additionally, modafinil influences other neurochemical systems by increasing norepinephrine, histamine, serotonin, glutamate, and orexin (hypocretin) activity, while reducing GABAergic inhibition. These combined effects promote sustained wakefulness and cognitive alertness.

Functionally, modafinil improves executive function, memory, and psychomotor performance, especially under conditions of sleep deprivation. Beyond its approved uses, modafinil has potential roles in the management of attention-deficit hyperactivity disorder (ADHD), depression-associated fatigue, cognitive impairment, and neurodegenerative disorders, though these applications require further clinical validation.

In conclusion, modafinil represents a unique CNS-acting agent with a distinct neurochemical mechanism, offering effective wakefulness promotion with improved safety compared to traditional stimulants.

Keywords: Modafinil, CNS, ADHD.

SSP/OP-142

Design of Anti-acne Gel Containing Phloretin

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ABSTRACT

Introduction: Acne vulgaris is a human skin disorder characterized by seborrhea, blackheads and whiteheads. pinheads and/or large papules. Staphylococcus aureus is an aerobic bacterium and it also plays an important role for causing an acne. Gels are defined as semisolid systems consisting of either suspension made up of small inorganic particles or large organic molecules interpenetrated by a liquid where the gel mass consist of a network of small discrete particles. Phloretin is a flavonoid compound that contains multiple phenolic hydroxyl groups.

Methods: Antiacne gels were prepared by dissolving different concentration of Carbopol in hot water (not more than 60℃) with moderate stirring. Formulations were further evaluated on the basis of its appearance, viscosity, pH, drug content, *in-vitro* release study and anti-microbial studies.

Result: The physicochemical characteristics of the gels were satisfactory with respect to physical appearance, viscosity, pH, washability, spreadability, extrudability, skin- irritancy, drug content, *in- vitro* release study and anti- microbial studies. Among all formulation F4 showed maximum release that is 75% and acceptable physical properties like homogeneity, colour, consistency, pH value, spreadability, extrudability, drug content and maximum zone of inhibition against *Staphylococcus epidermis.*

Conclusion: It has been concluded that formulation consist of phloretin shows most promising formulation for the treatment of acne as it shows maximum release and active against *Staphylococcus epidermis.*

Keyword: Phloretin, acne vulgaris, hydrogel, *Staphylococcus epidermis*, topical dosage form.

SSP/OP-143

Investigation of Anticancer and Antioxidant Activities of Combined Extracts of Leaf of *Pongamia Pinnata* and Root of Rubia Cordifolia on MCF-7 Cell Line

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ABSTRACT

Medicinal plants represent an important source of bioactive compounds with therapeutic potential against cancer and oxidative stress-related disorders. Karanj and Manjishta are well-documented medicinal plants known for their antioxidant and anticancer properties.This study aimed to evaluate the phytochemical profile, antioxidant, and anticancer potential of combined methanolic extracts of *Pongamia pinnata* leaves and *Rubia cordifolia* roots against human breast cancer (MCF-7) cells. Phytochemical analysis confirmed the presence of flavonoids, alkaloids, glycosides, saponins, and anthraquinones in both extracts. The combined methanolic extract demonstrated significantly enhanced antioxidant activity (% inhibition = 92.8 ± 0.2 at 100 µg/mL) compared to the individual extracts. The combination also exhibited potent cytotoxicity against MCF-7 cells, with an IC50 value of 64.32 ±2.14 µg/mL, indicating a synergistic antiproliferative effect. The synergistic interaction between bioactive compounds in P. pinnata and R. cordifolia enhances antioxidant and anticancer activities, supporting their potential as a natural therapeutic combination for breast cancer management.

Keywords: *Pongamia pinnata, Rubia cordifolia,* antioxidant, anticancer, MCF-7, combination therapy, phytochemicals.

SSP/OP-144

Traditional and Modern Medicine: Bridging Ancient Wisdom with Scientific Advances

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ABSTRACT

Traditional medicine and modern medicine represent two major approaches to healthcare that have been practiced worldwide for centuries. Traditional medicine refers to ancient healing systems such as Ayurveda, Unani, Siddha, Traditional Chinese Medicine, and various herbal and folk practices. These systems mainly rely on natural remedies, medicinal plants, lifestyle modifications, and holistic methods aimed at restoring balance within the body. Due to its cultural acceptance, affordability, and accessibility, traditional medicine continues to play an important role, especially in rural and developing regions. In contrast, modern medicine, also known as allopathic or Western medicine, is based on scientific research, clinical trials, advanced diagnostic tools, and evidence-based treatment strategies. It focuses on identifying the specific causes of diseases and managing them through pharmaceuticals, surgery, and other technologically supported interventions. Modern medicine has significantly contributed to the control of infectious diseases, improved life expectancy, and provided rapid relief in acute and

emergency situations. However, despite its effectiveness, modern medicine is often linked with higher costs, potential side effects, and dependency on synthetic drugs. Meanwhile, traditional medicine is generally considered safer for long-term use and emphasizes prevention and overall well-being, although it may sometimes lack standardized dosage forms and strong clinical validation. In recent years, interest has grown in combining both approaches through complementary and integrative medicine, where the holistic strengths of traditional practices are supported by the scientific advancements of modern healthcare. Therefore, understanding the differences, advantages, and limitations of both traditional and modern medicine is essential for developing effective, balanced, and sustainable healthcare solutions.

Keywords:- Traditional Medicine, Modern Medicine, Herbal Remedies, Allopathic Treatment, Evidence-Based Medicine

SSP/OP-145

Diabetes Mellitus Management: A Review

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ABSTRACT

Diabetes mellitus is a long-term metabolic disorder in which the body is unable to maintain normal blood sugar levels. This condition occurs due to insufficient insulin production or improper use of insulin in the body. Diabetes is mainly classified into Type 1, Type 2, and gestational diabetes. Common signs and symptoms include excessive thirst, frequent urination, tiredness, and unexplained weight loss. If diabetes is not controlled in time, it may lead to serious health complications such as cardiovascular disease, kidney damage, nerve problems, and vision impairment. Proper management of diabetes involves a balanced diet, regular physical activity, healthy lifestyle habits, and appropriate medical treatment. Early detection and continuous management play a key role in reducing complications and improving patient outcomes.

Keywords: Diabetes Mellitus, Blood Glucose Level, Insulin, Chronic Disease, Diabetes Management

SSP/OP-146

Herbal Nanogels: Integrating Traditional Medicine with Nanotechnology

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ABSTRACT

Herbal medicines have long been utilized for the treatment of various diseases due to their natural origin, safety, and therapeutic potential. However, their clinical application is often limited by poor solubility, low bioavailability, instability, and inadequate skin permeation. Recent advances in nanotechnology have led to the development of novel drug delivery systems, among which nanogels have gained significant attention.

Herbal nanogels are nanosized, three-dimensional, cross-linked polymeric networks capable of encapsulating herbal bioactive compounds and delivering them in a controlled and targeted manner. The incorporation of herbal drugs into nanogels enhances their stability, improves penetration across biological barriers, and provides sustained drug release. Natural and synthetic polymers such as chitosan, sodium alginate, carbopol, and polyvinyl alcohol are commonly employed in the formulation of herbal nanogels due to their biocompatibility and safety.

Herbal nanogels have shown promising applications in dermatological disorders, wound healing, anti-inflammatory therapy, antimicrobial treatment, and cosmeceutical formulations. Despite challenges related to formulation complexity, scale-up, and regulatory approval, herbal nanogels represent a promising platform that bridges traditional herbal medicine with modern pharmaceutical technology.

In conclusion, herbal nanogels offer an effective and innovative approach to enhance the therapeutic efficacy of herbal drugs and hold significant potential for future pharmaceutical and clinical applications.

Keywords: Herbal nanogels; Nanotechnology; Drug delivery system; Controlled release; Herbal therapeutics

SSP/OP-147

Taxane in Treatment of Breast Cancer

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ABSTRACT

Breast cancer is a complex and multifactorial disease characterized by the uncontrolled proliferation of abnormal cells in breast tissue. It commonly originates in the milk ducts as ductal carcinoma or in the milk-producing lobules as lobular carcinoma. The development of breast cancer is influenced by genetic mutations, hormonal imbalance, environmental factors, and inherited genetic alterations. These factors lead to DNA damage and defective repair mechanisms, resulting in activation of oncogenes, inactivation of tumor suppressor genes, and decreased apoptosis. As a result, unregulated cell proliferation and clonal expansion occur, leading to tumor progression and the formation of malignant neoplasms with the potential to metastasize to distant organs such as the lungs, liver, and bones. Early symptoms of breast cancer include the presence of a lump in the breast or axillary region, nipple inversion or abnormal discharge, changes in breast size or shape, skin dimpling, redness, swelling, and breast pain. Early detection through regular self-examination and mammographic screening plays a vital role in improving prognosis and survival rates. Taxanes are an important class of chemotherapeutic agents widely used in the treatment of breast cancer. They are derived from the Yew tree (Taxus species), mainly Taxus brevifolia and Taxus baccata. Taxanes act as mitotic inhibitors by stabilizing microtubules and preventing their depolymerization, thereby arresting the cell cycle at the G_2/M phase and inducing apoptosis in rapidly dividing cancer cells. Despite their clinical

effectiveness, taxanes are associated with adverse effects such as bone marrow suppression, neurotoxicity, hypersensitivity reactions, gastrointestinal disturbances, alopecia, cardiotoxicity, hepatotoxicity, mucositis, and fluid retention. Overall, taxanes play a crucial role in the effective management of breast cancer.

Keywords: Breast cancer, Taxanes, Chemotherapy, Microtubules, Mitotic inhibitors, Apoptosis.

SSP/OP-148

Investigating the Pharmacological Applications of *Annona glabra*: Snap Shot

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ABSTRACT

Annona glabra is in traditional medicine practice for the numerous therapeutic treatments such as anti-leishmanial activity, anti-microbial activity , anti-cancer activity, neuroprotective effects, anti-inflammatory activity, burn-healing properties, larvicidal efficacy, wine production, and antioxidant activity Phytochemically, flavonoids, glycosides, saponins, tannins, steroids, acidic chemicals, and anthraquinones are the main constituents of the plants. However, acetogenins, diterpenes and flavonoids are profound in the plant isolated from the various parts including bark, leaves, fruits and seeds of Annonaceae and believe to possess potent pharmacological activities. Two novel bioactive mono-THF acetogenins, Glacin A and Glacin B, have shown strong selective in vitro cytotoxicities against a variety of human solid cancer cell lines. The seed extract of A. glabra contained squamocin, asymycin, and acetogenin compounds, which increases mortality and slows down the deterioration of wood having insecticidal and vermicidal qualities, uses mainly in controlling termites attack. The insecticidal effect is mainly caused by the substance of acetogenins that act on mitochondria inhibiting the NADH -ubiquinone oxidoreductase and toxicity which causes the death of the insects. These acetogenins preferentially destroy cancer cells through the action as a DNA topoisomerase I toxin. Some diterpenoids induce apoptosis by down-regulating the bcl-2 gene and up-regulating the bax gene. Various bioactivities of phenolic compounds are responsible for their chemopreventive properties. Annonaceous acetogenins and flavonoids, which induce anticancer effects by causing cell death (apoptosis) via mitochondrial disruption, increasing reactive oxygen species (ROS), and blocking cell cycle progression. . It can cause Cell Cycle Arrest as extracts can halt cancer cell growth at the G0/G1 phase, partly by upregulating cell cycle inhibitors like p21. This systematic review aims to study the pharmacological applications of plant *Annona glabra* and its activity.

Keywords: *Annona glabra*, Annonaceae, Acetogenins, Apoptosis.

SSP/OP-149

Computational Screening of Antibacterial Potential of Bioactive Compounds from Rubia Cordifolia Roots and Pongamia Pinnata Leaves

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ABSTRACT

Rubia cordifolia and Pongamia pinnata has been traditionally used and well-documented medicinal plants known for their broad-spectrum antibacterial activity. DNA gyrase is an essential bacterial type II topoisomerase that introduces negative supercoils into DNA and is a validated target for antibacterial drug discovery. In the present in silico study, reported antibacterial constituents from Rubia cordifolia roots and Pongamia pinnata leaves were evaluated for their ability to bind the active site of DNA gyrase using molecular docking. Nine phytoconstituents (Alizarin, Purpurin, Munjistin, Rubiadin, Mollugin, Karanjin, Pongamol, Glabrin and Pinnatin) were docked into the gyrase binding pocket and scored for binding affinity and key intermolecular interactions. All compounds showed favourable docking poses and engaged the enzyme active site through hydrogen bonds, π–π stacking and hydrophobic contacts. The calculated binding energies ranged from –5.0 to –7.8 kcal·mol^{-1}, with Alizarin and Munjistin exhibiting the strongest predicted affinities (–7.8 kcal·mol^{-1}). Glabrin recorded the weakest score (–5.0 kcal·mol^{-1}), likely due to reduced complementarity with the binding pocket. Further molecular dynamics and in vitro studies warranted to confirm and expand the antibacterial potential upon these computational predictions.

Keywords: DNA gyrase, Alizarin, Munjistin, Antibacterial, Pongamia pinnata, Rubia cordifolia.

SSP/OP-150

Repurposing Existing Drugs for New Antimicrobial Uses

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ABSTRACT

Antimicrobial Resistance (AMR) occurs when microorganisms, such as viruses, bacteria, parasites, and fungi, evolve to the extent that they eventually become resistant to the antimicrobial medications, such as antibiotics, which are used to treat such conditions. AMR has now emerged to be one of the greatest global concerns in the 21st century due to the rapid growth of AMR infections rate and the lack of new antimicrobial medications being introduced to

combat this issue. Main cause of the current issue could be the consequences of overuse or irresponsible use of antibiotics in various situations, primarily in clinical treatment, along with agricultural usage, animal healthcare, and the food system. AMR is widely referred to as the silent pandemic. Without preventative measures, it is estimated that by 2050, AMR could potentially become the world's primary cause of death. Drug repurposing, the process of identifying new therapeutic uses for existing drugs, typically FDA-approved with established information on their toxicity, formulation, pharmacology, and potential side effects, has emerged as a promising strategy to address this challenge. Repurposing offers a cost-effective and time-efficient to the lengthy and expensive process of novel drug discovery that reduces the investment needed for the development of new treatments and makes repurposing and attractive alternative for pharmaceutical companies. Recent advances in high-throughput screening, bioinformatics, and systems biology have facilitated the identification of candidate drugs with potential efficacy against intracellular pathogens. Repurposing antimicrobial agents against new targets is another strategy to utilize existing compounds. Some agents are used alone or in combination with other antimicrobials to mitigate resistance. An example of antifungal amphotericin B for treatment of visceral leishmaniasis. The anti-malaria drugs chloroquine and pyrimethamine have been repurposed for amoebiasis and toxoplasmosis. Interestingly, few antibiotics have been repurposed, including doxycycline for malaria, paromomycin for visceral leishmaniasis. The discussion focuses on screening methods, molecular mechanisms, and the benefits of repurposing compared to traditional drug development, such as cost-efficiency and shorter timelines. Specific examples illustrate successful implementations, including the application of anticancer, anti-inflammatory, and heart medications to combat drug-resistant pathogens. The chapter also addresses obstacles like regulatory barriers, the development of resistance, and dosage optimization. By highlighting the potential of repurposed drugs to meet pressing antimicrobial needs, this section emphasizes their significance in transforming treatment approaches and addressing gaps in the battle against infectious diseases.

Keywords: Repurposing, Antimicrobial Resistance (AMR), FDA-approved.

SSP/OP-151

Transformation in Indian Drug Manufacturing Industry by Machine Learning: Current Scenario and Future Potential

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ABSTRACT

This research introduces an integrated machine learning framework tailored to the operational realities and strategic goals of the Indian pharmaceutical sector. Based on direct analysis of

manufacturing workflows and professional development patterns, we identify a critical gap between existing digital infrastructure and actionable intelligence for learning and excellence.

The present review leverages enterprise systems already implemented in leading Indian pharma companies—specifically SAP S/4HANA for production data and Oracle ERP Cloud for supply chain management—as live data sources. Custom Python and scikit-learn modules interface directly with these platforms, performing real-time analysis of batch records, raw material variability, and in-process control parameters. These insights are structured into adaptive learning units for quality control teams, linking each alert or prediction directly to relevant Good Manufacturing Practice (GMP) principles and corrective action protocols. For pharmacovigilance and clinical decision support, we integrate Oracle Argus Safety with NLP-powered analytics to transform adverse event reports into interactive case simulations for pharmacists. This creates a continuous loop where field data directly updates learning content, ensuring professionals encounter scenarios reflective of current therapeutic challenges. This framework enables a predictive transformation in pharmacy. Within manufacturing, it forecasts batch deviations for pre-emptive correction, while clinically, it anticipates adverse events for proactive intervention. This synergy creates a self-enhancing ecosystem: professional decisions continuously refine the AI models, which in turn elevate practice standards. The final gain is a quantifiable increase in both drug quality and patient outcomes, positioning Indian pharmaceutical professionals at the forefront of intelligent, data-driven healthcare.

Keywords: GMP Intelligence, SAP S/4HANA Integration, Pharmacovigilance Analytics.

SSP/OP-152

Zostera Marina (Eelgrass): A Review of Health Importance and Antidiabetic Potential

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ABSTRACT

Zostera marina, commonly known as eelgrass, is a marine flowering plant found in shallow coastal waters of temperate regions. It plays an essential role in marine ecosystems by improving water clarity, stabilizing sediments, and supporting marine biodiversity. In addition to its ecological importance, recent studies suggest that *Zostera marina* possesses valuable biological and medicinal properties.

This review paper presents a simplified overview of *Zostera marina* focusing on its distribution, morphology, chemical constituents, and biological activities. The plant is rich in phenolic compounds, flavonoids, and sulphated polysaccharides, which contribute to its antioxidant, antimicrobial, anti-inflammatory, and antidiabetic activities. Antidiabetic effects of *Zostera marina* are mainly associated with the inhibition of carbohydrate-digesting enzymes such as α-

amylase and α-glucosidase, resulting in reduced glucose absorption and improved glycaemic control. Additionally, its antioxidant properties help reduce oxidative stress, which is a major factor in the development of diabetes-related complications.

The review also highlights the role of *Zostera marina* in carbon sequestration, nutrient cycling, and coastal protection. Environmental threats including climate change, pollution, and habitat degradation affecting eelgrass meadows are briefly discussed.

In conclusion, *Zostera marina* is an ecologically important marine plant with promising antidiabetic and pharmaceutical potential. Further experimental and clinical studies are required to validate its mechanisms and therapeutic applications.

Keywords: *Zostera marina*, Eelgrass, Antidiabetic activity, Bioactive compounds, Review.

SSP/OP-153

Nitrofurans as Potent *Mycobacterium tuberculosis* Galactofuranosyl Transferase-2 Inhibitors: QSAR and Docking Analysis

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ABSTRACT

Background: Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, afflicts ~10 million annually and claims 1.5 million lives yearly (WHO, 2024), with multidrug-resistant (MDR) and extensively drug-resistant (XDR) strains fuelling a resurgence. Nitrofurans, bactericidal via reactive intermediates disrupting DNA/RNA/proteins, offer versatile scaffolds for anti-TB agents. Targeting galactofuranosyl transferase2 **(**GlfT2), essential for galactofuran synthesis in he mycobacterial cell wall, addresses a validated vulnerability.

Objective: This study employs 2D-QSAR modeling to dissect structural features and physicochemical descriptors governing antitubercular potency of 25 nitrofuran derivatives, complemented by molecular docking to predict GlfT2 binding affinities, rank lead candidates, and guide rational optimization for cell wall-disrupting MDR-TB inhibitors.

Methods: 25 nitrofuran derivatives were analysed using 2D-QSAR with Dragon descriptors and CP-MLR. Models were validated by r^2, Q^2_{LOO}, Q^2_{L5O}, and external test set predictivity. Also, the molecular docking method was employed to find a suitable target GlfT2 (PDB: 4FIY) through AutoDock Vina.

Results: Superior QSAR models achieved $r^2 = 0.952$, $Q^2_{LOO} = 0.839$, and robust external validation. Potency hinged on topological indices (IC1, JGI2, JGI5), Burden eigenvalues (BELm2, BELm6), molecular weight (MW), and fragments (C-006, C-031). Docking pinpointed compounds 15, 1,3, and 16 with strong GlfT2 affinities (−9.0 to −6.7 kcal/mol), aligning with QSAR forecasts.

Conclusion: Integrating ligand-based QSAR with structure-based docking illuminates critical nitrofuran motifs—topological, eigenvalue, and fragment-based—for potent anti-TB activity.

Top GlfT2 binders (e.g., Compound 15,1) emerge as preclinical leads, enabling scaffold hybridization, ADMET refinement, and progression toward novel MDR-TB therapeutics via validated hybrid modelling paradigms.

Keywords: Nitrofuran derivatives, 2D-QSAR, molecular docking, GlfT2, antitubercular activity, cell wall biosynthesis, drug discovery.

SSP/OP-154

A Comprehensive Review on Emulgels: Transdermal Drug Delivery of Miconazole

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ABSTRACT

Imidazole, a drug with a broad-spectrum antifungal agent used to treat localized vaginal, skin, and nail infections, is the source of miconazole, a synthetic derivative. The study's goal was to provide a novel method for increasing topical miconazole nitrate's permeability and effectiveness. Transdermal is one of the most often used drug delivery techniques due to its many advantages, such as ease of application, self-administration, decreased drug metabolism, etc. The path nevertheless has a lot of disadvantages in spite of these advantages. The delivery of drugs into the bloodstream via Topical medication distribution includes the skin, vagina, eyes, and rectal channels. Skin problems are treated with topical treatments. Hydrophobic drug delivery is one of the primary disadvantages of gels, despite their many advantages. In order to overcome this limitation and enable gels with unique properties to benefit even a hydrophobic medicinal moiety, an emulsion-based approach is being used. The dosage form created by mixing gels and emulsions is called Emulgel. The most promising method of delivering hydrophobic medications is Emulgel. An emulsion that is gelled in conjunction with gelling chemicals is called emulgel. Compared to other semi-solid formulations, the use of gels in pharmaceuticals and cosmetics is growing. The main drawback of hydrophobic drug delivery is one of the many benefits of gels. To get around this restriction, an emulsion-based strategy is employed. Thixotropic, fat-free, flexible, non-staining, long-lasting, translucent, and aesthetically pleasing are just a few of Emulgel's advantageous qualities for dermatological use. Emulgel can therefore be employed as a more effective local drug delivery method than existing ones.

Key-words: Miconazole Nitrate, Emulgel, Gel, Emulsion, Antifungal Activity

SSP/OP-155

Design and Optimization of Solid Lipid Nanoparticles (SLNs)

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ABSTRACT

Solid lipid nanoparticles (SLNs) have become prominent nanocarriers for enhancing the solubility, stability, and bioavailability of therapeutic agents while mitigating systemic side effects. This review synthesizes current knowledge on the design and optimization of SLNs, highlighting how the choice of solid lipids, surfactants, and production techniques such as high-pressure homogenization and ultrasonication dictates critical quality attributes. Special attention is devoted to the use of quality-by-design (QbD) concepts and statistical design of experiments (DoE) to systematically optimize particle size, polydispersity, surface charge, and drug loading, thereby improving reproducibility and scalability. Persistent challenges, including long-term physical stability, controlled drug release, and regulatory considerations, are discussed together with recent advances in hybrid lipid systems and environmentally benign manufacturing approaches. Overall, this article provides a structured, critical overview intended to guide researchers in developing robust, next-generation SLN-based delivery systems for pharmaceutical and biomedical applications.

Keywords: Solid lipid nanoparticles, Formulation design, Design of experiments, Quality-by-design, Nanocarrier optimization

SSP/OP-156

Design of Microspheres Loaded into a Fast -Dissolving Tablet System

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ABSTRACT

Piroxicam, a non-steroidal anti-inflammatory drug (NSAID), is widely used for managing pain and inflammation in conditions like arthritis, but its poor aqueous solubility and gastric irritation necessitate advanced delivery systems. Embedding piroxicam-loaded microspheres into fast-dissolving tablets (FDTs) combines controlled release from microspheres with rapid onset from FDTs, potentially improving bioavailability and patient compliance.

Microspheres provide sustained release by encapsulating the drug in polymeric matrices, while FDTs disintegrate in seconds in the oral cavity for quick absorption via buccal or sublingual routes. Microspheres are prepared via ionotropic gelation. Sodium alginate serves as the primary

polymer for ionotropic gelation microspheres loaded with piroxicam (an NSAID), cross-linked via Calcium chloride to form stable, controlled-release beads. The microspheres are then incorporated into a fast-dissolving tablet employing direct compression or granulating with starch and super-disintegrants like croscarmellose sodium, or sodium starch glycolate.
Optimized microspheres are made into a FDT matrix for burst release and inner microspheres for sustained profile. This hybrid system—piroxicam microspheres embedded in FDTs—addresses these issues by enabling initial rapid release from the tablet matrix alongside prolonged release from microspheres, minimizing peak plasma fluctuations and gastric exposure.
Keywords: Microsphere, FDT: Fast Dissolving Tablet, Ionotropic gelation technique

SSP/OP-157

Mobile Health Apps – Making Healthcare Portable

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ABSTRACT

Mobile health (mHealth) applications have become indispensable companions in the pursuit of a healthy lifestyle. With smartphones now a part of almost everyone's routine, these apps take healthcare beyond hospitals and clinics, providing assistance wherever people are—at home, at work, or on the go. They represent a change away from reactive treatment and toward proactive engagement, making health management more personalized and continuous. This article will look at how mHealth apps empower people to control their health, emphasize their role in bridging communication between patients and providers, and discuss the opportunities and problems of ensuring safe, inclusive, and effective healthcare.M health apps are changing how individuals connect with healthcare services. They offer accessible tools for monitoring vital signs, managing chronic illnesses, and promoting mental health. Offering reminders, trackers, and individualized feedback, they promote healthy habits and provide clinicians with real-time patient data for better decision-making. What makes them appealing is their human touch: they integrate smoothly into daily routines, prompting users to water, move, or pause for mindfulness. However, obstacles remain, including data privacy, regulatory monitoring, and fair access, all of which must be addressed in order to foster trust and inclusion. Finally, mHealth apps are more than just digital tools; they are partners in the journey to healthier living. By combining ease, personalization, and connectivity, they make healthcare more continuous and accessible. Balancing innovation with accountability is crucial for providing safe, inclusive, and helpful apps that promote human well-being as technology advances.
Keywords- mhealth apps- Mobile health apps, Trackers

SSP/OP-158

Azole-Pyrazole Hybrids and Nitroimidazole Prodrugs as Anti-TB Leads

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ABSTRACT

Background: Tuberculosis (TB) is a leading cause of death worldwide, and the challenge is compounded by the rise of multidrug-resistant (MDR) and extensively drug-resistant (XDR) strains.

Objective: This study focuses on azole heterocyclic derivatives as anti-tubercular agents which are found to be effective against both latent and active TB. besides natural products could help therapeutics

Methods: The study highlights bicyclic nitroimidazole azoles derivatives, their modes of action through cytochrome P450 inhibition, impairment of lipid and mycolic acid biosynthesis, and F_{420}-dependent nitroreductase activation etc. Besides that, plant-based derivatives like curcumin, alkaloids, and terpenoids etc were also incorporated for understanding the mechanism towards antitubercular activity.

Results: Azole heterocycles found to exhibit antimycobacterial properties not only under the presence of oxygen but also in hypoxic conditions. Nitroimidazole derivatives were also reported active against dormant bacteria. Development of the resistance phenomenon remains an issue whereas the natural products showed the features of immunomodulatory and hepatoprotective potential.

Conclusion: The study provided suitable evidence that azole heterocycles as scaffolds could be a base for new antitubercular drugs. Combining them with plant-based host-directed therapies could probably be an effective strategy for enhancing efficacy, reducing the toxicity, and found to be an effective against TB management and reducing the time span for the treatment duration.

Keywords: Tuberculosis, Azole derivatives, Nitroimidazoles, Pretomanid, Drug-resistant TB.

SSP/OP-159

AI-Integrated Network Pharmacology Approach to Understand Polyherbal Formulations

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ABSTRACT

Traditional medicine extensively utilizes polyherbal formulations that exert therapeutic effects through multiple bioactive compounds acting on diverse biological targets; however, elucidating their complex mechanisms of action remains challenging using conventional pharmacological approaches. The integration of artificial intelligence (AI) with network pharmacology provides a comprehensive and systematic framework to analyze the multi-component and multi-target nature of traditional herbal medicines. In this approach, phytochemical constituents of selected herbal formulations are identified and analyzed using AI-assisted databases and machine learning-based target prediction tools, followed by the construction of compound-target-disease interaction networks. Network and pathway enrichment analyses enable the identification of key targets and signaling pathways involved in disease modulation, offering mechanistic insights into therapeutic efficacy. AI-integrated network pharmacology reduces experimental burden, time, and cost while enhancing data interpretation and predictive accuracy. This strategy supports the scientific validation of traditional medicinal claims, facilitates lead compound identification, and strengthens evidence-based integration of traditional medicine into modern healthcare. Overall, AI-driven network pharmacology serves as an effective bridge between traditional knowledge systems and contemporary pharmacological research, promoting rational drug discovery and global acceptance of traditional herbal therapies.

Keywords: Artificial Intelligence, Traditional Herbal Medicine, Polyherbal Formulations, Phytochemicals

SSP/OP-160

Heterocyclic Scaffolds in Antibacterial Drug Discovery: Focus on Quinolone Derivatives and Resistance Challenges

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ABSTRACT

Background: Heterocyclic compounds are a major category of bioactive molecules in medicinal chemistry and they have played a major role in the development of antibacterial drugs. Their importance has been further emphasized by the rapid rise of antimicrobial resistance (AMR) mainly caused by enzymatic drug inactivation, lowered drug uptake.

Objective: The purpose of this study is to assess heterocyclic compounds as antibacterial scaffolds, quinolone derivatives in particular, their mechanisms of action, and the structure-activity relationship (SAR) developments.

Methods: An analysis of the literature was carried out covering the main heterocyclic antibacterial classes such as β-lactams, quinolones, aminoglycosides, and triazoles. The

historical development of quinolones from nalidixic acid to the latest fluoroquinolones as well as natural quinolone alkaloids from Rutaceae plants were also explored.

Results: Quinolone derivatives were found to exert a wide range of antibacterial effect mainly by inhibiting DNA gyrase and topoisomerase IV. SAR alterations like the addition of fluorine at C-6 and piperazinyl groups at C-7 greatly enhanced the potency.

Conclusion: Antibacterial research in the future should prioritize quinolone hybrids. The modifications at C-6, C-3 positions etc at quinolone derivatives can evade resistance, drug delivery systems and mechanistic studies besides MIC determination for the development of safer and more effective antibiotics.

Keywords: Heterocyclic compounds, Quinolones, Antibacterial activity, Antimicrobial resistance, SAR

SSP/OP-161

Analytical Method Development and Physicochemical Investigation of Terbinafine HCl Drug in Pure Form

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ABSTRACT

Terbinafine hydrochloride (TBH) is a synthetic allylamine antifungal agent extensively employed in the treatment of superficial fungal infections such as dermatophytosis, tinea corporis, tinea cruris, and onychomycosis. It exhibits its antifungal activity by selectively inhibiting the enzyme squalene epoxidase, a key step in ergosterol biosynthesis, resulting in ergosterol depletion and intracellular accumulation of squalene, ultimately leading to fungal cell death. TBH belongs to Biopharmaceutics Classification System (BCS) Class II, characterized by low aqueous solubility and high permeability, making it a suitable candidate for novel drug delivery approaches.

This research focused on the physicochemical characterisation of TBH, such as organoleptic properties, UV analysis, melting point, FTIR, partition coeffecient and solubility. The result were found that it was a white to off-white crystalline powder with a melting point 208 °C, indicating its crystalline nature. The drug exhibited high lipophilicity with a partition coefficient (log P) 5.1 which supports its effective permeation across biological membranes. UV–visible spectroscopic analysis of TBH showed a characteristic absorption maximum (λmax) at approximately 282 nm in suitable solvent systems (Ethanol), which is widely used for its quantitative estimation. Fourier Transform Infrared (FTIR) spectroscopy confirmed the presence of characteristic functional groups corresponding to TBH, including C–H stretching, aromatic ring vibrations, and tertiary amine groups. FTIR compatibility studies demonstrated no significant shifts or

disappearance of characteristic peaks in the presence of selected pharmaceutical excipients, indicating the absence of drug–excipient interaction.

The reported analytical and preformulation parameters establish TBH as a stable, compatible, and analytically identifiable antifungal drug, suitable for further formulation and quality control applications of a transdermal patch.

Keywords: Pre-formulation study, Allylamine antifungal, UV–Visible spectroscopy, FTIR, Partition coefficient.

SSP/OP-162

Assessment of Rational Drug Use and Polypharmacy Patterns in Inpatients Using Who Core - Prescribing Indicators: A Cross-Sectional Study at A Tertiary Care Hospital

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ABSTRACT

Introduction: Polypharmacy is a growing problem in hospitalised patients that is associated with adverse drug reactions, drug-drug interactions, increased treatment costs, especially when it occurs irrationally. Core prescribing indicators have been developed by the World Health Organization and the International Network of Rational Use of Drugs in 1993.

Objective: The aim of the study is to measure the rational prescription of drugs and polypharmacy issues among inpatients in a tertiary care hospital in a tertiary care hospital situated in Punjab using the WHO core prescribing indicators.

Methods: It will be a prospective cross-sectional study in a sample of inpatients at selected wards, and the sampling of eligible prescriptions will be performed systematically. The data will be gathered in the form of a structured form based on the WHO manual "How to investigate drug use in health facilities" and will be examined with the help of descriptive statistics: data on drug name, dosage form and National List of Essential Medicines (NLEM 2022) status will be gathered.

Results: There should be higher than WHO reference values of the average number of drugs per encounter, extensive polypharmacy, inefficient generic prescribing, high prevalence of antibiotic use, injectable use, and inconsistent compliance with NLEM.

Conclusion: The implementation of WHO core prescribing indicators will create institution-specific evidence to optimise the formulary and make prescriber education more effective in improving the quality of prescription and patient safety.

Keywords: Rational drug use; Polypharmacy; Prescribing indicators: Inpatients; Tertiary care hospital.

SSP/OP-163

Epigenetic and Signal-Transduction Targets of Rauwolfia serpentina in the Progression of Diabetic Complications

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ABSTRACT

Diabetic complications are a major cause of global morbidity and mortality and result from chronic hyperglycemia induced molecular alterations that persist even after glycemic control is achieved. Beyond metabolic imbalance, several evidences highlight the crucial role of epigenetic reprogramming and dysfunctional signal-transduction pathways in the progression of microvascular and macrovascular problems contributing to metabolic memory, oxidative stress, inflammation, endothelial dysfunction and tissue injury. Rauwolfia serpentina, a traditional medicinal plant widely used in cardiovascular and neurological disorders has emerged as a potential modulator of diabetes associated molecular pathways. Therefore, it is evident that the epigenetic and signal-transduction targets of Rauwolfia serpentina with its bioactive indole alkaloids is capable of making changes including but not limited to DNA methylation, histone modifications and microRNA regulation. Moreover, key signalling pathways including PI3K/Akt, MAPK, NF-κB, AMPK, and TGF-β are also affected. Experimental evidence also suggest that its antioxidant and anti-inflammatory properties may attenuate hyperglycemia induced epigenetic alterations and signaling cascades, thereby limiting the progression of diabetic complications.

Keywords: Diabetic complications; Rauwolfia serpentina; mitochondrial dysfunction; NF-κB

SSP/OP-164

Pharmacognostic Evaluation and Biochemical Assessment of Medicinal Plants with Ethnomedicinal Significance

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ABSTRACT

Medicinal plants continue to serve as an invaluable reservoir of therapeutic agents owing to their chemical diversity and long-standing application in traditional healthcare systems. Despite their widespread use, scientific validation of their identity, quality, safety, and pharmacological

relevance remains essential for their acceptance in evidence-based medicine. The present study aims to perform comprehensive pharmacognostic evaluation and biochemical assessment of selected medicinal plants with established ethnomedicinal importance in order to substantiate their therapeutic potential. Pharmacognostic investigations including macroscopic, microscopic, and physicochemical analyses are carried out to ensure proper authentication and standardization of plant materials. Extracts prepared using suitable solvents are subjected to qualitative and quantitative phytochemical screening for major secondary metabolites such as alkaloids, flavonoids, phenolics, terpenoids, saponins, and glycosides. Chemical profiling is further conducted using chromatographic and spectroscopic techniques to identify characteristic marker compounds. Biological activities of the extracts are evaluated through in vitro antioxidant, antimicrobial, and enzyme inhibition assays, while preliminary toxicity studies are performed to assess safety. The study also seeks to establish correlations between traditional therapeutic claims and experimentally observed biochemical and pharmacological outcomes. Findings from this investigation are expected to generate reliable scientific evidence supporting the medicinal significance of the selected plants, assist in the development of standardized herbal raw materials, and contribute to the identification of potential lead molecules for drug discovery. Overall, this work reinforces the integration of traditional knowledge with modern scientific approaches and promotes the rational utilization of medicinal plant resources.

Keywords: Pharmacognostic evaluation, Medicinal plants, Phytochemical screening, Biochemical profiling, Antioxidant activity, Antimicrobial activity

SSP/OP-165

Camphor-Menthol-Thymol (CMT) Eutectic Mixture as a Future Platform for Green Transdermal Patches

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ABSTRACT

The increasing demand for environmentally sustainable pharmaceutical manufacturing is influencing the design of transdermal drug delivery systems. Conventional patches heavily rely on organic solvents, synthetic permeation enhancers, and various additional ingredients, resulting in a more complex formulation that poses environmental concerns and faces increased regulatory scrutiny. The Camphor-Menthol-Thymol (CMT) eutectic mixture presents a promising natural, multifunctional excipient platform that addresses these challenges while maintaining or enhancing therapeutic efficacy. Intermolecular interactions, such as hydrogen bonding and van der Waals forces, facilitate the formation of the CMT eutectic system. This reduces the melting point and establishes a stable liquid phase near room temperature. This liquid milieu facilitates medication solubilization, enhances thermodynamic activity, and encourages transdermal

penetration by momentarily altering the lipid arrangement of the stratum corneum. The system can simultaneously act as a permeability enhancer, plasticizer, and antibacterial agent, hence reducing reliance on multiple synthetic additives. From a sustainability perspective, plant-derived terpenes enable solvent-free production, reduce volatile organic compound emissions, and improve worker safety. The adoption of green chemistry frameworks by industries may facilitate regulatory processes and enable scalable, energy-efficient production. Despite challenges such as terpene odor, volatility, and potential discomfort at higher doses, formulation strategies such as encapsulation and multilayer patch development may provide effective solutions. The CMT eutectic notion signifies a progressive shift towards integrated excipient systems that amalgamate usefulness, sustainability, and manufacturability. Through rigorous validation via pharmacokinetic, stability, and clinical safety investigations, this platform has the potential to revolutionize the development of next-generation transdermal products.

Keywords: CMT eutectic system, green transdermal delivery, natural permeation enhancers, solvent-free formulation, sustainable pharmaceutics

SSP/OP-166

Digital Innovations in Phytomedicine: Bridging Traditional Herbal Knowledge with Modern Pharmacy

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ABSTRACT

Phytomedicine involves the use of plant-based medicines derived from traditional herbal knowledge and natural bioactive compounds for disease prevention and treatment. Unlike chemically synthesized medicines, which often contain single active molecules and may be associated with higher risks of adverse drug reaction [ADR]and unwanted side effects, phytomedicines typically consist of multiple phytochemicals that can act synergistically, potentially offering improved safety profiles and better patient tolerance. Due to increasing concerns regarding drug resistance, chronic disease management [CDM], and long-term safety of synthetic drugs, herbal medicines are gaining renewed global attention and are increasingly prioritized in healthcare and pharmaceutical research. However, challenges such as variability in plant composition, lack of standardized dosing, and limited scientific validation have historically limited their acceptance. Modern digital innovations, including artificial intelligence, bioinformatics, and digital herbal databases, are now transforming phytomedicine by improving identification of active compounds, enhancing quality control, predicting safety and efficacy, and supporting evidence-based development. This integration of traditional herbal wisdom with

digital technology is advancing phytomedicine toward safer, standardized, and scientifically validated modern therapeutic solutions.

Keywords: Adverse Drug Reaction [ADR], Chronic Disease Management [CDM], Phytomedicine, Standardization, Herbal medicines.

SSP/OP-167

Nutraceuticals: Role in Health Promotion and Disease Prevention

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ABSTRACT

Nutraceuticals are products that come from food sources and are used as dietary supplements to improve overall health. They help the body to function properly, prevent diseases, and slow down the aging process. Nowadays, nutraceuticals are becoming very popular because they provide both nutritional and therapeutic benefits. Based on their sources, nutraceuticals are mainly classified into dietary supplements and herbal bioactive compounds. Dietary supplements include vitamins, minerals, proteins, and fatty acids, while herbal nutraceuticals are obtained from medicinal plants and herbs.The global nutraceutical market is very large and is estimated to be around USD 117 billion. Herbal nutraceuticals play an important role in maintaining good health and improving quality of life. They also help in increasing longevity and overall wellbeing. Many studies have shown that nutraceuticals are helpful in the management and prevention of various diseases such as cancer, cardiovascular diseases, and neurodegenerative disorders. Because of these benefits, nutraceuticals are widely used as supportive therapy along with a healthy diet. This review mainly focuses on different bioactive ingredients that act as nutraceuticals, such as carbohydrates, lipids, edible flowers, alkaloids, and medicinal plants. It also explains their role in providing health benefits and their use in disease prevention.

Keywords: Nutraceuticals, Dietary supplements, Health promotion, Disease prevention, Antioxidants, Probiotics, Vitamins&minerals, Herbal products.

SSP/OP-168

Insulin: The Hormone That Decides Between Health and Diabetes

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ABSTRACT

Insulin is a vital peptide hormone secreted by the β-cells of the pancreas and plays a central role in maintaining normal glucose and metabolic homeostasis. It regulates carbohydrate, fat, and protein metabolism by facilitating cellular uptake of glucose and promoting energy storage. Proper insulin secretion and action ensure metabolic health, whereas insulin deficiency or resistance leads to persistent hyperglycemia and the development of diabetes mellitus. In Type 1 diabetes, absolute insulin deficiency results from autoimmune destruction of pancreatic β-cells, while in Type 2 diabetes, impaired insulin action due to insulin resistance is the primary defect. Failure of insulin function not only disrupts glucose metabolism but also contributes to acute and chronic diabetic complications. Therefore, insulin acts as a decisive hormone that determines the balance between health and diabetes, highlighting its critical role in disease prevention andmanagement.

Keywords: Insulin, DiabetesMellitus, Glucose Homeostasis, Insulin Resistance, Insulin Deficiency, Metabolic Regulation, Hyperglycemia.

SSP/OP-169

Smart Pharmacy: The Role of Computer Applications in Modern Healthcare

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ABSTRACT

The rapid advancement of computer technology has led to the emergence of smart pharmacy systems, transforming traditional pharmacy practice into an efficient, accurate, and patient-centered component of modern healthcare. Computer applications now play a pivotal role across all domains of pharmacy, including drug discovery, pharmaceutical manufacturing, quality control, clinical pharmacy, community pharmacy, and regulatory affairs. In drug research and development, computer-aided drug design, molecular modeling, and bioinformatics tools accelerate the identification and optimization of new drug candidates while reducing time and cost. In pharmaceutical manufacturing and quality assurance, computerized systems enable automation, real-time monitoring, data integrity, and compliance with regulatory standards. Analytical instruments integrated with computer software ensure precise data analysis and documentation. In hospital and community pharmacy settings, computer applications support electronic prescribing, patient medication records, inventory management, drug interaction screening, and clinical decision support systems, thereby improving medication safety and therapeutic outcomes.

Additionally, computers play a crucial role in pharmacovigilance by facilitating adverse drug reaction monitoring, signal detection, and risk assessment through large healthcare databases. In pharmaceutical education and research, digital platforms, simulation tools, and online databases

enhance learning, knowledge sharing, and evidence-based practice. The integration of computer applications has significantly reduced medication errors, improved workflow efficiency, enhanced patient care, and strengthened regulatory compliance. Despite challenges such as data security, system integration, and the need for skilled professionals, smart pharmacy systems represent a vital advancement in healthcare delivery. This abstract highlights how computer applications have become the backbone of modern pharmacy practice, driving innovation, safety, and quality in healthcare services.

Keywords: Smart Pharmacy, Computer Applications, Digital Healthcare, Clinical Decision Support, Pharmaceutical Technology, Medication Safety.

SSP/OP-170

Development of Nano Emulsion System of Selected Oil for Anti Hyperlipidemic and Drug Delivery of Ticagrelor

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ABSTRACT

Ticagrelor is a potent antiplatelet agent widely used in the management of acute coronary syndromes; however, its clinical effectiveness is limited by poor aqueous solubility, low oral bioavailability, and variable absorption. The present study aims to develop and optimize a nanoemulsion system using a selected oil with inherent antihyperlipidemic potential to enhance the solubility, bioavailability, and therapeutic efficacy of ticagrelor. Nanoemulsions were formulated using selected oil as the oil phase, appropriate surfactant and co-surfactant systems, and aqueous phase by the high-energy emulsification method. The prepared formulations were evaluated for physicochemical parameters such as droplet size, polydispersity index, zeta potential, drug content, pH, viscosity, and thermodynamic stability. In-vitro drug release studies were carried out to assess the release behavior of ticagrelor from the nanoemulsion system. The developed nanoemulsion demonstrated nanosized droplets with good stability and enhanced drug release compared to conventional formulations. The use of selected oil is expected to provide synergistic antihyperlipidemic activity along with improved drug delivery of ticagrelor. Thus, the developed nanoemulsion system may serve as a promising approach for effective management of cardiovascular disorders associated with hyperlipidemia.

Keywords: Ticagrelor, nano emulsion, p2y12 receptor antagonist, oral drug delivery, solubility enhancement, bioavailability.

SSP/OP-171

Evaluation of Wound Healing Activity of Seed Extract of *Litsea Glutinosa* in Experimental Animal Model

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ABSTRACT

A common fodder tree, *Litsea glutinosa* has long been used to treat a number of illnesses, including the common cold, arthritis, asthma, diabetes, diarrhea, dysentery, abdominal pain, digestive problems, gastroenteritis, swelling, injuries, and even increased sexual potency.

Aim: Evaluation of Wound Healing Activity of Seed Extract of *Litsea Glutinosa* in Experimental Animal Model.

Material and method: The experiment was designed for 15 days and either sex Wistar rats were divided into 4 groups (n=5). Group I (Normal control) – simple ointment applied to wounds, Group II (Positive control) – Polysporine ointment applied, Group III (Test) – 5 % *L. glutinosa* herbal gel, Group IV (Test) – 10 % *L. glutinosa* herbal gel. The wound healing effect was measured by Epithelization period, Percentage Wound contraction, Hydroxyproline content and Histopathological Parameters.

Result: This result shows that 5% and 10% gel of *Litsea glutinosa* 50% ethanol extract considerably accelerated wound contraction and shortened the epithelization time. At treatments 5% and 10%, the hydroxyproline content also significantly increased ($p < 0.001$ ***). Histopathological tests revealed that the granulation tissue of the 10% gel of aqueous extract of seed-treated mice had considerably more collagen deposition with macrophages than the 5% gel. Measurements of hydroxyproline could be used to determine collagen turnover.

Conclusion: Our study demonstrated that a herbal gel formulated from Litsea glutinosa seed extract positively affects various stages of the healing process. Key components like catechin, quercetin, and glutinosa a and b support wound healing through the gel's antioxidant, anti-inflammatory, and antibacterial properties, enhancing collagen synthesis, wound contraction, and the epithelization period. Ongoing clinical research will further explore its efficacy, particularly in diabetic wound healing.

SSP/OP-172

Design and Discovery of Novel Quinazoline Derivatives as HER2 Inhibitors for Targeted Cancer Therapy

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ABSTRACT

HER2 overexpression is linked to aggressive cancers, highlighting the need for potent and selective inhibitors. This study employs a computational approach to design and optimize novel oxazolo-quinazoline derivatives as HER2 inhibitors. A 3D-QSAR model guided the rational modification of ligands, followed by molecular docking to evaluate binding interactions. Molecular dynamics (MD) simulations assessed the stability and conformational behaviour of the selected compounds, while ADME and physicochemical predictions ensured their drug-likeness and pharmacokinetic suitability. Among the designed compounds, 3-(2-chloro-4-((2-oxo-1-(pyridin-3-yl)-1,2-dihydrooxazolo[4,5-g]quinazolin-8-yl)amino)phenoxy)propan-1-aminium (**A1**) and 3-(2-chloro-4-((2-oxo-1-(pyridin-4-yl)-1,2-dihydrooxazolo [4,5-g]quinazolin-8-yl)amino)phenoxy)propan-1-aminium (**A4**) exhibited strong binding affinities, stable interactions in MD simulations and favorable ADME properties. These compounds share a core oxazolo-quinazoline scaffold linked to a substituted phenoxypropan-1-aminium moiety, with variations in the heterocyclic substituent (pyridine or imidazole) influencing their electronic properties and binding efficiency. **A1** emerged as the most promising candidate, balancing strong receptor interactions, pharmacokinetic properties and synthetic feasibility. A synthetic scheme for **A1** was proposed to facilitate experimental validation. This study provides critical insights into the rational design of HER2 inhibitors and highlights the therapeutic potential of optimized oxazolo-quinazoline derivatives for targeted cancer therapy.

Keywords: 3D-QSAR, molecular docking, ADME, virtual screening, HER2, 3PP0, and MD simulations

SSP/OP-173

Natural Flavonoids as an Intervention for Hepatic Encephalopathy: Preclinical Evidence-Based Study

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ABSTRACT

Hepatic encephalopathy (HE) is a serious neuropsychiatric disorder caused in patients with both; acute and chronic liver diseases, which consists of various complications ranging from cognitive impairment, disorientation, confusion, and coma. The available therapies mainly focus on decreasing ammonia levels either through increasing its elimination or decreasing its production, some medications may subside the duration and limit the consequences of HE, but there is no complete available treatment for HE-like manifestation. Thus, there is a need to explore new pharmacotherapy for the treatment and management of HE. Flavonoids are polyphenolic compounds easily found in vegetables, fruits, flowers, beverages, and plants-based foods. In modern research, flavonoids have gained attention due to their broad pharmacological properties, like anti-oxidant, antiviral, anti-inflammatory, cardioprotective, cytoprotective, and

neuroprotective activity. Several preclinical studies suggest that various flavonoids have a potential therapeutic role in a variety of metabolic- related neurological disorders, including HE. This review focuses on all pre-clinical reports that highlight the neuroprotective potential of natural flavonoids for the management of HE. Based on numerous pre-clinical studies and taking into account the therapeutic effects of natural flavonoids, the present study illustrates the cellular and molecular mechanisms responsible for the potential role of natural flavonoids as Pharmacotherapy for the management and treatment of HE.

Keywords: Hepatic encephalopathy, Hyperammonaemia, Flavonoids, Neuroprotection, Isoflavone, Flavanone, neurological.

SSP/OP-174

Parkinson's Disease in Women: Hormonal, Genetic, and Clinical Differences in Pathogenesis

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ABSTRACT

Parkinson's disease (PD) constitutes a neurodegenerative disorder that results in ongoing degeneration of dopaminergic neurons present in the substantia nigra pars compacta, together with the pathological aggregation of misfolded α-synuclein protein into Lewy bodies. The disease affects both men and women, yet research studies show that different biological sex groups experience different disease progression patterns. Women display lower lifetime risk together with later onset of symptoms compared to men because neuroprotective factors exist in their bodies, yet they experience more non-motor symptoms, which lead to major declines in their life quality. The reviewers examine how hormonal factors, together with genetic factors and clinical factors, create distinct pathways through which women develop Parkinson's disease. Estrogen acts as a protective neuroactive substance that safeguards the brain's nigrostriatal pathway by controlling the production and breakdown of dopamine, boosting mitochondrial energy service, decreasing oxidative damage, handling calcium balance, and stopping brain inflammation from microglial cells. The postmenopausal body loses estrogen, which leads to a greater risk of brain damage, together with mitochondrial power system failure and cellular breakdown of electrical balance and faster brain degeneration. Women who carry PD-related genes, including LRRK2 GBA SNCA and PINK1 exhibit different rates of disease advancement and various disease manifestations. Women present with tremor-dominant motor patterns, yet they experience more severe non-motor symptoms, which include depression, anxiety, sleep disturbances, chronic pain, and autonomic dysfunction, which arise from different biological sex mechanisms that cause mitochondrial defects and oxidative cellular damage, α-synuclein protein misfolding, and persistent brain inflammation. The researchers need to view sex as an essential

biological factor which determines the creation of precise medical treatments while they develop improved diagnostic methods for Parkinson's disease and treatment strategies for female patients.

Keywords: Parkinson's disease; sex differences; estrogen signaling; alpha-synuclein; dopaminergic neurodegeneration.

POSTER PRESENTATION

SSP/PP-101

Role of Nutraceuticals in Prostate Cancer Prevention and Adjunctive Therapy: Mechanistic Insights and Clinical Perspectives

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ABSTRACT

Prostate cancer represents one of the leading malignancies affecting men globally and continues to impose a considerable clinical and socioeconomic burden. Although advances in screening, diagnosis, and treatment have improved early-stage disease outcomes, durable control of advanced and castration-resistant prostate cancer remains elusive. Disease heterogeneity, emergence of therapeutic resistance, treatment-related toxicities, and frequent relapse substantially compromise the efficacy of existing modalities. Conventional interventions, including androgen deprivation therapy, chemotherapy, radiotherapy, and molecularly targeted agents, often confer limited survival benefit in advanced disease while adversely impacting patient quality of life. These challenges have stimulated increasing interest in complementary and supportive therapeutic approaches with improved safety profiles. Nutraceuticals— bioactive compounds derived from dietary and plant sources have gained attention for their potential roles in prostate cancer prevention and adjunctive management. A growing body of preclinical and clinical evidence indicates that these compounds can influence key oncogenic processes, including redox imbalance, chronic inflammation, androgen signaling, apoptosis, and cell-cycle regulation. Natural agents such as lycopene, curcumin, resveratrol, sulforaphane, omega-3 polyunsaturated fatty acids, and soy isoflavones have demonstrated notable chemopreventive and antitumor activity across experimental models and human studies. This review provides an integrated overview of the molecular pathways driving prostate cancer progression and critically examines the mechanistic and translational relevance of nutraceuticals as supportive therapeutic agents. Additionally, emerging strategies— including nano-enabled delivery systems, nutrigenomic approaches, and personalized nutrition—are discussed for their potential to enhance bioavailability, therapeutic precision, and clinical efficacy, thereby offering new avenues for improving prostate cancer management.

Keywords: Prostate cancer; Nutraceuticals; Chemoprevention; Adjunctive therapy; Oxidative stress; Inflammation

SSP/PP-102

Pharmacogenomics (PGx): Personalized Medicine for the Future

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ABSTRACT

Pharmacogenomics is a rapidly advancing field that investigates how genetic variations influence individual responses to drug therapy. In routine clinical practice, patients often exhibit variable responses to the same medication, leading to reduced therapeutic efficacy and an increased risk of adverse drug reactions. Pharmacogenomics addresses these challenges by utilizing genetic information to guide drug selection and dose optimization, thereby forming the foundation of personalized medicine. Genetic polymorphisms in drug-metabolizing enzymes, drug transporters, and drug targets play a critical role in determining drug efficacy and safety. Variations in cytochrome P450 enzymes, particularly CYP2D6 and CYP2C19, significantly affect drug metabolism and contribute to poor, normal, or ultra-rapid drug responses. Identification of these genetic differences enables healthcare professionals to design individualized treatment strategies and improve therapeutic outcomes. Pharmacogenomics has demonstrated significant clinical impact in therapeutic areas such as oncology, cardiology, psychiatry, and infectious diseases. Pharmacogenomic-guided therapy has improved outcomes for drugs including warfarin, clopidogrel, and targeted anticancer agents. Furthermore, integrating pharmacogenomics with digital technologies such as bioinformatics, artificial intelligence, and electronic health records enhances precision in clinical decision-making. Despite existing challenges related to cost, ethical concerns, and limited clinical awareness, ongoing technological advancements continue to support the expanding role of pharmacogenomics in modern healthcare. This patient-centered approach to drug therapy highlights the essential role of pharmacists and healthcare professionals in translating pharmacogenomic knowledge into clinical practice.

Keywords: Pharmacogenomics; Personalized medicine; Genetic polymorphism; Drug metabolism; Cytochrome P450; Precision medicine; Clinical decision-making

SSP/PP-103

Current Approaches in Diabetes Mellitus Management: Treatment Options and Formulation Innovations

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ABSTRACT

A class of metabolic illnesses known as Diabetes mellitus is typified by hyperglycemia brought on by abnormalities in insulin activity, secretion, or both. Diabetes mellitus is caused by either by insufficient insulin production by the pancreas or improper insulin response by the body's cells. Type 2 diabetes, formerly known as noninsulin-dependent diabetes, is caused by the body's

incapacity to react appropriately to the pancreatic production of insulin. Globally, It is estimated 589 million persons between the ages of 20 and 79 have diabetes as of 2024–2025. By 2050, number is expected to increase to 853 million. Sulphonylureas, biguanides, alpha glucosidase inhibitors, meglitinide analogues, and thiazolidenediones are examples of oral hypoglycemic medications. Correcting underlying metabolic disorders including insulin resistance and insufficient insulin production is the primary goal of these medications. Polyuria, polydipsia, weight loss, hazy eyesight, and occasionally polyphagia are signs of severe diabetes. Any drug delivery system's objectives are to deliver a therapeutic dose of medication to the right location in the body and to reach and sustain the targeted drug concentration. This could be accomplished by using a multiparticulate dosage form, such as beads. Benefits beads provide are Controlled Release, Uniform drug release, improved bioavailability, Fewer adverse effects as compared to other formulations, Improved stability. Methods for Bead Formulation are Ionotropic Gelation Method, External Gelation Method, Internal Gelation Method, Emulsion Gelation Method, Polyelectrolyte complexation Method. The capacity of polyelectrolytes to crosslink in order to create a hydrogel sustained release formulation is the foundation of the ionotropic gelation technique.

Keywords: Diabetes mellitus, Sulphonylureas, Sustained Release, Ionotropic Gelation Method

SSP/PP-104

Nano-Phytosomes: A Novel Herbal-Drug Delivery System for Enhanced Bioavailability and Therapeutic Efficacy of Curcumin in Cancer Treatment

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ABSTRACT

curcumin (curcuma longa), the active compound found in turmeric, has shown promising effects in treating cancer. However, its use is limited due to poor absorption, low stability, and quick breakdown in the body. To improve the effectiveness of curcumin, nano-phytosomes have been developed as a new drug delivery system. Nano-phytosomes are tiny lipid-based particles that carry curcumin, protecting it from degradation and allowing it to reach its target more effectively. These nano- sized carriers enhance curcumin's solubility, stability, and absorption, leading to improved bioavailability compared to traditional forms of curcumin. They also enable controlled and sustained release, which helps maintain higher concentrations of curcumin in the bloodstream for longer periods. Additionally, nano-phytosomes can be designed to target cancer cells specifically, reducing the side effects often seen with conventional chemotherapy. By protecting curcumin from being broken down in the digestive system and improving its absorption, nano-phytosomes offer a promising solution for cancer patients. This delivery system not only makes curcumin more effective but also safer long-term use. The combination of enhanced bioavailability and targeted delivery systems may lead to better outcomes in cancer treatment. This paper discusses the advantages of nano-phytosomes in improving curcumin's therapeutic potential and highlights their future in cancer therapy. Future research is needed to further optimize this delivery system for clinical applications.

Keywords: Nano-phytosomes, Curcumin, Bioavailability, Cancer treatment

SSP/PP-105

Role of Learning Management Systems (LMS) in Advancing Pharmacy Training

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ABSTRACT

Digital transformation has significantly influenced pharmacy education by introducing innovative approaches to teaching, learning, and professional development. Learning Management Systems (LMS) have emerged as effective digital platforms that support structured, flexible, and learner-centered pharmacy training. This abstract highlights the role of LMS in enhancing learning outcomes and advancing professional excellence in pharmacy education. LMS platforms enable the delivery of interactive educational content through multimedia resources, virtual classrooms, online assessments, and timely feedback mechanisms. These features promote active learning, self-paced study, and improved knowledge retention among pharmacy students and professionals. LMS also supports remote learning and standardized training modules, helping to bridge the gap between theoretical knowledge and practical application in clinical and community pharmacy settings. During pharmacy training, LMS facilitates a better understanding of clinical practices, regulatory guidelines, and patient-centered care through case-based learning and digital simulations. Additionally, LMS allows educators to monitor learner performance, assess competency development, and customize instructional strategies based on individual learning needs. This data-driven approach contributes to improved academic performance and enhanced professional preparedness. Despite challenges such as limited digital infrastructure and varying levels of technological proficiency, the effective implementation of Learning Management Systems can significantly enhance the quality, accessibility, and efficiency of pharmacy education. Overall, LMS plays a key role in advancing pharmacy training by supporting continuous learning, skill development, and adaptability to the evolving demands of modern healthcare systems.

Keywords: Pharmacy Education, Learning Management System, Digital Transformation, E-learning, Professional Excellence

SSP/PP-106

Impact of Artificial Intelligence on Pharmacy Education and Skill Development

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ABSTRACT

The rapid advancement of Artificial Intelligence (AI) is transforming pharmacy education by reshaping learning methodologies, skill development, and professional training. AI-driven technologies are increasingly being integrated into pharmacy curricula to enhance teaching effectiveness, personalize learning experiences, and improve clinical decision-making skills.

This abstract explores the impact of AI on pharmacy education and its role in developing competent and future-ready pharmacy professionals. AI applications such as intelligent tutoring systems, virtual simulations, predictive analytics, and adaptive learning platforms support personalized and self-paced learning. These tools help pharmacy students strengthen their understanding of pharmacotherapy, drug interactions, and patient-centered care through real-time feedback and data-driven insights. AI-powered simulations and virtual patient models provide a safe environment for practicing clinical skills, enhancing problem-solving abilities, and building confidence before real-world practice. Furthermore, AI assists educators in monitoring learner performance, identifying knowledge gaps, and optimizing instructional strategies, thereby contributing to improved academic outcomes and continuous professional development. AI-based learning systems also prepare pharmacy students to adapt to emerging healthcare technologies, precision medicine, and digital health systems. Despite challenges such as ethical concerns, data privacy issues, and the need for adequate digital literacy, the effective integration of AI can significantly enhance the quality and accessibility of pharmacy education. In conclusion, Artificial Intelligence plays a vital role in advancing pharmacy education and skill development by fostering innovation, lifelong learning, and professional excellence in the digital era.

Keywords: Artificial Intelligence, Pharmacy Education, Digital Transformation, Skill Development, Professional Excellence

SSP/PP-107

Pathophysiology, Clinical Presentation, and Treatment of Psoriasis

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ABSTRACT

Psoriasis is a chronic inflammatory skin condition that affects nearly 125 million people worldwide and is linked to various health complications such as psoriatic arthritis, cardiovascular diseases, and mental health issues. The most common form is plaque psoriasis, and recent research has advanced the understanding of its causes, genetics, associated disorders, and treatment options. Plaque psoriasis is often accompanied by comorbidities including arthritis, metabolic disorders, and depression, which can greatly affect a patient's overall well-being. For individuals with mild psoriasis, treatment mainly involves topical therapies such as corticosteroids, vitamin D analogues, calcineurin inhibitors, and keratolytic agents. The American Academy of Dermatology–National Psoriasis Foundation recommends biologic drugs as a first-line therapy for moderate to severe psoriasis due to their strong effectiveness and favorable safety records. These biologics work by blocking specific immune pathways that cause inflammation, such as TNF-α inhibitors (etanercept, adalimumab, certolizumab, infliximab), IL-12/23 inhibitors (ustekinumab), IL-17 inhibitors (secukinumab, ixekizumab, bimekizumab, brodalumab), and IL-23 inhibitors (guselkumab, tildrakizumab, risankizumab, mirikizumab). Many of these are also approved for treating psoriatic arthritis. Additionally, oral medications like methotrexate, acitretin, cyclosporine, and apremilast (a phosphodiesterase-4 inhibitor) are used, along with narrowband UV-B phototherapy, the preferred light-based treatment. Overall,

psoriasis significantly impacts life quality, but modern therapies have greatly improved its management.

Keywords: Psoriasis, Chronic inflammatory skin disease, Plaque psoriasis, Comorbidities, Psoriatic arthritis, Cardiometabolic diseases

SSP/PP-108

Machine Learning Approaches for Predicting Efficacy of Traditional Herbal Drugs

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ABSTRACT

The efficacy prediction of conventional herbal medicines is relatively difficult because of complicated phytochemical profiles and lack of sufficient standardized clinical information. ML provides powerful tools to represent and model such complexity based on data-driven pattern recognitions in high-dimensional chemical and biological data. This abstract summarizes some of the vital ML techniques to predict herbal drug activity. Supervised learning techniques such as support vector machines (SVM), random forests (RF), and deep neural networks (DNN) have been utilized to classify herbal compounds and to predict therapeutic efficacy of compounds based on molecular descriptors and bioactivity profiles. Unsupervised approaches, such as clustering and dimension reduction, allow to detect inherent structure in multi-omics data, which facilitate to identify biologically meaningful features. Ensemble techniques and hybrid systems of ML and network pharmacology to assess multi-component herbal remedies by simulating the interactions of compounds, targets and illness pathways. Novel methodologies, e.g., transfer learning, are developed to cope with data scarcity. Although a number of hurdles exist such as insufficient labelled datasets and inconsistency in data quality, the herbal drug discovery can be hastened by utilizing ML-based predictive models, herbal evidence-based validation can be supported, and therapeutic choice can be optimized. The integration of various data sources and enhancement in model interpretability will boost trust in these methods.

Keywords: Herbal, ML techniques, bioactivity profiles, molecular descriptors

SSP/PP-109

Current Strategies for Brain Drug Delivery

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ABSTRACT

Brain diseases often result in severe symptoms, disability, or death, highlighting the urgent need for effective therapeutic strategies. Malignant brain tumors such as gliomas are highly progressive and lethal, while neurodegenerative diseases, including Alzheimer's and Parkinson's diseases, cause irreversible functional decline. Despite significant advances in neuroscience, current medical treatments for many brain disorders remain inadequate. A major challenge in treating cerebral diseases is the blood–brain barrier (BBB) and the blood–brain tumor barrier, which protect the brain by restricting the entry of most therapeutic agents from the bloodstream into brain tissue. To overcome these limitations, the development of efficient brain-targeted drug delivery systems (DDS) has attracted increasing attention. This review provides a comprehensive overview of recent advances in brain drug delivery strategies over the past several years. It first outlines the structure and function of the BBB under both healthy and pathological conditions, including diseases in which BBB integrity is disrupted. Strategies for enhancing drug delivery to the brain are discussed, including ligand-mediated transport, transient BBB permeabilization, nanoparticle-based and non-nanoparticle approaches, and non-invasive delivery techniques. Methods for evaluating intra brain drug distribution, which critically influences therapeutic efficacy, are also summarized. Finally, current applications of brain-targeted DDS in the treatment of brain tumors, neurodegenerative diseases, stroke, and the influence of aging on the BBB are highlighted.

Keywords: Blood–brain barrier; brain targeting; ultrasound; multicolour deep imaging

SSP/PP-110

Role of Lung Microenvironment in Designing Pulmonary Drug Delivery Systems

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ABSTRACT

Pulmonary drug delivery has gained significant attention as an effective approach for both local and systemic drug administration due to the large surface area of the lungs and rapid onset of action. Traditionally, formulation strategies have primarily focused on particle size optimization, aerosolization efficiency, device design, and carrier systems, while limited emphasis has been placed on the role of the lung microenvironment. Recent studies demonstrate that the pulmonary microenvironment is highly dynamic and undergoes substantial alterations in disease conditions such as asthma, chronic obstructive pulmonary disease, respiratory infections, and pulmonary fibrosis. Changes in mucus properties, epithelial barrier integrity, local pH, inflammatory mediators, oxidative stress, and immune responses can markedly influence drug deposition, dissolution, clearance, and therapeutic efficacy. Currently, pulmonary drug targeting is mainly achieved through inhalation using pressurized metered dose inhalers, dry powder inhalers, and intratracheal administration in experimental models. Various drug carriers, including liposomes, nano- and microparticles, cyclodextrins, micelles, and microemulsion-based systems, have been explored to enhance lung targeting and controlled drug release. Micro reservoir-type carrier systems offer advantages such as high drug loading capacity and controllable release kinetics. Integrating lung microenvironment-specific factors into formulation design may improve drug

retention, therapeutic outcomes, and consistency of clinical response, thereby advancing pulmonary drug delivery strategies.

Keywords: Pulmonary drug delivery, lung microenvironment, inhalation therapy, formulation design, pulmonary barriers, respiratory diseases

SSP/PP-111

Proton Therapy in Modern Radiation Oncology: Physical Principles, Technological Advances, and Clinical Applications

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ABSTRACT

Proton therapy represents a significant advancement in radiation oncology, providing a highly precise alternative to conventional photon-based radiotherapy. In contrast to photon beams, which deposit radiation along their entire path and irradiate both tumor and surrounding normal tissues, proton therapy employs high-energy proton beams that deliver the majority of their dose at a specific tissue depth. This unique dose-distribution characteristic, known as the Bragg peak, enables accurate tumor targeting with minimal exit dose, resulting in superior sparing of adjacent healthy tissues. Consequently, proton therapy is associated with reduced radiation-induced toxicity and improved protection of critical organs. This review outlines the fundamental physical principles underlying proton therapy, highlights key technological developments such as advanced beam delivery and treatment planning systems, and examines its expanding clinical applications. Particular emphasis is placed on pediatric malignancies, tumors of the brain and spinal cord, head and neck cancers, prostate cancer, and ocular tumors, where normal tissue preservation is of paramount importance. Clinical evidence related to tumor control, survival outcomes, and toxicity profiles is critically discussed. Although challenges such as high cost and limited global availability persist, ongoing technological innovation and growing clinical experience are expected to further strengthen the role of proton therapy in contemporary and future cancer care.

Keywords: Bragg peak, Cancer treatment, Proton therapy, Radiation oncology, Tumor targeting

SSP/PP-112

Development and *In-vitro* assessment of Topical Emulgel Containing an Antifungal Drug

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ABSTRACT

The study aimed to prepare an emulgel formulation of Luliconazole. Emulgel has emerged as a promising drug delivery system for the delivery of hydrophobic drugs. Luliconazole is an antifungal medication used for fungal infections. It belongs to a group of drugs called azole antibiotics. The oil phase of the emulsion was prepared by dissolving the drug in light liquid paraffin using Span 20. The aqueous phase is prepared by dissolving Tween 80 in purified water. The gel phase was prepared by dispersing Carbopol 940 in purified water & both phases were mixed with continuous stirring. The pH is adjusted using Triethanolamine. The prepared emulgel was evaluated for its physical properties, pH, drug content, viscosity, spreadability and swelling index. The pH of the formulation prepared with liquid paraffin was found in the range of 5 to 7.0 and the viscosity was found in the range of 1550-2259 centipoises. It was concluded that the prepared emulgel was found to be stable and effective and can be used for further studies.

Keywords: Emulgel, Hydrophobic drug, Luliconazole, Topical drug delivery

SSP/PP-113

Ethosomes and Transfersomes as Advanced Transdermal Carriers for Curcumin in Skin Cancer Therapy

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ABSTRACT

Skin cancer is one of the most prevalent malignancies worldwide, and its effective management remains a clinical challenge due to limited drug penetration, systemic toxicity, and poor patient compliance associated with conventional therapies. Curcumin, a natural polyphenolic compound derived from *Curcuma longa*, exhibits significant anticancer, anti-inflammatory, and antioxidant activities; however, its clinical application is restricted by poor aqueous solubility, low bioavailability, and limited skin permeability. Advanced vesicular drug delivery systems such as ethosomes and transfersomes have emerged as promising carriers to overcome these limitations. This review provides a comprehensive overview of ethosomes and transfersomes as novel transdermal carriers for curcumin in skin cancer therapy. Emphasis is placed on their composition, mechanism of skin penetration, formulation strategies, and optimization parameters. The physicochemical characterization, in vitro and ex vivo evaluation techniques, and stability considerations of curcumin-loaded vesicular systems are critically discussed. Comparative advantages of ethosomes and transfersomes over conventional liposomes and topical formulations are highlighted. Additionally, recent preclinical studies demonstrating enhanced transdermal delivery, improved anticancer efficacy, and reduced systemic toxicity are reviewed. Overall, ethosomes and transfersomes represent efficient and versatile transdermal platforms for curcumin delivery, offering a promising approach for localized skin cancer treatment and warranting further clinical investigation.

Keywords: Ethosomes, Transfersomes, Transdermal drug delivery, Curcumin, Skin cancer

SSP/PP-114

Herbal Mouthwashes in the Management of Gingivitis: Antibacterial Potential of Ipomoea marginata

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ABSTRACT

Gingivitis is a common inflammatory condition of the gingival tissues primarily caused by bacterial plaque accumulation. Conventional chemical mouthwashes, although effective, are often associated with adverse effects such as tooth staining, altered taste sensation, and mucosal irritation, leading to increased interest in herbal alternatives. Herbal mouthwashes formulated from medicinal plants offer a safer and biocompatible approach for long-term oral hygiene management. Ipomoea marginata, a traditionally used medicinal plant, has gained attention due to its reported antibacterial, anti-inflammatory, and antioxidant properties. This review highlights the potential role of Ipomoea marginata in the formulation of herbal mouthwashes for the management of gingivitis, with particular emphasis on its antibacterial activity against oral pathogens. Various extraction methods, phytochemical constituents, and formulation considerations relevant to mouthwash development are discussed. In vitro studies evaluating antibacterial efficacy against gingivitis-associated microorganisms are critically analyzed to establish scientific evidence supporting its therapeutic use. The review also compares herbal mouthwash formulations with conventional oral care products in terms of safety, efficacy, and patient compliance. Overall, Ipomoea marginata emerges as a promising natural antibacterial agent for gingivitis control, warranting further in vivo studies and clinical trials to validate its effectiveness and support its incorporation into standardized herbal oral care formulations.

Keywords: Herbal mouthwash, Gingivitis, Ipomoea marginata, Antibacterial activity, Oral pathogens, Medicinal plants

SSP/PP-115

Recombinant Pharmaceutical Protein Production Using Plant Expression Platforms

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ABSTRACT

Plant-based expression systems have emerged as promising platforms for the production of recombinant pharmaceutical proteins, offering a safe, scalable, and cost-effective alternative to conventional microbial and mammalian expression systems. These systems utilize whole plants, plant cell cultures, or transient expression technologies to produce a wide range of therapeutic proteins, including vaccines, antibodies, enzymes, and growth factors. The absence of human pathogens and endotoxins in plants enhances product safety, while their ability to perform post-translational modifications contributes to functional protein expression. This review discusses the major plant-based expression platforms, including stable nuclear and chloroplast transformation, transient expression using viral vectors, and plant cell suspension cultures. Key

factors influencing expression efficiency, protein yield, and downstream processing are critically analyzed. Advances in genetic engineering, promoter optimization, codon usage, and glycoengineering strategies to humanize plant-derived proteins are also highlighted. In addition, the regulatory landscape, scalability, and commercialization challenges associated with plant-made pharmaceuticals are reviewed. Recent successes in plant-derived vaccines and therapeutic proteins underscore the growing potential of these systems in meeting global healthcare demands. Overall, plant-based expression systems represent a versatile and sustainable approach for recombinant pharmaceutical protein production, with significant implications for future biopharmaceutical development.

Keywords: Recombinant pharmaceutical proteins, Molecular farming, Transgenic plants, Plant cell cultures

SSP/PP-116

Green Synthesized Metallic Nanoparticles (MNPs) Loaded into Transdermal Patches: A Non-Invasive, and Sustainable Strategy for Targeted Brest Cancer Treatment

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ABSTRACT

Breast cancer is a heterogeneous disease that originates from mammary epithelial tissues and is influenced by combination of genetic predisposition, hormonal regulation, lifestyle habits, and environmental factors, making it the most commonly diagnosed malignancy among women and major contributor to cancer related deaths worldwide. The clinical limitations of conventional chemotherapy, particularly nonspecific toxicity and reduced patient adherence, highlight the need for alternative and patient friendly therapeutic approaches. In this work, an eco-friendly and non-invasive transdermal delivery platform was developed using green-synthesized metallic nanoparticles (MNPs) for targeted breast cancer treatment. The nanoparticles were produced through environmentally sustainable synthesis routes employing natural reducing agents, yielding biocompatible particles with controlled physicochemical characteristics and anticancer performance. These nanoparticles were subsequently incorporated into polymer-based transdermal patches formulated with suitable permeation enhancers to achieve optimal flexibility, uniformity, and skin compatibility. Comprehensive characterization of fabricated patches included assessment of thickness, weight consistency, surface pH, moisture uptake, nanoparticle distribution, and mechanical integrity. In-vitro and ex-vivo permeation analyses demonstrated prolonged and regulated release behavior, attributed to nanoparticle–skin interactions and diffusion-driven transport mechanisms, resulting in improved transdermal permeation. Cell-based evaluations indicated that the nanoparticle-loaded patches exerted pronounced cytotoxic effects against breast cancer cells, particularly triple-negative subtypes, while maintaining low toxicity toward normal fibroblast cells. Compared with free drug formulations, nanoparticle-based systems exhibited lower inhibitory concentration values and superior suppression of cancer cell migration. Overall, green-engineered metallic nanoparticle-embedded transdermal patches offer promising, sustainable, and patient-compliant therapeutic

strategy for targeted breast cancer management, with strong potential for future clinical translation.

Keywords: Green synthesis, Metallic nanoparticles, Transdermal delivery, Breast cancer, Sustainable nanomedicine, Targeted therapy

SSP/PP-117

Digital Transformation in Pharmacology, Revolutionizing Drug Discovery by Nanotechnology

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ABSTRACT

Pharmacology is experiencing a transformative shift driven by the integration of advanced computational technologies, artificial intelligence, big data analytics, and nanotechnology into drug discovery and development. Traditional approaches to drug development are associated with high costs, lengthy timelines, and low success rates. The convergence of digital innovation with nanoscience is enabling faster, safer, and more precise therapeutic strategies. Nanotechnology has become a cornerstone of modern pharmacology by enabling targeted drug delivery systems, controlled drug release, and enhanced bioavailability. Advanced nanocarriers—including liposomes, polymeric nanoparticles, dendrimers, and solid lipid nanoparticles—are engineered using computer-aided design and simulation techniques to improve stability, optimize drug–carrier interactions, and enhance therapeutic performance. In-silico tools such as molecular docking, machine learning–based prediction models, and pharmacokinetic and pharmacodynamic simulations significantly streamline drug candidate selection while reducing experimental costs. Moreover, the integration of pharmacogenomic information, electronic health records, and real-world clinical data facilitates the development of personalized nanomedicine. Emerging innovations like virtual clinical trials and digital twin technologies further accelerate development timelines and improve regulatory outcomes. Overall, the synergy between digital transformation and nanotechnology is redefining pharmacology and advancing precision medicine and next-generation pharmaceutical research.

Keywords: Transformation, Pharmacology, Nanotechnology, Discovery, Personalized

SSP/PP-118

Gut–Brain Axis in Parkinson's Disease: Microbiota Dysbiosis, Neuroinflammation, and Emerging Therapeutic Targets

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ABSTRACT

Parkinson's disease (PD) is a progressive neurodegenerative disorder primarily characterized by motor impairments such as tremors, rigidity, and bradykinesia, resulting from the degeneration of dopaminergic neurons in the substantia nigra. In recent years, growing evidence has highlighted the significant role of the gut–brain axis in the pathogenesis and progression of Parkinson's disease. The gut–brain axis represents a bidirectional communication network linking the gastrointestinal system, gut microbiota, immune pathways, and the central nervous system. Alterations in gut microbial composition, known as dysbiosis, have been frequently observed in PD patients and are associated with intestinal inflammation, increased gut permeability, and systemic immune activation. These disturbances may promote the misfolding and aggregation of α-synuclein in the enteric nervous system, which can subsequently spread to the brain via the vagus nerve, contributing to neurodegeneration. Furthermore, bacterial metabolites such as lipopolysaccharides and short-chain fatty acids can trigger neuroinflammatory responses and oxidative stress, accelerating neuronal loss. Understanding the gut involvement in PD opens new therapeutic opportunities, including microbiota modulation through probiotics, dietary interventions, fecal microbiota transplantation, and anti-inflammatory strategies. Targeting the gut–brain axis may provide a promising complementary approach for the prevention and management of Parkinson's disease.

Keywords: Parkinson's Disease, Gut–Brain Axis, Neuroinflammation, α-Synuclein Aggregation Pharmacological Targets

SSP/PP-119

Virtual Laboratories and Simulation Tools in Pharmacy Learning

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ABSTRACT

Digital transformation has significantly reshaped pharmacy education, with virtual laboratories and simulation tools emerging as effective methods for enhancing learning and professional skill development. Traditional laboratory- based pharmacy education often faces challenges such as limited infrastructure, high operational cost, safety risks, and restricted students access. Virtual laboratories provide a technology-driven solution by allowing students to perform pharmaceutical experiments, visualize drug formulations. Process, and practice laboratory techniques in a safe, interactive, and repeatable virtual environment. Simulation tools, including virtual patients, clinical case scenarios, and computerized dispensing systems, support experiential and competency-based learning these tools help students develop critical skills such as clinical decision-making, problem solving, medication management, and preparedness for professional roles. Integration of virtual laboratories into pharmacy curricula promotes self-directed learning, standardization of training, and improved academic engagement studies indicates that students exposed to simulation-based learning demonstrate better knowledge retention and practical competence compared to conventional teaching methods although virtual laboratories cannot completely replace hands on laboratory experience, their integration with conventional teaching methods enhances overall learning outcomes. In conclusion virtual laboratories and simulation tools represent a progressive and effective educational strategy that

strengthens pharmacy learning and prepares research-scholars and students for future professional roles in the pharmaceutical and healthcare sectors.

Keywords: Virtual laboratories, Simulation-based learning, Pharmacy education, Digital transformation, Professional competence

SSP/PP-120

In-Silico Studies for Prediction of Drug Target, Drug Likeness and Toxicity of 1-(4- Substituted)-Phenyl Ethylidene Amino Urea Derivatives

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ABSTRACT

In-silico approaches play a crucial role in modern drug discovery by enabling early prediction of biological activity, pharmacokinetic behavior, and toxicity of drug candidates. In the present study, *in-silico* methods were employed to evaluate 1-(4-substituted)-phenyl ethylidene amino urea derivatives as potential antitubercular drug candidates. Computational target prediction approaches were used to identify probable molecular targets associated with *Mycobacterium tuberculosis*. Drug-likeness assessment was carried out using by SWISS ADME software to evaluate the suitability of the compounds for oral administration. Additionally, ADME properties were predicted to understand the pharmacokinetic behavior using by Molinspiration and SWISS ADME software of the said derivatives. Toxicity profiling was performed using PASS and ProTox 3.0 software to assess mutagenic carcinogenic and organ-specific toxicity risks. The results revealed that most of the studied derivatives exhibit favorable drug-likeness characteristics, acceptable ADME profiles, and low predicted toxicity. Several compounds demonstrated promising interactions with key mycobacterial targets, suggesting their potential role as antitubercular agents. This *in-silico* investigation provides valuable preliminary insights and supports further experimental validation and biological evaluation of 1-(4-substituted)-phenyl ethylidene amino urea derivatives for the development of new antitubercular therapies.

Keywords: *In-silico*, Target prediction, Drug-likeness, Toxicity, Anti-tubercular

SSP/PP-121

3D Printing–Enabled Healthcare Innovation in India: Present Applications and Future Directions

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ABSTRACT

In this technology-driven era, numerous contemporary hybrid applications, advancements, and intelligent utilities are changing and enhancing our lives, rendering them easier. India, having a

sizable young population, is drawn to these opportunities. Our healthcare industry is evolving with these technologies by embracing a more focused and intensive operational framework. In the healthcare industry, 3D printing is primarily used to produce prototypes or structures that can be applied in medical practice. Nonetheless, they serve various purposes in medical education and research within India. The current and future medical applications of 3D printing can be categorized into several key domains. The first FDA-approved 3D printing drug, Spritam, launched in 2015 using Zip Dose Technology, demonstraded that pharmaceutical 2D printing can meet regulatory, stability, and clinical safety standard. Since then, research has rapidly expanded across technology such as fused deposition modelling, selective laser sintering, stereolithography, binder jetting, inkjet deposition, and bioprinting. We discovered several opportunities within the healthcare sector in India and discussed them here. In conclusion, 3D printing holds significant potential for advancement in India's healthcare sector, and we aimed to emphasize these points to researchers primarily focused on Engineering as well as healthcare, fostering improved collaboration.

Keywords: 3D printing, Learning models, Tissue repair, Health care

SSP/PP-122

Artificial Intelligence–Assisted Design and Optimization of Gene Therapy–Based Liposomal Drug Delivery Systems: A Review

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ABSTRACT

Recent advances (2023–2025) in targeted liposomal drug delivery have focused on enhancing therapeutic precision in oncology and neurology through ligand-modified, stimuli-responsive, and hybrid nanocarriers. Liposomes exhibit low immunogenicity, high biocompatibility, and structural versatility, which have enabled their successful clinical application in diverse therapeutic areas. The integration of computational intelligence with experimental formulation strategies has further accelerated rational liposome design.

Machine learning (ML) tools such as LightGBM and Random Forest (RF) algorithms were employed to develop predictive models for critical formulation parameters, including liposome size, polydispersity index (PDI), zeta potential, and encapsulation efficiency. ChemDraw was used for molecular structure generation, while QSPR (Quantitative Structure–Property Relationship) modeling aided in evaluating drug suitability. ZINC database resources supported IVIVC and bioavailability profiling, and SCIEX OS software facilitated data processing and optimization in mass spectrometry-based ADME studies.

Various formulation approaches were explored to enhance drug loading capacity, including passive and active (remote) loading, lipid composition modification, cholesterol incorporation, inclusion of charged molecules, double emulsion techniques, solvent-assisted loading, proliposome methods, pH- and temperature-gradient strategies, cyclodextrin incorporation, lyophilization, and microfluidic-based preparation.

The ML prediction models demonstrated satisfactory accuracy across training, validation, test, and unknown experimental datasets, although limitations were observed due to small and biased data distributions. Feature importance analysis identified critical quality attributes (CQAs), indicating that drug molecules with logS values between −3 and −6, molecular complexity of 500–1000, and XLogP3 ≥ 2 exhibited higher encapsulation efficiency. Coarse-grained (CG) molecular modeling further elucidated drug–lipid interactions at the molecular level, explaining formulation-dependent variations.

Overall, this study highlights the potential of combining machine learning with molecular modeling as a robust framework for rational liposome formulation design, supporting future development of precision and personalized nanomedicine.

Keywords: Targeted liposomal drug delivery, Machine learning–assisted formulation, Stimuli-responsive nanocarriers, Encapsulation efficiency prediction

SSP/PP-123

Stimuli-Responsive Drug Delivery Systems: Advances for Precision and Personalized Medicine

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ABSTRACT

Stimuli-Responsive Drug Delivery Systems (SRDDS) have emerged as a transformative strategy in pharmaceutical and biomedical research, offering precise control over drug release in response to specific physiological or externally applied stimuli. These intelligent systems are engineered to respond to internal triggers such as pH gradients, redox potential, enzyme activity, and hypoxia, as well as to external stimuli such as temperature, light, ultrasound, magnetic fields, and electric signals. By enabling site-specific and on-demand drug release, SRDDS significantly enhances therapeutic efficacy while minimizing systemic toxicity and adverse effects.

Recent progress in nanotechnology, polymer chemistry, and biomaterials science has accelerated the development of advanced drug carriers such as liposomes, polymeric micelles, hydrogels, dendrimers, and multifunctional nanoparticles. These carriers exhibit dynamic physicochemical changes upon exposure to defined stimuli, allowing precise modulation of drug release profiles. Exploitation of pathological microenvironments—such as the acidic pH and elevated enzyme levels in tumour tissues—has further expanded the role of SRDDS in targeted cancer therapy, inflammatory disorders, diabetes management, and other chronic diseases. Moreover, the integration of external stimuli has enabled spatiotemporal control of drug delivery, thereby advancing precision and personalized medicine.

Despite their considerable promise, several challenges remain, including biocompatibility, immunogenicity, large-scale manufacturing, regulatory complexity, and long-term stability. Current research is increasingly focused on multifunctional and hybrid platforms capable of responding to multiple stimuli simultaneously, thereby improving targeting accuracy and therapeutic safety. This review critically examines recent advances in stimuli-responsive drug delivery systems, highlighting design principles, stimulus-specific mechanisms, biomedical applications, and existing limitations. The continued evolution of SRDDS is expected to revolutionize conventional drug administration and establish smarter, safer, and more efficient therapeutic strategies for future clinical practice.

Keywords: Stimuli-responsive drug delivery systems; Smart drug delivery; Controlled drug release; Targeted therapy; Nanotechnology; Precision medicine.

SSP/PP-124

Digital Transformation in Pharmacy Education and Practice: Advancing Pharmaceutical Learning Through Artificial Intelligence

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ABSTRACT

Digital transformation has emerged as a key driver in reshaping pharmacy education and pharmaceutical practice by integrating advanced digital technologies into conventional healthcare systems. Among these technologies, artificial intelligence (AI) plays a significant role in advancing pharmaceutical learning and improving the quality of patient-centred care. The incorporation of AI-based tools enables efficient data analysis, automation of routine pharmacy operations, and enhanced clinical decision-making. Artificial intelligence supports various pharmaceutical applications, including drug discovery, formulation optimization, pharmacovigilance, and personalized medicine. AI-driven clinical decision support systems help pharmacists in identifying drug interactions, predicting adverse drug reactions, and optimizing therapeutic outcomes. In addition, digital technologies such as electronic health records, tele pharmacy, and automated dispensing systems contribute to improved medication safety, reduced human errors, and better patient counselling services. In the field of pharmacy education, digital transformation promotes advanced learning through e-learning platforms, virtual simulations, and AI-assisted assessment tools. These innovative approaches enhance students' understanding of complex pharmaceutical concepts, strengthen problem-solving skills, and bridge the gap between theoretical knowledge and practical application. Tele pharmacy and digital health platforms also expand access to pharmaceutical services, particularly in rural and underserved areas, thereby supporting continuity of healthcare delivery. Despite the significant benefits of digital transformation, several challenges remain, including data privacy concerns, lack of interoperability among digital systems, ethical considerations, and insufficient digital skills among pharmacy professionals. Addressing these challenges requires structured training programs, supportive regulatory policies, and collaboration among academic institutions, healthcare organizations, and technology developers. Overall, the integration of artificial intelligence and digital technologies in pharmacy represents a transformative approach that enhances advanced pharmaceutical learning, improves healthcare outcomes, and redefines the evolving role of pharmacists in a technology-driven healthcare environment.

Keywords: AI in Digital Pharmacy, AI in Pharma education, Digital transformation, AI in Healthcare

SSP/PP-125

Smart Learning & Smart Care: The Digital Pharmacy Revolution

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ABSTRACT

The rapid integration of digital technologies is reshaping the landscape of pharmacy education, practice, and professional development. This transformation is driven by innovations such as artificial intelligence, big data analytics, e-learning platforms, and virtual simulations, which collectively enhance both academic learning and clinical decision-making. The present work explores how digital transformation fosters professional excellence by bridging the gap between theoretical knowledge and practical application. In pharmacy education, digital tools such as interactive learning modules, online laboratories, and virtual patient counselling platforms provide immersive experiences that strengthen conceptual understanding and skill acquisition. These innovations not only improve accessibility but also promote personalized learning, enabling students to progress at their own pace while receiving real-time feedback. From a professional standpoint, digital health records, tele-pharmacy services, and AI-driven drug information systems empower pharmacists to deliver patient-centred care with greater accuracy and efficiency. Furthermore, continuous professional development is facilitated through online training programs, webinars, and digital certification platforms, ensuring that practitioners remain updated with evolving global standards. The study emphasizes that digital transformation is not merely a technological shift but a cultural evolution in pharmacy. It encourages adaptability, lifelong learning, and interdisciplinary collaboration, ultimately advancing the quality of healthcare delivery. By embracing digital innovation, pharmacy professionals can achieve excellence in both academic and clinical domains, positioning themselves as vital contributors to the future of healthcare.

Keywords: Pharmacy education. Smart learning, Digital Pharmacy, AI in Pharmacy

SSP/PP-126

Magnetic Drug Delivery Systems for Targeted Thrombolytic Therapy: Recent Progress and Future Perspectives

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ABSTRACT

Stroke remains a leading cause of mortality and long-term disability worldwide, with thrombolytic therapy being the primary pharmacological intervention for dissolving intravascular clots. However, conventional systemic administration of thrombolytic agents requires high doses to achieve effective drug concentrations at the clot site, which significantly increases the risk of serious complications such as intracranial haemorrhage and systemic bleeding. Magnetic drug delivery systems (MDDS) have emerged as a promising approach to overcome these limitations by enabling site-specific targeting and controlled release of thrombolytic agents using externally applied magnetic fields.

Recent advances in magnetic nanoparticles and microrobot-based delivery platforms have demonstrated enhanced navigation capabilities within complex vascular environments and precise localization at thrombotic sites. These systems integrate biocompatible magnetic carriers, electromagnetic navigation technologies, and real-time imaging modalities for accurate guidance and monitoring of drug delivery. Magnetic drug delivery systems can be classified into biomimetic microrobots, bio-templated carriers, and advanced material-based magnetic platforms, each exhibiting distinct propulsion behavior, drug loading capacity, and biocompatibility characteristics. Drug loading and release strategies include physical adsorption, covalent conjugation, polymeric encapsulation, and stimuli-responsive mechanisms triggered by pH changes, enzymatic activity, temperature, or magnetic fields.

Despite notable progress, challenges such as long-term biosafety, large-scale fabrication, immune response, and precise navigation under physiological blood flow conditions remain significant barriers to clinical translation. Future research should focus on optimizing magnetic responsiveness, improving imaging-guided control systems, and establishing regulatory pathways. Magnetic drug delivery systems hold substantial potential to transform targeted thrombolytic therapy by enhancing therapeutic efficacy while minimizing systemic toxicity, thereby advancing precision medicine.

Keywords: Magnetic drug delivery systems (MDDS), Targeted thrombolytic therapy, Magnetic nanoparticles, Microrobot-based drug delivery, Image-guided navigation

SSP/PP-127

An Integrated Extraction and Molecular Docking Approach to Identify Bioactive Compounds from *Solanum torvum*.

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ABSTRACT

Solanum torvum is a medicinal plant widely used in traditional systems for the management of metabolic disorders. The present study employed an integrated strategy combining phytochemical extraction, LC–MS–based compound identification, and molecular docking analysis to identify bioactive constituents from *Solanum torvum* fruits with potential dual antidiabetic and antihyperlipidemic activity. The plant material was subjected to successive extraction using solvents of increasing polarity to obtain chemically diverse fractions, followed by preliminary phytochemical screening to assess the presence of major secondary metabolites. High-resolution LC–MS analysis was performed to profile and putatively identify phytoconstituents based on accurate mass measurements, isotopic distribution, adduct formation, and chromatographic behavior. The identified compounds were further evaluated through in silico molecular docking against key protein targets involved in glucose and lipid metabolism. Docking results revealed favorable binding affinities and stable interaction patterns with functionally important residues of the selected targets, indicating their potential role in modulating metabolic pathways. Overall, the integrated findings suggest that *Solanum torvum* contains bioactive compounds with promising dual antidiabetic and antihyperlipidemic potential. These results provide a strong computational foundation for further in vitro and in vivo investigations to validate therapeutic efficacy and support future drug development efforts.

Keywords:*Solanum torvum*; Phytochemical extraction; LC–MS analysis; Molecular docking; Antidiabetic activity; Antihyperlipidemic activity; Dual action.

SSP/PP-128

Materiovigilance in India: Strengthening Patient Safety through Systematic Monitoring and Reporting of Medical Device–Related Adverse Events

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ABSTRACT

Medical devices are the most important part of modern healthcare systems. They help with diagnosis, treatment, and follow-up care. But when bad things happen with medical devices, they are often not reported or recorded correctly, which can put patients in danger. Materiovigilance is the ongoing process of watching over, assessing, and stopping medical devices from hurting people. The Materiovigilance Programme of India (MvPI) is a big step forward for making sure that medical devices in India are safe and follow the rules. This poster gives an overview of the current state of materiovigilance in India and explains why it is important to protect patients. It discusses what MvPI does, how to report adverse events that occur in medical devices, and what healthcare professionals, manufacturers, and regulators need to do. It also discusses the key challenges, such as underreporting, unawareness, and a need for training among healthcare professionals. Integration of materiovigilance in healthcare practice helps in the early detection of possible risks associated with medical devices, helps in decision-making, and improves patient safety. To strengthen materiovigilance in India, it is necessary to create awareness and train people to report adverse events immediately.

Keywords: Materiovigilance, Medical Devices, Patient Safety, Adverse Event Reporting, Materiovigilance Programme of India (MvPI).

SSP/PP-129

Integrating Phytotherapy into Modern Rheumatoid Arthritis Management: Mechanisms, Efficacy, and Future Directions

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ABSTRACT

Rheumatoid arthritis (RA) is a long-term, systemic, autoimmune disease that can be defined as the chronic inflammation of synovial membranes, the gradual cartilage erosion, erosion of bones, resulting in the formation of a deformity and functional disability of joints. Although there have been tremendous progress in the traditional disease-modifying antirheumatic drugs (DMARDs) and the biologic therapy, adverse effects, expensive cost, and failure to cure and induce disease remission in the long term tends to restrict treatment options. Such constraints have triggered increased interests in the use of traditional herbal medicines as complementary or alternative forms of therapy to RA.

These traditional medicinal herbs have been available in centuries through systems like Ayurveda, Traditional Chinese Medicine and Unani medicine in the treatment of inflammatory

and autoimmune ailments. Recent scientific findings show that a number of herbs, such as Curcuma longa, Boswellia serrata, Withania somnifera, Zingiber officinale, and Tripterygium wilfordii have a tremendous effect on anti-inflammatory, immunomodulatory, antioxidant, and chondroprotective properties. These herbs are aimed at various pathophysiological pathways of RA, such as inhibition of pro-inflammatory cytokines (TNF-α, IL-1, 6), suppression of the nuclear factor-κB signaling and regulation of T-cell and B-cell functions, and alleviation of oxidative stress.

The preclinical research involving in vitro and animal models has persistently indicated the possibility of herbal extracts and phytoconstituents in slowing down the synovial inflammation and joint destruction. Numerically and size-limited clinical trials have indicated symptomatic and disease-activity improvement and quality of life in RA patients who took standardized herbal formulations. Nonetheless, issues of formulation standards, drug safety testing, herb-drug interaction, and approval are still critical hindrances to clinical translation.

To sum up, traditional herbs possess a bright future as a multi-target treatment method of rheumatoid arthritis. Strict mechanistic research, appropriate clinical trials, and regulated regulatory systems are necessary to determine their safety, effectiveness, and suitability to be incorporated in evidence-based RA management programs.

Keywords: Rheumatoid arthritis; Phytotherapy, Immunomodulation, Integrative Rheumatology, Pro-inflammatory Cytokines.

SSP/PP-130

Artificial Intelligence–Driven Prediction of Drug–Drug Interactions: Enhancing Medication Safety

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ABSTRACT

Drug–drug interactions (DDIs) are a major cause of adverse drug events, contributing to increased morbidity, mortality, and healthcare costs. Conventional DDI detection methods, such as clinical trials, post-marketing surveillance, and rule-based systems, are often time-consuming, limited in scalability, and inadequate for identifying rare or complex interactions. Advances in artificial intelligence (AI) provide new opportunities for improving DDI prediction and clinical risk assessment.

This study evaluates the effectiveness of AI-based models in predicting DDIs using multi-source biomedical data. Machine learning and deep learning approaches were applied to integrate heterogeneous datasets, including electronic health records, drug chemical structures, pharmacological databases, and biomedical literature. Advanced feature extraction and predictive modeling techniques were used to identify interaction patterns and estimate the likelihood and clinical relevance of potential DDIs.

AI-driven models demonstrated higher predictive accuracy and sensitivity compared to traditional rule-based systems. The models successfully detected known DDIs and predicted potential novel interactions, several of which were supported by pharmacological evidence. Additionally, AI systems efficiently handled large-scale datasets and adapted to newly available biomedical data.

AI-based DDI predictions represent a significant advancement in pharmacovigilance and medication safety. These approaches have the potential to support clinical decision-making, reduce adverse drug reactions, and improve personalized therapy. Further clinical validation and integration into healthcare systems are necessary for broader implementation.

Keywords: Drug interactions, Personalized therapy, Post marketing surveillance

SSP/PP-131

CNS Control of Memory: Brain Regions and Mechanisms Involved in Memory Consolidation

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ABSTRACT

Memory is a vital function of the central nervous system (CNS) that allows the storage, processing, and retrieval of information. The CNS controls memory through the coordinated activity of several brain regions and complex neurobiological mechanisms. Short-term memory (STM) is mainly regulated by the prefrontal cortex and hippocampus, where information is temporarily stored for seconds to minutes. In contrast, long-term memory (LTM) involves the hippocampus, cerebral cortex, amygdala, and basal ganglia, which support long-lasting storage of factual, emotional, and procedural memories.

The process of converting short-term memory into long-term memory is known as memory consolidation. This process depends on synaptic plasticity, particularly long-term potentiation (LTP), protein synthesis, and neurotransmitters such as glutamate, acting through NMDA and AMPA receptors. Several factors influence memory consolidation, including attention, repetition, emotional significance, sleep, stress levels, and neurochemical balance.

Impairment in memory formation or consolidation can lead to memory loss or ineffective transfer of short-term memory into long-term storage. Conditions such as aging, stress, sleep deprivation, neurodegenerative disorders, and damage to the hippocampus can disrupt this process. Understanding the CNS control of memory and the mechanisms involved in memory consolidation provides valuable insight into learning, memory disorders, and potential therapeutic approaches for cognitive dysfunction.

Keywords: Drug–drug interactions, NMDA, AMPA

SSP/PP-132

Therapeutic Potential of a Natural Anthraquinone Derivative Emodin in Brain-related Disorders

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ABSTRACT

Brain-related disorders are one of the world's most important and complex health problems today. These brain-related disorders are responsible for a massive number of morbidities and death all around the world. However, researchers have devoted a large amount of time to investigating these diseases and found positive results; nevertheless, there are currently quite a few medications available to treat them. Emodin (EM), a polyphenol compound, has many health benefits. It is a biologically active monomer derived from rhubarb root that exhibits anti-inflammation, anti-oxidation, anticancer, and neuroprotective properties. A series of preclinical trials have shown EM to have protective benefits against many brain-related diseases. This review has evaluated the potential of EM as a pharmacological agent for the treatment and management of various brain-related disorders based on the findings of multiple pre-clinical studies and considering the compound's therapeutic properties.

Keywords: EM, Alzheimer's disease, Parkinson's disease, Stress, Epilepsy, Depression, Cerebral ischemia, Traumatic brain injury

SSP/PP-133

Role of Gut Microbiota in the Pathogenesis and Management of IBD

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ABSTRACT

Inflammatory Bowel Disease (IBD), encompassing ulcerative colitis and Crohn's disease, is a chronic relapsing inflammatory disorder of the gastrointestinal tract with complex and multifactorial etiology. Although genetic predisposition and immune dysregulation play important roles, accumulating clinical and experimental evidence highlights the **gut microbiota** as a key factor in the pathogenesis and progression of IBD. In healthy individuals, gut microbiota contributes to intestinal homeostasis by maintaining epithelial barrier integrity, regulating immune responses, and producing beneficial metabolites such as short-chain fatty acids. In IBD patients, an imbalance in gut microbial composition, referred to as **dysbiosis**, is commonly observed. This dysbiosis is characterized by a reduction in protective commensal bacteria and an increase in pathogenic microorganisms. Such alterations result in increased intestinal permeability, enhanced translocation of luminal antigens, and activation of inflammatory signaling pathways, particularly the NF-κB pathway. Consequently, excessive production of pro-inflammatory cytokines including tumor necrosis factor-α (TNF-α), interleukin-6 (IL-6), and interleukin-1β (IL-1β) leads to sustained mucosal inflammation and tissue damage.

Based on these mechanistic insights, targeting gut microbiota has emerged as a promising pharmacological approach in IBD management. Therapeutic strategies such as probiotics, prebiotics, synbiotics, selective antibiotics like rifaximin, and fecal microbiota transplantation aim to restore microbial balance, strengthen the intestinal barrier, and attenuate inflammatory responses. Several clinical studies have demonstrated improvement in disease activity and maintenance of remission when microbiota-modulating therapies are used as adjuncts to conventional treatments. In gut microbiota plays a pivotal role in both the pathogenesis and management of IBD. Modulation of gut microbiota represents a validated, mechanism-based, and patient-friendly therapeutic strategy with potential to improve long-term outcomes in IBD.

Keywords: Inflammatory Bowel Disease, Gut Microbiota, Dysbiosis, NF-κB Pathway, Probiotics, Pharmacological Management

SSP/PP-134

Beyond Innovation: Why Some Next-Generation Drugs Fail to Outperform Established Therapies

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ABSTRACT

Next-generation drugs are often developed using advanced technologies such as targeted drug delivery and novel molecular mechanisms, with the expectation of improved therapeutic outcomes in serious and life-threatening diseases. However, several such drugs have failed to demonstrate clear clinical superiority over older, well-established medications. This study aims to explore the reasons behind the limited real-world performance of certain next-generation drugs despite successful regulatory approval.

The present work is based on a case-based review of selected drugs that were approved but later withdrawn or restricted due to safety or efficacy concerns. Notable examples include rofecoxib (Vioxx), febuxostat, and Relyvrio. These cases highlight gaps between pre-approval clinical trial outcomes and post-marketing real-world evidence. Factors such as commercially driven development priorities, limited patient diversity in clinical trials, accelerated approval pathways, and inadequate long-term safety monitoring contribute to these failures.

The findings emphasize that technological advancement alone does not guarantee better therapeutic outcomes. Robust clinical trial design, transparent data reporting, diverse patient inclusion, and strong post-marketing surveillance are essential to ensure that next-generation drugs provide meaningful clinical benefits over existing therapies. Strengthening regulatory oversight is critical to protect patient safety and promote truly effective pharmaceutical innovation.

Keywords: Next generation drugs, Post market surveillance, Efficacy gaps, Drug withdrawal

SSP/PP-135

Nanotechnology and Drug Delivery System

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ABSTRACT

In recent times, nanotechnology applications are used to the overcome potential health risks which occur during medication or therapies due to the use of large molecules size in drug delivery. It includes the poor bioavailability, in-vivo stability, poor absorption with specific targeted delivery. Nanoparticle are prepared by using nanotechnology which improve drug stability, prolonged circulation duration, facilitated tailored drug administration, reduces the adverse effects, and enhanced the therapeutic outcomes and were mitigated by nanoparticle-

based approaches to address these challenges associated with the conventional approaches. Nanotechnology technique developed some nanoscale size material that comprises of natural, synthetic, semisynthetic polymers, lipids, which facilitated the formation of various formulation approaches such as liposomes and solid lipid nanoparticle, dendrimers and metallic nanoparticles etc. Nanoparticles range size varies from 1 to 100 nm. The drug delivery employing nanoparticles has been the subject of substantial research for treating various ailments, including cancer, infectious diseases, neurological disorders, and cardiovascular diseases. Nanomedicine is the application of nanotechnology to achieve innovation in healthcare. Nanomedicine tends to focus on using the diversifying range of nanocarrier based system as nanodrugs to create highly effective drug delivery systems, which eventually mark a noteworthy progression in curing various disorder. Nanomedicine have the tendency to enable early detection as well as prevention and to drastically advanced the diagnosis, treatment and follow-up of many disorders.

Keywords: Nanotechnology, Nanoparticle, Nanomedicines, Targeted drug delivery, Health risk

SSP/PP-136

Impact of Pharmacist-Led Educational Intervention on Medication Adherence in Hemodialysis Patients

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ABSTRACT

Hemodialysis patients with end-stage renal disease face complex medication regimens requiring strict adherence to prevent complications. Non-adherence remains a significant challenge, contributing to increased morbidity, hospitalizations. Objective: This prospective interventional study aims to assess the impact of pharmacist-led educational intervention on medication adherence in hemodialysis patients at SGT Medical College, Hospital & Research Institute, Gurugram. Methods: A total of 31 adult patients undergoing maintenance hemodialysis for at least 3 months were enrolled in this study. Medication adherence was assessed using the Morisky Medication Adherence Scale (MMAS-8). Following baseline assessment, participants received individualized pharmacist-led educational interventions including counseling sessions and informational materials on proper medication use, adherence strategies. Post-intervention reassessment was conducted to evaluate changes in adherence levels. Data were analyzed using, paired t-tests, with statistical significance set at $p < 0.001$, 95% CI: -6.85 to -5.78]. This demonstrates the effectiveness of pharmacist-led education in improving medication adherence and provides evidence for implementing such interventions to optimize patient-centered care and improve outcomes in hemodialysis patients.

Keywords: Hemodialysis, Medication Adherence, Pharmacist-led Education, MMAS-8.

SSP/PP-137

Extraction, Phytochemical Analysis, and Anti-Gonorrheal Activity of Abelmoschus Esculentus Fruits

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ABSTRACT

Abelmoschus esculentus (okra) is traditionally used in Ayurvedic and Unani medicine to treat urinary tract and gonorrheal infections. Gonorrhea, caused by *Neisseria gonorrhoeae*, is a growing global health concern due to rising antimicrobial resistance. Okra fruits contain bioactive phytochemicals such as flavonoids, alkaloids, tannins, saponins, and carbohydrates, which possess antimicrobial properties. In this research work, we investigate the anti-gonorrheal activity of ethanolic fruit extracts of *Abelmoschus esculentus* against *Neisseria gonorrhoeae* MTCC 1770. Dried okra fruits were extracted with ethanol using a Soxhlet apparatus, and the extract was screened for phytochemicals. Its antibacterial activity against *Neisseria gonorrhoeae* was tested using the agar well diffusion method at concentrations of 25–100 mg/mL, with ciprofloxacin (5 µg/mL) as a positive control. Plates were incubated at 37°C for 48 hours, and zones of inhibition were recorded. Phytochemical analysis revealed alkaloids, flavonoids, saponins, tannins, and carbohydrates, and the ethanolic extract showed a dose-dependent inhibitory effect against *Neisseria gonorrhoeae*. No zone of inhibition was observed at 25 mg/mL, while zones of 6 mm, 12.45 mm, and 16.34 mm were recorded at 50, 75, and 100 mg/mL, respectively. The standard antibiotic ciprofloxacin produced a significantly higher zone of inhibition of 29.34 mm. Although the antibacterial activity of the extract was lower than standard drug, the results showed significant in vitro anti-gonorrheal potential. These findings scientifically support the traditional use of *Abelmoschus esculentus* fruits and highlight their potential as a natural source for the development of alternative anti-gonorrheal agents.

Keywords: *Abelmoschus esculentus*, *Neisseria gonorrhoeae*, Gonorrhea, Antimicrobial activity, Phytochemicals.

SSP/PP-138

Extraction, Phytochemical Investigation and Anti-Mycobacterial Evaluation of Tinospora Cordifolia

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ABSTRACT

Tinospora cordifolia is an Ayurvedic medicinal herb that has been used for centuries to cure a variety of illnesses and has played a major role in Indian systems of medicine. The Menispermaceae family of *Tinospora* species contains a variety of bioactive principles used for

plant nutraceuticals. *Tinospora cordifolia* contains several phytochemicals, including berberine, tembeterine, cordifoliside, choline, magnoflorine, beta- sitosterol, tinosporide, isocolumbine, furanolactone and many more. This plant is traditionally used for the treatment of various diseases such as immunomodulation, anticancer, hepatoprotective, cardiac diseases, dysentery, helminthiasis, skin diseases, leprosy, tuberculosis, and many more. In this research work, we investigate the activity of *Tinospora cordifolia against Mycobacterium tuberculosis* and *Mycobacterium smegmatis*. The extract was prepared from the stem part of *Tinospora cordifolia*. The fresh extract was subjected to qualitative analysis, and its anti-tubercular and anti-leprotic activities were evaluated using the well diffusion method against *Mycobacterium tuberculosis* H37Rv (MTCC 300) and *Mycobacterium smegmatis* on Middlebrook 7H10 agar, with DMSO used as the solvent control. The bioactive compounds responsible for antimycobacterial activity, including flavonoids, alkaloids, and tannins, were identified and analyzed using phytochemical screening. The sample displayed significant activity against *Mycobacterium* species, although the activity was lower than that of the positive controls (rifampicin and dapsone). The results showed that the zone of inhibition for the test sample (100 µg/mL) was 17.66 mm against *Mycobacterium tuberculosis* H37Rv *and* 20.44mm against *Mycobacterium smegmatis. W*hile the positive control (5µg/mL) showed a zone of inhibition of 26.48 mm against *Mycobacterium tuberculosis* H37Rv and 32.08mm against *Mycobacterium smegmatis.*

Keywords: Tinospora cordifolia, Mycobacterium Tuberculosis H37Rv, *Mycobacterium smegmatis.*

SSP/PP-139

Digital Pharmacies in India: Regulatory Gaps and Patient Safety Concerns

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ABSTRACT

Digital pharmacies, or e-pharmacies, have rapidly expanded in India, particularly after the COVID-19 pandemic, offering doorstep delivery of medicines and improved accessibility. While these platforms enhance patient convenience, growing concerns have emerged regarding regulatory compliance, workforce competency, and medication safety. This study aims to examine key operational challenges in digital pharmacies and their potential impact on patient safety in India.

This work is a case-study–based review, drawing on published literature, regulatory reports, and documented cases related to Indian e-pharmacies. The analysis reveals that inadequate regulatory enforcement, limited involvement of qualified pharmacists, and the use of untrained or non-pharmacy personnel in dispensing processes contribute to prescription bypassing, unauthorized drug sales, and the circulation of substandard or counterfeit medicines. Case reports involving counterfeit insulin, substandard inhalers, and antibiotics with undeclared additives highlight significant gaps in prescription verification and supply-chain oversight. In addition, the absence of effective grievance redressal mechanisms further increases patient risk.

The study highlights that technological advancement alone cannot ensure safe pharmaceutical practice. Mandatory registration with regulatory authorities, digital prescription validation, pharmacist-led dispensing, and enhanced traceability measures such as 2D barcoding and blockchain integration are essential to safeguard patient health. Strengthening regulatory

frameworks and enforcement mechanisms is critical for the safe and sustainable growth of digital pharmacies in India

Keywords: 2D barcoding, Digital pharmacy, Blockchain integration, Counterfeit medicines, E-pharmacies.

SSP/PP-140

Unnoticed Color Adulteration in Milk-Based Sweets: A Spectrophotometric Study of Synthetic Food Dyes

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ABSTRACT

The increasing use of synthetic food colorants to enhance the visual appeal of confectionery products has raised concerns regarding food safety and regulatory compliance. Milk-based sweets are particularly vulnerable to color adulteration due to their high demand and largely unregulated production. This study aimed to assess the extent of synthetic colorant adulteration in locally available milk-based sweets and to compare the analytical efficiency of conventional spectrophotometry and UV–Visible spectrophotometry. A total of forty visually coloured milk-based sweet samples were randomly collected from local confectionery outlets and analyzed in duplicate. Synthetic colorants were extracted using centrifugation followed by double filtration. Standard solutions of tartrazine, sunset yellow, and fast green FCF were prepared at known concentrations, and calibration curves were constructed. Quantitative analysis was performed using a normal spectrophotometer and further validated using a UV–Visible spectrophotometer at wavelengths of 425 nm, 482 nm, and 625 nm, respectively.

The findings revealed excessive use of tartrazine in several samples, with a mean concentration of 517 mg/kg, exceeding permissible limits. UV–Visible spectrophotometry demonstrated superior sensitivity and accuracy, particularly for turbid extracts. In contrast, sunset yellow and fast green FCF were detected within acceptable limits. The study highlights the unnoticed prevalence of synthetic color adulteration in milk-based sweets and emphasizes the need for routine monitoring. UV–Visible spectrophotometry proves to be a reliable and cost-effective tool for ensuring food safety.

Keywords: Synthetic food colorants; Food adulteration; Tartrazine; Milk-based sweets; UV–Visible spectrophotometry; Food safety

SSP/PP-141

Role of the Global Benchmarking Tool in Strengthening Drug Regulatory Systems

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ABSTRACT

Effective and robust drug regulatory systems are fundamental to ensuring the safety, quality, and efficacy of medical products and safeguarding public health. In many low- and middle-income countries, regulatory authorities face challenges related to limited resources, fragmented governance, and inadequate technical capacity. The World Health Organization's Global Benchmarking Tool (GBT) has emerged as a standardized and comprehensive framework for evaluating and strengthening national regulatory systems.

This paper examines the role of the Global Benchmarking Tool in enhancing regulatory performance through systematic assessment, capacity building, and continuous improvement. The GBT evaluates regulatory functions across key domains, including marketing authorization, pharmacovigilance, clinical trial oversight, inspection, laboratory testing, and regulatory governance. By assigning maturity levels, the tool enables authorities to identify gaps, prioritize interventions, and develop institutional development plans.

The study highlights how implementation of the GBT promotes transparency, accountability, and harmonization with international regulatory standards. Evidence from regulatory reforms demonstrates that GBT-guided interventions contribute to improved compliance, risk-based regulation, and strengthened quality management systems. Furthermore, the tool facilitates regulatory reliance and recognition mechanisms, fostering regional and global collaboration.

The findings suggest that effective utilization of the GBT supports sustainable regulatory strengthening and enhances public confidence in healthcare systems. Adoption of the GBT framework can accelerate progress toward achieving WHO-listed authority status and improve access to safe, effective, and affordable medicines. The paper concludes that the Global Benchmarking Tool is a critical instrument for regulatory capacity development and should be integrated into national health and pharmaceutical policies.

Keywords: Global Benchmarking Tool, Drug Regulation, Regulatory Systems, WHO, Capacity Building, Public Health

SSP/PP-142

Effect of Digital Intervention on Medication Adherence in Diabetic Patients with Comorbidities

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ABSTRACT

Background: Medication adherence is essential for achieving optimal therapeutic outcomes in diabetes mellitus, especially in patients with comorbid conditions. Poor adherence increases the risk of complication, hospitalization and health care burden. Digital educational interventions have gained importance as effective tools to improve patients' understanding and long-term

medication adherence. The study evaluated effect of digital intervention on medication adherence in patients with type 2 diabetes mellitus with comorbidities.
Method: A prospective interventional study was conducted among 50 adult diabetic inpatients with at least one comorbidity attending SGT hospital, Haryana. Ethical clearance was obtained from IEC, registered by DHR according to GCP guidelines. Demographic characteristics of patients was obtained. Baseline medication adherence was assessed using the Morisky Medication Adherence Scale (MMAS-8). Digital educational intervention included mobile based educational videos, text messages, phone calls and medication reminder alerts. Post-intervention adherence was assessed after 1 month using the same tool and changes were analyzed. Paired *t*-test was used ($p < 0.05$ considered significant).
Results: 62% patients were males. Hypertension was the most common comorbidity (50%). 28% of patients belonged to rural area. The most common cause of low adherence was forgetfulness followed by lack of knowledge. Marked improvement in medication adherence was observed following the digital education intervention. The proportion of patients with poor adherence decreased from 60% to 10% while moderate adherence increased from 10% to 50%.
Conclusion: Digital educational intervention is an effective tool in improving medication adherence among diabetes patients with comorbidities. Integrating digital health education into routine clinical practice can enhance treatment outcomes and promote long-term disease management.
Keywords: Digital Technology, Educational Intervention, Type 2 Diabetes Mellitus, Morisky Scale, Adherence

SSP/PP-143

Development and In-Vitro Evaluation of Miconazole Nitrate for Antifungal Therapy

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ABSTRACT

Fungal infections of the skin are among the most common infectious conditions affecting people worldwide and require effective topical treatment for proper management. Miconazole nitrate is a well-known imidazole antifungal agent that exhibits broad-spectrum activity against dermatophytes, yeasts, and other pathogenic fungi.The present study focuses on the development and in-vitro evaluation of a topical formulation containing miconazole nitrate intended for antifungal therapy.

In this study, miconazole nitrate was formulated into a suitable topical dosage form using appropriate pharmaceutical excipients to ensure uniform drug distribution, stability, and patient acceptability. The prepared formulation was evaluated for various physicochemical parameters such as appearance, pH, viscosity, spreadability, and drug content uniformity to ensure its quality and consistency. In-vitro drug release studies were carried out using a suitable diffusion method to assess the release profile of miconazole nitrate from the formulation. The antifungal activity of the developed formulation was also evaluated in-vitro against selected fungal strains to confirm its therapeutic effectiveness.

The results of the study demonstrated that the formulated preparation showed acceptable physicochemical properties and uniform drug content. In-vitro release studies indicated a satisfactory and controlled release pattern of miconazole nitrate. The antifungal evaluation confirmed significant inhibitory activity against fungal organisms, indicating the effectiveness of the developed formulation.

Overall, the study concludes that the developed miconazole nitrate formulation is suitable for topical antifungal therapy and may provide effective treatment for fungal infections. Further in-vivo studies are recommended to establish its clinical efficacy and safety.

Keywords: Miconazole nitrate; Antifungal formulation, In-vitro study, Topical delivery

SSP/PP-144

Marine Natural Products as Emerging Alternatives to Terrestrial Drugs in Cancer Management

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ABSTRACT

For decades, the terrestrial biosphere specifically higher plants and soil dwelling microorganism has been playing a huge role for natural product-based oncology, by yielding landmarks drugs such as Texans and vinca alkaloids. However, the rise of Multi Drug Resistance (MDR) and the exhaustion of terrestrial chemical platform have prompted a strategic shift towards marine pharmacology.

This review provides a comparative evaluation of the cytotoxic potential and pharmacological profiles of marine derived versus terrestrial derived compounds.

If we compared terrestrial flora, which is primarily utilize physical and basic metabolic defenses to marine invertebrates which is Porifera, Cnidria have evolved highly potent, and structurally complex secondary metabolites to survive in hyper-competitive, sessile environment. By this we analyze how these unique marine architectures such as macrocyclic polyether and discodermolides distinct mechanism of action that differs from traditional terrestrial tubulin stabilizing agents.

Our analysis suggests that while terrestrial drugs that remain the current clinical gold standard, marine-derives metabolites provide a superior chemical space for overcoming existing therapeutics. These abstract highlights the necessity of integrating marine bioprospecting with advanced synthetic biology to catalyze the next generation of precision anti-cancer therapeutics

Keywords: Oncology, Marine natural products, Terrestrial metabolites, Drug discovery, Cytotoxicity, Multi-drug Resistance (MDR)

SSP/PP-145

Synergistic Antidiabetic Potential of a Polyherbal Formulation of Aerva Lanata and Acmella Oleracea

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Diabetes mellitus is a multi-factorial metabolic disorder that often requires a combination of therapeutic agents for effective management. This study was designed to investigate the synergistic antidiabetic efficacy of a polyherbal formulation (PHF) consisting of hydro-ethanolic extracts of Aerva lanata and Acmella oleracea in Alloxan-induced diabetic Wistar rats. The PHF was developed by combining the extracts in a 1:1 ratio, aiming to utilize the diverse secondary metabolites—alkaloids and flavonoids from A. lanata and spilanthol from A. oleracea.
Diabetes was induced via a single intraperitoneal injection of Alloxan monohydrate (150 mg/kg). The rats were treated orally with PHF at doses of 200 and 400 mg/kg for a period of 21 days, with Glibenclamide (5 mg/kg) serving as the reference standard. Experimental outcomes demonstrated a significant ($p < 0.01$) dose-dependent reduction in fasting blood glucose levels and a substantial restoration of body weight in the PHF-treated groups. Furthermore, the formulation significantly attenuated diabetic dyslipidemia by reducing total cholesterol, triglycerides, and LDL, while simultaneously increasing HDL levels. Biochemical analysis of pancreatic tissue revealed a marked increase in endogenous antioxidants (SOD, CAT, and GSH) and a reduction in lipid peroxidation (MDA). Histopathological studies confirmed the protective and regenerative effects of the PHF on the Islets of Langerhans. These findings suggest that the combination of A. lanata and A. oleracea exerts a potent synergistic effect, offering a promising, multi-target natural therapeutic strategy for diabetes management and its associated oxidative complications.
Keywords: Aerva lanata, Acmella oleracea, Polyherbal Formulation, Synergism, Alloxan, Antidiabetic activity.

SSP/PP-146

Importance of 3D Printing in Pharmacy

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ABSTRACT

In the healthcare industry, 3D printing is primarily used to produce prototypes or structures that can be applied in medical practice. Nonetheless, they serve various purposes in medical education and research within India. The current and future medical applications of 3D printing can be categorized into several key domains. The first FDA-approved 3D printing drug, Spritam, launched in 2015 using Zip Dose Technology, demonstraded that pharmaceutical 2D printing can meet regulatory, stability, and clinical safety standard. Since then, research has rapidly expanded across technology such as fused deposition modelling, selective laser sintering, stereolithography, binder jetting, inkjet deposition, and bioprinting. We discovered several opportunities within the healthcare sector in India and discussed them here. In conclusion, 3D printing holds significant potential for advancement in India's healthcare sector, and we aimed to emphasize these points to researchers primarily focused on Engineering as well as healthcare, fostering improved collaboration.

The application of 3D printing in pharmacy include personalized medicines, polypills, orodispersible tablets, controlled release system, drug eluting implants microneedles, transdermal system, pediatric friendly formulation, and bioprinting tissue for research furthermore, 3D printing support on demand manufacturing in in hospitals, reducing storage burden and enabling rapid preparation of patient specific doses.

Keywords: 3D printing; Learning models; Tissue repair; Health care.

SSP/PP-147

AI-Based Approaches for Adverse Drug Reaction Monitoring

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ABSTRACT

Adverse Drug Reactions (ADRs) are a major global health concern, leading to increased morbidity, mortality, and healthcare costs. Traditional pharmacovigilance systems relying on spontaneous reporting often suffer from under-reporting, delayed signal detection, and limited capacity to manage large volumes of complex healthcare data. To address these challenges, artificial intelligence (AI), including machine learning (ML), deep learning (DL), and natural language processing (NLP), has emerged as a transformative approach for ADR detection and pharmacovigilance. AI-driven methods enhance the capability to analyse structured data (e.g., electronic health records) and unstructured sources (e.g., clinical notes and social media) more accurately and efficiently than conventional statistical methods. For instance, deep learning frameworks have shown improved detection performance compared to traditional models, while NLP techniques facilitate extraction of adverse event information from clinical text with higher precision. Systematic reviews indicate that ML models can achieve clinically meaningful sensitivity and specificity in ADR prediction when properly validated. Despite promising results, challenges remain related to data quality, model interpretability, and regulatory integration. Nevertheless, AI's ability to automate signal detection, uncover hidden patterns, and support real-time pharmacovigilance has the potential to significantly improve drug safety monitoring and patient outcomes.

Keywords: Adverse Drug Reactions (ADRs), Artificial Intelligence, Pharmacovigilance, Deep Learning.

SSP/PP-148

Formulation and Evaluation of Bigel Containing Black Glutinous Rice Extract for Topical Application

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ABSTRACT

The present study was aimed to formulate and evaluate a stable bigel containing Black Glutinous Rice (Oryza sativa L. var. glutinosa) extract for topical application. Black glutinous rice is rich in anthocyanins, phenolic compounds, and flavonoids, which possess significant antioxidant and skin-protective properties. The bigel was prepared by combining Carbopol 940 hydrogel and beeswax-olive oil oleogel in a 60:40 ratio using a simple mixing method. The prepared formulation was evaluated for pH (5.4), viscosity (45,000 cP), spreadability (6.9 cm), and stability, all of which were within acceptable limits for dermatological use. Antioxidant activity was assessed by DPPH radical scavenging assay, which confirmed the strong free radical inhibition potential of the extract. The bigel showed good homogeneity, smooth texture, and ease of spreadability without phase separation. The results indicated that the formulation was physically stable and suitable for skin application. Hence, black glutinous rice-based bigel can serve as an effective antioxidant topical formulation with potential applications in cosmetic and dermatological preparations.

Keywords: Bigel, Black Glutinous Rice, Antioxidant, Topical Formulation, Carbopol 940, DPPH Assay

SSP/PP-149

Nano-Ethosomal Gel: A Novel Carrier System for Enhanced Topical Drug Delivery

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ABSTRACT

Topical drug delivery faces significant barriers, including limited skin permeation due to the stratum corneum's lipid bilayer structure, resulting in poor bioavailability and suboptimal therapeutic outcomes. Nanoethasomes, ultradeformable vesicular carriers composed of phospholipids, ethanol, and edge activators like surfactants, emerge as a promising innovation to overcome these challenges. This study introduces nanoethasomal gel (nanoethasomal GEO) as a novel carrier system engineered for enhanced topical drug delivery. Nanoethasomes were formulated via the thin-film hydration method, optimized for size (<200 nm), entrapment efficiency (>80%), and elasticity using Box-Behnken design. Incorporation into a gel matrix (GEO) via high-shear mixing ensured mucoadhesive properties, prolonged release, and shear-thinning rheology ideal for skin application. In vitro skin permeation studies using Franz diffusion cells on rat skin demonstrated a 4.5-fold increase in drug flux compared to conventional liposomes or hydrogels, attributed to ethanol-induced lipid fluidity and nanoethasomes' ability to squeeze through corneocyte gaps without disrupting skin integrity.Ex vivo fluorescence microscopy confirmed deeper dermal penetration, while in vivo pharmacokinetic evaluation in Wistar rats revealed sustained plasma levels and reduced systemic toxicity. Stability assessments (4°C/25°C) showed minimal aggregation over 90 days. Nanoethasomal GEO thus represents a versatile, biocompatible platform for delivering hydrophobic drugs like antifungals, anti-inflammatories, or anticancer agents transdermally, with potential applications in dermatology and oncology.

Keywords: Nanoethasomes, Skin application

SSP/PP-150

Digital Transformation in Pharmacy: Advancing Healthcare Through Artificial Intelligence

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ABSTRACT

The digital transformation of pharmacy is rapidly redefining healthcare delivery, education, and pharmaceutical research. Among emerging digital technologies, Artificial Intelligence (AI) plays a pivotal role in enhancing accuracy, efficiency, and personalization across pharmacy practices. This poster highlights the growing impact of AI as a transformative tool in modern pharmacy and its contribution to professional excellence.

AI-driven technologies enable advanced data analysis by integrating electronic health records, clinical data, and real-time patient information. These systems support early disease prediction, improved diagnostic accuracy, and individualized drug therapy. In pharmacy practice, AI assists in medication therapy management by identifying potential drug–drug interactions, predicting adverse drug reactions, and optimizing dosage regimens. Such applications improve patient safety and therapeutic outcomes, especially in chronic disease management.

Digital transformation also influences pharmaceutical research and development. Machine learning models accelerate drug discovery by predicting drug-target interactions and reducing time and cost involved in preclinical studies. Additionally, AI-based tools strengthen pharmacovigilance and regulatory processes through continuous monitoring of drug safety data.

In pharmacy education, digital platforms and AI-supported learning tools enhance knowledge acquisition, clinical decision-making skills, and research exposure. However, challenges such as data privacy concerns, ethical issues, lack of standardized regulations, and the need for skilled professionals must be addressed for successful implementation.

Overall, the integration of AI within pharmacy represents a significant advancement toward patient-centered care, improved research efficiency, and professional development. Embracing digital transformation is essential for advancing pharmacy practice and meeting the evolving demands of the healthcare system.

Keywords: Digital Transformation, Artificial Intelligence, Pharmacy Practice, Healthcare Innovation, Personalized Medicine

SSP/PP-151

Aquasomes in Drug Delivery System: An Overview

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ABSTRACT

Aquasomes represent a sophisticated class of multicomponent particulate delivery system that leverage the unique structural properties of ceramic cores coated with carbohydrate film. Unlike traditional lipid-based carriers, Aquasomes are "three- layered" nano system designed

specifically to protect and deliver fragile biologically active molecules, such as peptides, proteins, and antigens. The architecture consists of a central solid crystalline core (typically calcium phosphate or hydroxyapatite), a polyhydroxy oligomer coating (such as cellobiose or trehalose), and the absorbed therapeutic agent. The carbohydrate coating acts as a "dehydration protectant", maintaining the structural integrity and conformational stability of the drug by mimicking the aqueous environment. This prevents the denaturing that often occurs when proteins are exposed to harsh delivery environments. It protects the drug's 3D structure ensuring it stays active and effective inside the body. The literature explores the synthesis of Aquasomes through methods like colloidal precipitation and sonication (core fabrication), sonication (core coating), lyophilization (drug loading) their physicochemical characterization, and their diverse application in vaccine delivery and oxygen transport. By maintaining the bioactivity of sensitive molecules and providing a high degree of surface stability, aquasomes offer a promising solution to the challenge of modern biopharmaceutical delivery. The following discussion highlights recent advancements in their formulation and the potential for targeted therapy in the evolving landscape of nanomedicine.

Keywords: Aquasomes, Nanoparticulate Delivery System, Ceramic nanoparticles, Drug delivery system, polyhydroxy oligomers

SSP/PP-152

Do Drug Really Expires?

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ABSTRACT

Medicines are commonly discarded once they reach their labelled expiration date, mainly due to safety concerns and regulatory caution. However, growing scientific evidence suggests that many medicines retain substantial potency and chemical stability beyond their stated expiry when stored under recommended conditions. This poster examines the scientific basis of pharmaceutical expiry dating, regulatory principles guiding shelf-life assignment, and real-world stability observations, with particular emphasis on data from programs such as the U.S. Shelf-Life Extension Program (SLEP). Available evidence indicates that although therapeutic potency may gradually decline over time, acute toxicity from most expired medicines is uncommon. The degree of degradation depends on drug class, dosage form, environmental exposure, and packaging integrity. Special caution is required for medicines known to form harmful degradation products, such as tetracyclines, or those showing visible physical instability. This work highlights the urgent need for India to develop stability databases and structured medicine disposal policies to reduce pharmaceutical waste and economic burden. The findings suggest that expiration dates primarily indicate assured potency rather than an absolute safety cutoff. However, unsupervised use of expired medicines is discouraged. Overall, this poster supports evidence-based decision-making in medicine storage practices, regulatory policy development, and public health awareness.

Keywords: Drug stability; Expiry date; Shelf-life Extension; Pharmaceutical degradation

SSP/PP-153

Mouth Gargles: The Impact of Gargling on Respiratory Infections

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ABSTRACT

Mouth Gargle (also called mouthwashes) are commonly used in oral hygiene to decrease microbial rate, manage gum inflammation, protect from infection, and at mass level reduce viral transmission. This review examines the type of curative agent used in gargles, their mode of action, clinical efficacy for both bacterial and viral settings, safety issues, and knowledge gaps. The drugs include chlorhexidine, povidone-iodine, cetyl pyridinium chloride (CPC), hydrogen peroxide, herbal/herbal- based and propolis mouthwashes. Unplanned clinical trial show that 0.12% chlorhexidine gargle significantly lowers salivary SARS-Co V- 2 viral load for 60 minutes similarly, povidone -iodine, hydrogen peroxide, and CPC promise in short-term vir al load against plaque and inflammation in gum, sometimes comparable to chlorhexidine with less side effects. However, many studies have drawbacks like small sample sizes, short durations, risk of bias and long-term safety data is inadequate. Future work should address optimal concentrations, the effect on the oral microbiome, patient acceptability and cost- effectiveness. The gargling agents reviewed in this article have proven efficacy in reducing either bacterial or viral or both respiratory infections. The challenges facing this target were examined for 7 reagents found in commercially available mouth rinses and listed on the ClinicalTrials.gov website: povidone-iodine, chlorhexidine, hydrogen peroxide, cyclodextrin, Citrox, cetylpyridinium chloride, and essential oils. Because SARS-CoV- 2 is an enveloped virus, many reagents target the outer lipid membrane. This critical review indicates that current knowledge of these reagents would likely improve trends in salivary viral load status.

Keywords: Mouth Gargle, Mouthwash, Chlorhexidine, Propolis, SARS-CoV- 2, Gingivitis, Oral hygiene

SSP/PP-154

Rh-D Isoimmunization: A Persisting yet Preventable Threat to Maternal and Neonatal Health

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ABSTRACT

Rhesus (Rh) blood group system specifically Rh-D antigen is also a clinically important factor in pregnancy based on its involvement with Rh incompatibility. Rh-D isoimmunization is described when an Rh-negative woman becomes sensitized to Rh-positive fetal red cells and produces its own maternal anti-D IgG antibodies. The subsequent hemolytic disease of the fetus and newborn (HDFN) caused by these antibodies can lead to fetal anemia, hyperbilirubinemia, hydrops fetalis and increased perinatal morbidity/mortality. Although there have been

improvements in the antenatal care, Rh-D alloimmunization is still a preventable cause of perinatal morbidity and mortality.
The incidence of Rh negative pregnancy in India varies between 3.0 and 5.7% which highlights the importance of these feasible screening program and preventive programme.pickle: in the war for talent, can one company, or industry,. It can occur during labour, antepartum haemorrhage, invasive obstetric procedures or occult fetomaternal haemorrhage. The incidence of Rh-D isoimmunization has been dramatically lowered with the introduction anti-D immunoglobulin prophylaxis but still occurs secondary to lack of awareness, delay or failure to execute prophylactic protocols. This study emphasizes the need for early detection of Rh-negative pregnancies, administration of anti-D immunoglobulin ahead of time and long-term monitoring to reduce maternal sensitization and enhance fetal and neonatal outcomes.
Keywords: Rh-D isoimmunization, Rh-negative pregnancy, Anti-D immunoglobulin, Hemolytic disease of the fetus and newborn (HDFN), Antenatal screening

SSP/PP-155

Nanoemulsion-Based Drug Delivery Systems: Formulation Approaches, Evaluation, and Therapeutic Applications

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ABSTRACT

Nanoemulsions are thermodynamically stable, nanosized colloidal systems composed of oil, water, surfactant and co-surfactant, with droplet sizes typically below 200 nm. Due to their small globule size and high interfacial surface area, nanoemulsions have emerged as an effective drug delivery platform for improving the solubility, stability and bioavailability of poorly water-soluble drugs. The formulation of nanoemulsions requires careful selection of oils and surfactants to achieve ultra-low interfacial tension and long-term physical stability.
Nanoemulsions can be prepared using high-energy techniques such as high-pressure homogenization and ultrasonication, as well as low-energy methods including phase inversion and spontaneous emulsification.
Comprehensive characterization plays a crucial role in evaluating formulation performance and includes droplet size distribution, polydispersity index, zeta potential, drug content, in vitro drug release and morphological analysis using transmission electron microscopy. Owing to their nanoscale droplet size, nanoemulsions show enhanced resistance to physical instability phenomena such as creaming and sedimentation, although Ostwald ripening remains a key challenge.
Nanoemulsion-based drug delivery systems have been widely explored for various routes of administration including oral, topical, parenteral, ocular and pulmonary delivery. Recent advancements highlight their potential in targeted drug delivery, cancer therapy, vaccine development and cosmetic applications. Despite limitations related to surfactant concentration and safety concerns, nanoemulsions represent a promising and versatile pharmaceutical approach capable of enhancing therapeutic efficacy and enabling the development of challenging drug molecules.

Keywords: Nanoemulsion; Drug delivery system; Bioavailability enhancement; Nanotechnology; Pharmaceutical applications

SSP/PP-156

In Silico Prediction of Hepatotoxicity in Novel NSAID Derivatives: A Machine Learning Approach to Digital Drug Safety

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ABSTRACT

Non-Steroidal Anti Inflammatory Drugs (NSAIDs) remain among the most widely prescribed medications globally, yet their clinical utility is often limited by idiosyncratic drug induced liver injury (DILI). In alignment with the digital transformation of pharmaceutical sciences, this study employs computational modeling to predict the hepatotoxic risk of novel NSAID derivatives before laboratory synthesis. By shifting from traditional trial-and-error methods to predictive digital analytics, we aim to improve safety profiles in drug design. A library of 500 NSAID-related chemical structures was analysed using quantitative structure activity relationship (QSAR) models and Random Forest algorithms. The digital screening focused on identifying structural alerts such as carboxylic acid groups and halogenated aromatic rings frequently associated with mitochondrial dysfunction and oxidative stress in hepatocytes. The predictive model achieved a sensitivity of 84% in distinguishing between hepatotoxic and non-toxic analogs.

The results demonstrate that in silico profiling can effectively filter out high-risk candidates during the lead optimization phase. This digital approach not only reduces the reliance on animal models but also provides a rapid, cost-effective framework for developing safer analgesics. This research highlights how integrating computational intelligence into pharmacology is essential for the future of safe and effective drug discovery.

Keywords: NSAIDs, Hepatotoxicity, In Silico, Machine Learning, Computational Pharmacology.

SSP/PP-157

Metabolic Syndrome at the Crossroads of Stress, Sleep, and Mental Health: A Digitally Enabled Pharmacy Perspective

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ABSTRACT

Background: Metabolic syndrome (MetS) is an emerging worldwide health challenge characterised by lifestyle and cardiometabolic risk factors. New evidence shows that chronic

stress, sleep disturbances and mental health disorders are interrelated and under-explored factors in the pathogenesis and progression of MetS. Although the triad is increasingly being recognised, there is currently little integrated assessment and management of it in routine pharmacy and clinical practice.
Objective: This review aims to critically evaluate the bidirectional relationships among metabolic syndrome, psychological stress, sleep disturbances, and mental health disorders, and to explore how pharmacy digital transformation could facilitate early identification, risk stratification, and personalised intervention strategies.
Methods: We performed a narrative review of published literature via electronic databases that include PubMed, Scopus and Google Scholar. A review of studies covering stress physiology, sleep dysregulation, mental health disorders and metabolic implications was made. Particular attention was paid to the use of digital health tools (e.g., wearable health devices, mobile health apps, AI-based analytics and pharmacist-led digital interventions).
Results:
There is evidence indicating that hypothalamic–pituitary–adrenal axis dysregulation, circadian rhythm disruption and neuroinflammatory pathways form a shared biological framework linking stress, sleep impairment, depression, anxiety, and MetS. Digital tools have led to new avenues for continuous monitoring of sleep, stress biomarkers, medication adherence and lifestyle behaviours. Through digital competences, it is the domain of pharmacists that they can take up such data (and other data) for both preventive and therapeutic decision making, and that is where they may be the most ready to use it appropriately.
Conclusion:
By putting metabolic syndrome at the intersection of stress, sleep and mental health, its location in the triad of stress, sleep and mental health positions digitally enabled, multidisciplinary pharmacy-led models of care. Utilisation of the digital transformation will contribute to the improvements in the quality of clinical learning, excellence, and a focus on the patient's optimal outcomes to enable future new research and practice in pharmaceutical sciences.
Keywords: Metabolic syndrome; Stress; Sleep disturbances; Mental health; Digital pharmacy; Wearable technology

SSP/PP-158

Protective Effects of Capparis Species Against Hyperlipidemia

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ABSTRACT

The Capparis genus is traditionally recognized for its therapeutic relevance in lipid metabolic disorders. This study investigates the phytochemical profile and preliminary antihyperlipidemic relevance of selected Capparis species. Authenticated flowers of Capparis genus species were subjected to successive solvent extraction using hexane and ethanol. Preliminary phytochemical screening demonstrated that hexane extracts were enriched with non-polar constituents such as terpenoids, steroids, and fixed oils, whereas ethanolic extracts contained a broad spectrum of polar bioactive metabolites including flavonoids, phenolics, tannins, saponins, alkaloids, and glycosides. The marked abundance of flavonoids and phenolic compounds in ethanolic extracts indicates a strong association with antioxidant potential and lipid-lowering mechanisms. Acute oral toxicity evaluation conducted according to OECD guideline 420 revealed no signs of

toxicity up to 5000 mg/kg body weight, establishing 500 mg/kg as a safe dose for further pharmacological investigations. Overall, the findings highlight Capparis genus plants as antihyperlipidemic candidates.

Keywords: Capparis genus; Antihyperlipidemic activity; Phytochemical screening; Flavonoids; Phenolic compounds; Acute toxicity.

SSP/PP-159

Artificial Intelligence as a Catalyst for Innovation in Pharmacy and Pharmaceutical Care

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ABSTRACT

Artificial Intelligence (AI) is catalysing a profound revolution in pharmacy and pharmaceutical sciences, harnessing machine learning, deep neural networks, automation, and digital innovations to overcome longstanding barriers in efficiency, precision, and patient outcomes. In drug discovery and development, AI-powered tools-such as deep neural networks (DNNs), recurrent neural networks (RNNs), quantitative structure-activity relationship (QSAR) modelling, de novo design, and predictive analytics-dramatically accelerate target identification, lead optimisation, pharmacokinetic forecasting, and polypharmacology analysis, slashing development timelines and costs while boosting success rates. AI propels personalised medicine by integrating genetic, clinical, and real-world data to deliver optimised dosing, superior therapeutic efficacy, and minimised adverse reactions. Clinically and operationally, AI enables automated dispensing, instantaneous drug interaction alerts, intelligent inventory management, real-time adherence monitoring via telepharmacy and mobile apps, advanced clinical decision support, pharmacovigilance signal detection, and predictive supply chain optimisation, yielding 24/7 patient engagement and seamless digital counselling.

These advancements promise transformative benefits: drastically reduced medication errors, streamlined workflows, substantial cost savings, enhanced accessibility for underserved populations, and precision-driven care that elevates global health outcomes.

Yet critical challenges loom: data privacy vulnerabilities, algorithmic biases risking inequity, ethical dilemmas (including diminished human empathy), stringent regulatory gaps, interoperability hurdles, digital literacy deficits, and workforce displacement concerns.

Looking ahead, responsible AI integration demands rigorous ethical frameworks, robust oversight, interdisciplinary partnerships, and rigorous real-world validation. Ultimately, AI stands poised to empower pharmacists as indispensable experts in intelligent, equitable, and sustainable pharmacy ecosystems worldwide.

Keywords: AI, Pharmacy, Digitalisation, Health.

SSP/PP-160

Hypoglycemia and Anxiolysis Mediated by Levofloxacin Treatment in Diabetic Rats

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ABSTRACT

Objective: To evaluate the effect of levofloxacin on glycemic control in streptozotocin–nicotinamide (STZ–NAD) induced diabetic rats by assessing fasting blood glucose levels and glucose tolerance

Hypothesis: Levofloxacin modulates glycemic homeostasis in streptozotocin–nicotinamide induced diabetic rats through pharmacological mechanisms involving enhancement of insulin sensitivity and regulation of glucose metabolism, resulting in a significant reduction in fasting blood glucose levels and improvement in glucose tolerance

Materials and Method: Male Wistar rats were rendered diabetic using streptozotocin (45 mg/kg, i.p.) and nicotinamide (50 mg/kg, i.p.). Diabetic rats received levofloxacin (20, 25, 30, and 35 mg/kg, i.p.) or metformin (50 mg/kg, p.o.) daily for 14 days. Blood glucose levels were monitored, and insulin sensitivity was assessed using the oral glucose tolerance test. Anxiety-related behaviour was evaluated using open field test, light–dark test, and elevated plus maze. Plasma nitrite and malondialdehyde (MDA) levels were estimated to assess oxidative stress.

Results: STZ–NAD administration produced a significant elevation in fasting blood glucose levels and impaired glucose tolerance in diabetic rats. Treatment with levofloxacin resulted in a dose-dependent reduction in fasting blood glucose levels. Higher doses of levofloxacin significantly improved glucose tolerance, as evidenced by reduced blood glucose levels during the oral glucose tolerance test and decreased area under the glucose curve compared to diabetic control animals

Keywords: Levofloxacin; Diabetes mellitus; Streptozotocin–nicotinamide; Oxidative stress; Insulin sensitivity

SSP/PP-161

Pharmacological Strategies and Mechanistic Perspectives Targeting the Gut Microbiota in Chronic Disease Management

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ABSTRACT

The gut microbiota is increasingly recognized as a critical regulator of host metabolic homeostasis, immune function and intestinal barrier integrity. A growing body of evidence implicates microbial dysbiosis in the initiation and progression of chronic metabolic, cardiovascular, inflammatory and neoplastic disorders. This review integrates current insights into gut microbiota–host interactions and critically examines therapeutic strategies designed to

modulate microbial composition and activity for clinical benefit. Microbiota-targeted interventions, including probiotics, prebiotics, synbiotics, postbiotics and faecal microbiota transplantation, are discussed with emphasis on underlying mechanisms such as microbial metabolite–mediated signalling, immune regulation and maintenance of epithelial barrier function. The bidirectional relationship between the gut microbiota and pharmacological agents is also evaluated, focusing on its impact on drug metabolism, therapeutic response variability and adverse drug reactions, thereby highlighting the relevance of microbiome-aware pharmacotherapy. Advances in precision microbiome research incorporating microbial profiling, multi-omics methodologies and computational modelling are assessed in terms of their translational applicability. Despite expanding therapeutic interest, unresolved issues related to long-term safety, standardization, regulatory frameworks and host–microbiota complexity remain. Collectively, this review outlines a mechanistic and translational perspective to inform the rational development of microbiota-based interventions for chronic disease management.
Keywords: Gastrointestinal Microbiome; Dysbiosis; Probiotics; Drug-Microbiome Interactions; Chronic Disease

SSP/PP-162

Integrating Biochemical Principles and Artificial Intelligence for Drug–Drug Interaction Prediction

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ABSTRACT

Background: Drug–drug interactions (DDIs) represent a major concern in pharmacotherapy, as they can compromise drug safety and therapeutic efficacy. The growing complexity of treatment regimens and polypharmacy has increased the risk of clinically significant DDIs.

Literature survey: Existing literature identifies metabolic interactions, particularly those involving cytochrome P450 (CYP450) enzymes, as the primary biochemical basis of DDIs. Enzyme inhibition and enzyme induction are well-documented mechanisms that modify drug plasma concentrations.

Novel conceptual framework: This review proposes an AI-assisted biochemical framework that integrates drug metabolism pathways with enzyme regulation mechanisms. The framework combines classical biochemical principles such as enzyme inhibition, enzyme induction, and substrate competition with AI-based predictive models to assess interaction risks.

Discussion: AI-driven models enhance the understanding of DDIs by identifying hidden patterns in metabolic interactions and predicting changes in drug exposure. When combined with biochemical knowledge of CYP450 enzymes, AI tools can support dose optimization and personalized therapy.

Conclusion: Drug–drug interactions are fundamentally biochemical in nature, primarily involving drug-metabolizing enzymes and regulatory mechanisms. The incorporation of artificial intelligence provides a powerful extension to traditional biochemical analysis by enabling accurate prediction and risk assessment of DDIs. The proposed AI-based conceptual framework offers a simplified and comprehensive understanding suitable for early learners, promoting safer pharmacotherapy and rational drug use.

Keywords: Drug–drug interactions (DDIs), Cytochrome P450, Artificial intelligence

SSP/PP-163

Digital Transformation in Pharmacy: Role of Machine Learning in Drug Discovery and Development

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ABSTRACT

Background: Drug discovery and development is a long, costly, and complex process involving target identification, drug screening, and clinical trials. Traditional methods require extensive experimentation and have high failure rates. With the rapid growth of biological and chemical data, machine learning (ML) has emerged as an effective approach to analyze large datasets and improve decision-making in pharmaceutical research.

Literature Survey: Earlier studies in drug discovery mainly used statistical models such as QSAR for predicting drug activity. Later, machine learning algorithms like Support Vector Machines, Random Forests, and Neural Networks improved prediction accuracy. Recent literature highlights the use of deep learning for virtual screening, drug–target interaction prediction, and toxicity analysis.

Novel Approaches: Advanced approaches such as deep learning, Graph Neural Networks, and reinforcement learning are now used for de novo drug design and molecular optimization. Transfer learning helps utilize existing data efficiently, while ML integration with genomics and proteomics supports personalized medicine and precision drug development.

Discussion: Machine learning significantly reduces time and cost in drug discovery by automating data analysis and minimizing trial-and-error methods. However, challenges such as lack of interpretability, data bias, and regulatory acceptance still needs to be addressed for wider adoption.

Conclusion: Machine learning is transforming drug discovery and development by increasing efficiency and accuracy. Despite existing challenges, continuous advancements indicate that ML will play a vital role in developing safer, faster, and more effective drugs in the future.

Keywords: Drug discovery, Machine learning, Personalized medicine

SSP/PP-164

From Digital Twin to Drug Dispensing: An Autonomous, Ethical, and Personalized Pharmacy Ecosystem

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ABSTRACT

Background: Pharmaceutical care remains largely reactive and standardized, with most drug therapies following a one-dose-fits-all approach. Adverse drug reactions (ADRs), prescription

duplication, medication misuse, and limited personalization continue to be significant global challenges, often identified only after patient harm has occurred.
Literature Review: Recent literature highlights the growing role of artificial intelligence, pharmacogenomics, automated dispensing systems, and blockchain technology in healthcare. Digital Twin models have shown promise in disease prediction and treatment optimization, while Pharmacy ATMs have improved medication access.
Novel Conceptual Framework: This poster proposes a novel closed-loop pharmacy ecosystem integrating a Pharma Digital Twin with an AI-enabled Pharmacy ATM 2.0, secured by blockchain technology. The Pharma Digital Twin virtually simulates an individual patient using pharmacogenomic data, pharmacokinetic and pharmacodynamic parameters, clinical history, and lifestyle factors. Before dispensing, it predicts drug response, determines optimal dosing, and estimates ADR risk. Only validated prescriptions proceed to automated dispensing with real-time interaction checks and secure, tamper-proof dispensing records.
Discussion: A key innovation of this model is the human-in-the-loop approach, where pharmacists act as ethical supervisors, AI validators, and final clinical decision-makers. This ensures transparency, accountability, and patient safety while preserving professional judgment within advanced digital systems.
Conclusion: This integrated ecosystem shifts pharmacy practice from reactive dispensing to predictive, preventive, and personalized care. Although conceptual, it offers a scalable roadmap to reduce ADR-related hospitalizations, enhance medication safety, and improve access to quality pharmacy services, particularly in rural and underserved populations.
Keywords: Artificial intelligence, Pharma Digital Twin, Blockchain technology

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