PAAVAI ENGINEERING COLLEGE

(Autonomous)

NH-44, PAAVAI NAGAR, PACHAL, NAMAKKAL - 637018

PROCEEDINGS OF THE NATIONAL CONFERENCE NON-COMMUNICABLE DISEASES: TRANSLATIONAL INNOVATIONS, AI INTEGRATION AND THERAPEUTIC APPLICATIONS NDTAT'26

Organized by

Department of Pharmaceutical Technology

Paavai Engineering College

Namakkal - 637018

Tamil Nadu, India

Proceedings of the National Conference on Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications

(NDTAT'26)

Book of Abstracts

Department of Pharmaceutical Technology

Paavai Engineering College

13th March 2026

Proceedings of the National Conference on Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications (NDTAT'26)

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CHAIRMAN'S MESSAGE

The growing prevalence of non-communicable diseases in India poses a significant challenge to our healthcare system, demanding urgent attention from researchers, technologists, and innovators. As we enter an era of digital transformation, it becomes essential for academic institutions to drive advancements that can bridge the gap between scientific discovery and societal need. This National Conference on "Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications" (NDTAT'26) is a commendable step in that direction.

Non-communicable diseases are deeply interconnected with lifestyle, environment, socio-economic status, and public health accessibility. Addressing them requires innovative thinking, evidence-based approaches, and strong interdisciplinary collaborations. I am pleased to see the Department of Pharmaceutical Technology create a platform where knowledge exchange and impactful discussions can flourish.

The integration of artificial intelligence into pharmaceutical technology represents a revolutionary shift in how we diagnose, monitor, and treat chronic diseases. Through predictive modelling, personalized therapeutics, and automation in drug development, AI has the potential to reshape healthcare delivery. Conferences like NDTAT'26 motivate young minds to embrace such emerging technologies with curiosity and confidence.

I appreciate the efforts of the organizing committee, faculty members, and student volunteers for meticulously putting together this national-level academic gathering. Their dedication reflects the institution's commitment to nurturing talent, fostering research potential, and contributing meaningfully to national healthcare progress.

I am confident that the insights, deliberations, and innovative ideas shared during NDTAT'26 will inspire participants to take forward impactful research and contribute significantly to the nation's wellness. I extend my warm wishes for the conference's grand success.

Sincerely,

Shri. CA N.V. Natarajan

Chairman, Paavai Institutions

CORRESPONDENT'S MESSAGE

I am delighted that the Department of Pharmaceutical Technology is hosting the National Conference on "Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications" (NDTAT'26). As non-communicable diseases continue to rise at an alarming rate, conferences like this play a vital role in strengthening research, promoting awareness, and empowering future professionals.

This conference theme aligns perfectly with the evolving needs of modern healthcare, where innovation and technology go hand in hand. The incorporation of artificial intelligence into pharmaceutical sciences opens new possibilities for precision medicine, advanced therapeutic design, and improved patient outcomes. I am glad that our students and faculty will have the opportunity to engage with such transformative ideas.

I commend the organizing team for their dedication and thoughtful planning in bringing together experts, researchers, and students onto one productive platform. Their efforts reflect the institution's vision of fostering academic excellence and creating avenues for meaningful scientific dialogue.

I strongly believe that NDTAT'26 will inspire learners, enrich research perspectives, and contribute significantly to the academic and professional growth of all participants. I extend my heartfelt wishes for a successful and impactful conference.

Sincerely,

Smt. Mangai Natarajan

Correspondent, Paavai Institutions

DIRECTOR-ADMINISTRATION'S MESSAGE

The rise of non-communicable diseases presents an evolving challenge that demands collaborative research, technological integration, and a strong commitment to public health innovation. The National Conference on "Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications" (NDTAT'26) is a timely and relevant initiative by the Department of Pharmaceutical Technology, reflecting its dedication to addressing significant national concerns.

Artificial intelligence has emerged as a transformative force across healthcare, offering new avenues for disease prediction, therapeutic optimization, and clinical decision support. By bringing together experts, academicians, and aspiring researchers, this conference paves the way for exploring how digital advancements can strengthen the fight against chronic illnesses and improve long-term patient well-being.

I applaud the meticulous efforts of the organizing committee for curating a platform that encourages knowledge sharing, research exposure, and cross-disciplinary collaboration. Such initiatives elevate the learning environment and instill in students the confidence to engage with emerging scientific trends.

I am certain that NDTAT'26 will spark productive discussions, stimulate innovative approaches, and contribute meaningfully to the advancement of pharmaceutical and healthcare research. My best wishes for the conference's successful execution.

Sincerely,

Dr. K.K. Ramasamy M.E., Ph.D.,

Director- Administration, Paavai Institutions

PRINCIPAL'S MESSAGE

The National Conference on "Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications" (NDTAT'26) stands as a valuable academic initiative aimed at enriching the research culture and scientific mindset of our students. The burden of NCDs is rapidly growing, and it is essential for future pharmaceutical professionals to acquire the knowledge and skills necessary to address these challenges effectively.

The fusion of artificial intelligence with pharmaceutical research represents the next frontier in modern healthcare. From predictive analytics to personalized medicine, AI-driven strategies are redefining how chronic diseases are understood and managed. By engaging with these advancements, participants of NDTAT'26 will gain exposure to emerging trends that will shape the future of drug development and clinical practice.

I appreciate the Department of Pharmaceutical Technology for organizing this conference with such precision and academic intent. Their efforts contribute significantly to strengthening research capacity and encouraging students to explore innovative solutions for real-world healthcare problems.

I firmly believe that the discussions, expert interactions, and presentations during this conference will elevate the learning experience and inspire meaningful contributions to the field. I wish NDTAT'26 great success and a productive academic outcome.

Sincerely,

Dr. M. Premkumar M.E., Ph.D.,

Principal, Paavai Engineering College.

HEAD OF THE DEPARTMENT'S MESSAGE

It is a matter of pride for the Department of Pharmaceutical Technology to organize the National Conference on "Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications" (NDTAT'26). This event reflects our department's continued commitment to promoting research excellence, scientific awareness, and collaborative academic growth among students and scholars.

With the rise of non-communicable diseases globally, it becomes essential for young researchers to explore innovative approaches that combine pharmaceutical sciences with modern technological tools. This conference provides an excellent opportunity for participants to engage with experts, understand emerging research trends, and expand their scientific perspectives.

I extend my sincere appreciation to the organizing team, resource persons, and participants for contributing their time and expertise. I am confident that NDTAT'26 will be a fruitful learning experience and will inspire impactful ideas for the advancement of healthcare and pharmaceutical technology.

Sincerely,

Dr. R. Praveen Cumar M.Pharm., Ph.D.,

Department of Pharmaceutical Technology, Paavai Engineering College.

CONVENOR'S MESSAGE

Greetings!

The Department of Pharmaceutical Technology, established in 2018 as a pioneering academic division of Paavai Engineering College, is delighted to organize the **One-Day National Conference on "Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications"** on **13th March 2026**.

This conference aims to bring together students, researchers, academicians, clinicians, technologists, and industry experts from reputed Institutions and Universities across the nation. It serves as a platform for exchanging groundbreaking ideas, emerging research findings, and transformative insights that drive progress in the management of non-communicable diseases (NCDs). The event underscores our commitment to bridging the gap between scientific innovation and real-world healthcare applications.

We express our profound gratitude to the **Chairman, Correspondent, Director–Administration, and Principal** for their continuous encouragement, guidance, and support, which have been instrumental in making this conference possible.

A **special note of appreciation** is extended to our distinguished guest speakers:

- **Prof. Sathees C. Raghavan**, Professor, Department of Biochemistry, Indian Institute of Science, Bangalore, Karnataka, for graciously sharing his expertise and profound insights into molecular mechanisms and translational approaches relevant to NCD research.
- **Dr. George M. Varghese**, Professor, Department of Infectious Diseases, Christian Medical College, Vellore, Tamil Nadu, for delivering an enlightening session that seamlessly integrates clinical excellence with emerging therapeutic concepts impacting modern healthcare.

We also express our sincere thanks to **Prof. M. Mohan**, Overall Coordinator of Paavai Institutions, for his steadfast encouragement and constant support throughout the planning and execution of this event.

A heartfelt appreciation is extended to the Principals of **Paavai College of Pharmacy and Research**, **Paavai College of Nursing and Research**, **Paavai College of Physiotherapy Science**, and **Paavai College of Arts and Science for Women**, as well as to all **Heads of various Departments of Paavai Engineering College**, for their valuable contributions toward the success of this conference.

We take this opportunity to acknowledge the dedicated efforts of the **Head of the Department, faculty members, students, and organizing committee**, whose commitment and teamwork have been crucial in shaping this National Conference into a meaningful and impactful academic gathering.

Finally, we extend our warmest gratitude to all **students, research scholars, faculty members, clinicians, industry professionals, and delegates** whose active participation enriches the spirit of this conference and elevates it to great heights.

Wishing each of you a productive and inspiring experience at NDTAT'26.

With Best Regards,
Dr. H. Harikrishnan, M.Tech., Ph.D.
Dr. M. Masilamani Selvam, M.Tech., Ph.D.
Mr. M. G. Karthih, M.Tech., (Ph.D.)

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Tamil Nadu Scientist Awardee [1997]
International "NAGA-2001" Awardee
Among Top 1% scientists in the world (Stanford University, 2021-24)
IUCN Mangrove Specialist Group Member
Member, Steering Committee, MoEF & CC [Govt. of India]
Marine Ecosystem Expert, TBGPCCR [Govt. of Tamil Nadu]

12.3.2026

Message

I am extremely happy to know that a national Conference on "*Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications*" is organized by the Department of Pharmaceutical Technology, Paavai Engineering College [Autonomous].

The greatest health challenge of the 21st century is Non-communicable diseases that are silent killers, while communicable diseases are sound killers. **Silent killers are more dangerous than sound killers.** The non-communicable diseases are rapidly increasing due to climate change. Cardiovascular diseases, cancers, diabetes, and respiratory diseases are responsible for 75% of global deaths. Millions of people are affected across urban and rural communities and placing enormous pressure on healthcare systems. The fight against non-communicable diseases is **not merely a medical challenge—it is a societal challenge**. Hence, it is a matter of urgency to develop translational innovations integrating with Artificial Intelligence for therapeutic applications. Bearing this in mind, the present conference is organized. I wish the conference great success and meaningful deliberations.

My heartiest congratulations are due to the College Management and Organizing Committee especially **Prof. Dr. M. Masilamani Selvam**.

Speaker's Message to "National Conference on 'Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications (NDTAT'-26)"

Greetings to the Organising Team,

It is a great honour to be invited to deliver an address at the '*National Conference on Non-Communicable Diseases: Translational Innovations, AI Integration and Therapeutic Applications (NDTAT'26)*', organised by the Department of Pharmaceutical Technology, Paavai Engineering College. I extend my sincere appreciation to the organisers for creating a multidisciplinary platform that unites researchers, academicians, and industry professionals to deliberate on emerging strategies for tackling the growing burden of non-communicable diseases. Non-communicable diseases continue to challenge global healthcare systems, requiring innovative, translational approaches that integrate biotechnology, artificial intelligence, and computational biology. Conferences such as NDTAT'26 play a pivotal role in fostering scientific dialogue, encouraging collaborative research, and accelerating the translation of laboratory discoveries into therapeutic solutions. I congratulate the organisers for their vision and dedication in hosting this important scientific event. I look forward to engaging in discussions, meaningful collaborations, and collective efforts to advance research and innovation in non-communicable diseases.

With Warm Wishes,

Dr. Zarin Taj Ph.D.
ICMR- Research Associate
Microbial Genomics
Laboratory Department of
Biotechnology Central
University of Tamil Nadu
Thiruvarur – 610 005

KEYNOTE ADDRESS

GUEST SPEAKER KEYNOTE ADDRESS

MANGROVES: NATURE'S HIDDEN PHARMACY FOR NON-COMMUNICABLE DISEASES

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Department of Pharmaceutical Technology, Paavai Engineering College, Pachal, Namakkal.

ABSTRACT

Mangrove ecosystems represent a largely untapped reservoir of bioactive compounds with significant therapeutic potential. In this study, we investigate the medicinal properties of mangrove-derived metabolites for the prevention and treatment of major non-communicable diseases (NCDs), which account for more than two-thirds of global mortality and are increasingly intensified by climate change and environmental stressors.

Mangroves are particularly rich in polyphenolic compounds with strong antioxidant capacity, enabling effective scavenging of reactive oxygen species and thereby reducing oxidative stress associated with chronic diseases.

Experimental studies demonstrated that mangrove-derived black tea extracts significantly inhibited chemically induced oral carcinogenesis in animal models, as confirmed through morphological, histopathological, and biochemical analyses. The extract also prevented cancer-associated hair loss in treated animals. Additionally, mangrove extracts exhibited antidiabetic activity comparable to that of commercial therapeutic drugs, and their efficacy is currently being evaluated in clinical studies.

Using computer-aided drug discovery approaches, several mangrove-derived compounds—including scalaradial, triterpenoids, dinitrophenylhydrazone, and heptadecanoic acid—were identified as promising candidates against target proteins associated with cervical, breast, oral, and skin cancers, based on strong docking scores and high binding affinity. These compounds are undergoing further validation through *in vitro* and *in vivo* studies.

Furthermore, mangrove-mediated nanoparticles demonstrated the ability to detoxify carcinogenic ethidium bromide and inhibit cancer cell proliferation.

Although many mangrove species are traditionally used in ethnomedicine, most remain scientifically underexplored. Systematic investigation of mangrove-derived bioactive compounds could accelerate drug discovery for NCDs while generating opportunities for innovation, patents, and sustainable bioeconomy development.

GUEST SPEAKER KEYNOTE ADDRESS

STREPTOMYCES AS A GOLDMINE OF NOVEL THERAPEUTICS FOR ORAL CANCER: INTEGRATING AI-ENABLED COMPUTATIONAL DISCOVERY WITH MOLECULAR DYNAMICS INSIGHTS

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ABSTRACT

Non-communicable diseases (NCDs) represent a substantial global health challenge, with oral diseases being increasingly acknowledged as significant factors in this global problem. Chronic oral conditions, including periodontitis, are recognised as significant contributors to the advancement of oral squamous cell carcinoma (OSCC), which represents over 90% of oral malignancies. Chronic periodontal inflammation, influenced by pathogenic bacteria such as Streptococcus mutans, Fusobacterium nucleatum, and Porphyromonas gingivalis, establishes a pro-tumorigenic microenvironment characterised by continuous cytokine activation, immune dysregulation, and alterations in host signalling pathways. The mechanisms outlined create a biological continuum linking chronic inflammatory oral diseases to malignant transformation, thereby positioning OSCC within the broader context of non-communicable disease progression. The genus Streptomyces constitutes a significant natural reservoir of a wide array of bioactive compounds, including antimicrobial peptides (AMPs), secreted proteins and secondary metabolites that exhibit various pharmacological activities. Streptomyces has historical significance in the discovery of various clinically important antibiotics and anticancer compounds, making it a valuable resource for contemporary therapeutic exploration. Utilising AI-driven computational screening and structural bioinformatics, we assessed the antibacterial and anticancer potential of Streptomyces-derived AMPs, secreted proteins and secondary metabolites in relation to OSCC. Molecular docking studies demonstrated significant interactions between the potential metabolite, secreted proteins and antimicrobial peptides (AMPs) with bacterial virulence factors, as well as with critical host proteins associated with oral squamous cell carcinoma (OSCC), including TNF-α, IL-6, IL-8, p38, p53, E-cadherin, JAK-1, and PAR2. Comprehensive molecular dynamics (MD) simulations were utilised to assess the stability and functional behaviour of ligand–protein interactions at the atomic level. The results of our research underscore the significance of Streptomyces as a valuable source of contemporary therapeutics. Furthermore, they illustrate the essential contribution of AI-driven molecular dynamics studies to expediting the translational discovery of next-generation agents to address the periodontitis–oral cancer relationship, within the broader context of non-communicable diseases.

Key Words: Antimicrobial peptides, Molecular Docking, Molecular Dynamics, Oral Oncobacteria, OSC

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DD01

IN SILICO DISCOVERY OF CHROMONE BASED TNF-α INHIBITORS: A COMPUTER AIDED DRUG DESIGN FRAMEWORK USING LIGAND-BASED PHARMACOPHORE MODELING

Yazhini P, Ramanan R, Dhanush S and Puratchikody A *

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ABSTRACT

Tumor Necrosis Factor-alpha (TNF-α) is a pro-inflammatory cytokine with a well-established role in the development of autoimmune and inflammatory diseases. When its activity becomes chronically elevated, the resulting immune dysregulation and tissue damage can be significant which is why it has remained a major focus in drug discovery for decades. Biologic therapies have shown real clinical value, but their high costs, immunogenicity, and side effect profiles mean they are far from a perfect solution. Natural small-molecule inhibitors offer a different angle, and one that is increasingly worth pursuing.The present study aims to identify potential natural small-molecule inhibitors of TNF-α through a structured in-silico drug discovery framework employing computer aided drug design (CADD) techniques. The crystal structure of TNF-α (PDB ID: 2AZ5) was selected as the molecular target, with particular emphasis placed on the dimer interface region a site whose disruption has been shown to impair the cytokine's biological activity. A curated dataset of natural compounds with experimentally reported inhibitory activity was assembled, with chromone-based scaffolds forming the foundation of the collection, refined by IC_{50} values to retain only molecules demonstrating meaningful potency. A ligand-based pharmacophore model will be constructed to define the key structural determinants of TNF-α inhibition, encompassing hydrogen bond donors and acceptors, aromatic ring systems, and hydrophobic features. Upon validation, this model will be applied to screen curated natural compound libraries for novel candidate hits. This work seeks to establish a rigorous computational basis for advancing natural lead compounds toward experimental evaluation in autoimmune disease research.

Keywords: TNF-α; Chromone Scaffold; Natural Small-Molecule Inhibitors; Ligand-Based Pharmacophore Modeling; Anti-Inflammatory; In Silico Drug Discovery; Autoimmune Diseases

DD02

STRUCTURE-GUIDED OPTIMIZATION OF THE NIFEDIPINE SCAFFOLD FOR ENHANCED METABOLIC STABILITY AND REDUCED TOXICITY

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ABSTRACT

Nifedipine is a common dihydropyridine calcium channel blocker that doctors use all the time for treating high blood pressure. Still, it runs into problems — side effects and the way the body breaks it down can get in the way, mostly because of the nitro group on its aromatic ring. So, in this study, we set out to design new versions of nifedipine by tweaking that nitro-containing ring. The idea: make it more stable in the body and less toxic, but keep its blood pressure-lowering effect.After digging through a lot of research, we landed on a few good bioisosteric swaps and new aromatic substitutions. From there, we proposed a set of nifedipine analogues. Then, we ran them through computational ADMET tests and checked their physicochemical properties, looking for drug-like and safe candidates.

Right now, we're working on docking studies and mapping out how these compounds interact with L-type calcium channels and related proteins. This helps us figure out how they bind and what effect they might have. In short, this work sets up a smart, in-silico approach to create nifedipine analogues that are safer and hold up better in the body, aiming for better hypertension treatment.

Keywords: Nifedipine, Hypertension, Bioisosteric Replacement, Molecular Docking, ADMET Analysis, Dihydropyridine

DD03

FORMULATION AND EVALUATION OF NANOTECHNOLOGY-BASED POLYHERBAL MOUTH RINSE FOR ORAL HYGIENE

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ABSTRACT

To provide an effective alternative to chemical-based mouthwashes with fewer side effects. To reduce plaque formation and maintain oral hygiene naturally. To prevent bad breath (halitosis) using herbal extracts with antimicrobial and deodorizing properties. To offer anti- inflammatory and antibacterial action against oral pathogens. To promote gum health and reduce gingivitis or periodontal issues. The primary aim is to control plaque, gingivitis, and halitosis without adverse side effects. Active ingredients like clove,Tulsi, *Liquorice, Haruaki inknut*, and Mint enhance oral hygiene and gum health. Unlike chemical mouthwashes, it ensures safety for long-term use and reduces risks of irritation, staining, or altered taste sensation. Probiotic-infused herbal mouthwash to balance oral microbiota and promote healthy oral flora. Use of encapsulated essential oils (like clove or peppermint) for controlled release and long-lasting freshness. No major side effects such as tooth staining, taste alteration, or mucosal irritation (common in chemical mouthwashes). Flavoring agent was added and the pH was adjusted to 5.5–7.0 using suitable buffer. The prepared herbal mouthwash was filled into amber-colored bottles, labeled, and stored under suitable conditions. The zone of inhibition for anti-microbial activity was measured and compared with standard marketed formulations. Additionally, antioxidant activity was evaluated using suitable *in-vitro* assays to determine the free radical scavenging potential of the formulation. The safety profile was assessed through irritation studies to confirm its suitability for oral use and for satisfactory physicochemical properties. The formulation remained stable without any noticeable changes during the study period. The herbal combination showed a promising result as a safer alternative to synthetic mouthwashes.

Keywords: Herbal Mouthwash, Healthy gums, Oral Health and hygiene.

DD04

DEEP LEARNING–BASED AUTOMATED DETECTION AND CLASSIFICATION OF DIABETIC RETINOPATHY USING RETINAL FUNDUS IMAGES

Sam Rhemond P[1], Sujitha A[1], Indumathi C P[2*] and Lakshmana Prabu S[1]**

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[2]*Department of Computer Science Engineering, University College of Engineering, BIT Campus, Anna University, Tiruchirappalli*
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ABSTRACT

Blindness that could have been avoided often comes from diabetic retinopathy, especially in people living with diabetes across the globe. Spotting it early, followed by quick care, helps keep eyesight safe. Yet checking eye images by hand takes too long - doctors need special training, which slows things down when trying to screen many people, particularly where tools and staff are scarce. Machines that learn patterns on their own, thanks to progress in smart software, now show real potential for reading medical scans without human help. This project focuses on building a system that uses deep learning to spot and sort signs of diabetic retinopathy in eye scan pictures. Instead of manual checks, a method inspired by the ResNet design helps the computer discover key patterns in these scans. Labelled image sets from open sources feed into the process, shaping how the model learns, improves, and gets checked. Before feeding images into the sindhu, adjustments like scaling and balancing brightness levels help sharpen results. A trained model picks which stage of diabetic eye disease a retinal image shows, from healthy to serious advanced forms. Its results get checked through measures like how often it is right, its ability to catch true cases, and avoid false alarms, along with AUC scores. On top of that, tools helping to show why decisions are made - like Grad-CAM - are used to point out key areas in the retina guiding those choices. One way to help eye doctors spot early signs of diabetic damage is through a new kind of support tool. Because it works quickly and consistently, screenings could reach more people without slowing down clinics. When machines take on first checks, specialists gain time to focus on complex cases instead. Catching problems sooner means treatment can start earlier, which may protect sight longer. With wider access to testing, more patients might avoid serious outcomes just by getting timely care.

Keywords : Diabetic Retinopathy, Deep Learning, Convolutional Neural Networks, ResNet, Retinal Fundus Images, Medical Image Analysis, Automated Disease Detection, Artificial Intelligence in Healthcare, Grad-CAM (Explainable AI), Early Disease Screening

DD05

DRUG DELIVERY AND DISPENSING

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ABSTRACT

Drug delivery systems and pharmacovigilance play an important role in improving the safety and effectiveness of medicines. Drug delivery refers to the methods and technologies used to transport a pharmaceutical compound to the target site in the body to achieve the desired therapeutic effect. Modern drug delivery systems, such as controlled release formulations, targeted drug delivery, nanoparticles, liposomes, and transdermal patches, help improve drug bioavailability, reduce side effects, and enhance patient compliance. These advanced systems allow drugs to be released at a specific rate and at a specific site, thereby increasing treatment efficiency.

Pharmacovigilance is the science and activities related to the detection, assessment, understanding, and prevention of adverse drug reactions (ADRs) and other drug-related problems. It plays a vital role in ensuring drug safety after medicines are released into the market. Through monitoring and reporting systems, healthcare professionals and regulatory authorities can identify potential risks associated with drugs and take necessary actions to protect patients.

The integration of advanced drug delivery technologies with effective pharmacovigilance systems contributes to safer and more efficient therapeutic outcomes. While innovative delivery systems improve the therapeutic performance of drugs, pharmacovigilance ensures continuous monitoring of their safety in real-world use. Together, these two fields support the development of safer medicines, improve patient care, and strengthen public health systems. Therefore, continuous research and awareness in drug delivery and pharmacovigilance are essential for the advancement of modern pharmaceutical science and for ensuring the safe use of medicines worldwide.

Keywords: Drug Delivery, Drug Dispensing, ADR

DD06

IDENTIFICATION OF MICRORNA BIOMARKERS ASSOCIATED WITH MULTIPLE SYSTEM ATROPHY USING INTEGRATED *IN SILICO* ANALYSIS

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ABSTRACT

Background:
Multiple System Atrophy (MSA) is a rare and rapidly progressive neurodegenerative disorder characterized by autonomic dysfunction, parkinsonism, and cerebellar impairment. Due to overlapping clinical symptoms with other neurodegenerative diseases, early diagnosis of MSA remains challenging. MicroRNAs (miRNAs), small non-coding RNAs that regulate gene expression at the post-transcriptional level, have emerged as promising biomarkers in neurological disorders. Identifying miRNAs associated with MSA may provide insights into disease mechanisms and facilitate the discovery of potential diagnostic biomarkers.

Methods:
In this study, an integrative bioinformatics approach was employed to identify potential miRNA biomarkers associated with MSA. Disease-related miRNAs were retrieved and analyzed using the web-based platform miRNet. The potential target genes of these miRNAs were predicted using miRDB. A miRNA–gene regulatory network was constructed and visualized using Cytoscape to identify key regulatory miRNAs and hub genes. Furthermore, functional enrichment analysis of the predicted target genes was performed using Enrichr to explore associated biological processes and signaling pathways.

Results:
The analysis identified several candidate miRNAs potentially involved in the pathogenesis of MSA. The miRNA–gene interaction network revealed multiple regulatory relationships between miRNAs and genes associated with neuronal survival, synaptic signaling, and neuroinflammatory responses. Functional enrichment analysis indicated that the predicted target genes were significantly involved in biological pathways related to neurodegeneration, apoptosis, and cellular stress responses, suggesting their possible role in disease progression.

Conclusion:
This integrative in silico analysis highlights several miRNAs that may serve as potential biomarkers for MSA. The identified miRNA–gene regulatory networks provide insights into the molecular mechanisms underlying the disease and may contribute to the development of novel diagnostic and therapeutic strategies. However, further experimental validation is required to confirm the biological significance of these candidate miRNAs in MSA.

DD07

DEVELOPMENT OF A BIO-MINERAL HYBRID TRANSDERMAL PATCH FOR DYSMENORRHEA

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ABSTRACT

Dysmenorrhea affects approximately 90% of adolescent and young women, often leading to a reliance on oral medications that cause gastrointestinal side effects like ulcers and nausea. This study aims to develop a non-pharmacological, bio-mineral hybrid transdermal patch to alleviate menstrual pain without synthetic drugs. The research focuses on a zero-drug solution utilizing Far-Infrared (FIR) technology. The methodology involves formulating a biocompatible matrix using natural polymers, specifically Chitosan or Alginate, via the solvent evaporation technique. To provide therapeutic relief, FIR-active mineral powders such as Titanium Dioxide are integrated into the matrix to reflect thermal energy back into the body. The patches are designed for a thickness of 200–500 μm and aim for a sustained effect of up to 24 hours. Characterization will be performed using FTIR spectroscopy for chemical compatibility and SEM for mineral distribution analysis. Performance and safety will be validated through skin irritation tests to ensure zero redness or swelling, even for sensitive skin, and pH testing to maintain skin-friendly levels (~5.5). This hybrid approach offers a localized, eco-friendly alternative to traditional pain management, with future potential for IoT-enabled pain tracking and Smart Fem Tech integration.

Keywords: Dysmenorrhea; Transdermal Patch; Far-Infrared Technology; Bio-polymers.

TM01

PHYTOSTEROLS AS EMERGING THERAPEUTIC AGENTS FOR NEUROLOGICAL, NEUROPSYCHIATRIC, AND BRAIN TUMOR DISORDERS

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ABSTRACT

Phytosterols are plant-derived sterols structurally similar to cholesterol and widely recognized for their role in lowering circulating low-density lipoprotein (LDL) cholesterol. Beyond lipid regulation, phytosterols exhibit diverse biological activities, including antioxidant, anti-inflammatory, immunomodulatory, and anti-tumor effects, suggesting their potential application in neurological health. Increasing evidence indicates that dysregulated lipid metabolism, oxidative stress, and chronic neuroinflammation are key contributors to the pathogenesis of several neurological and neuropsychiatric disorders. This study explores the therapeutic potential of phytosterols in modulating a broad spectrum of neurological conditions, including neurodegenerative disorders and neuropsychiatric disorders, is examined. Emerging evidence suggests that phytosterols may regulate neuronal signaling pathways, reduce neuroinflammation, and mitigate oxidative damage, thereby contributing to improved neuronal survival and function. Furthermore, phytosterols demonstrate promising anti-cancer properties that may be relevant to central nervous system tumors. Through mechanisms involving apoptosis induction, inhibition of tumor cell proliferation, and modulation of immune responses, phytosterols may contribute to novel therapeutic strategies for brain tumors. By integrating insights from Network Pharmacology, this work highlights the potential of phytosterols as adjunctive therapeutic agents for complex neurological disorders. Further translational and clinical investigations are required to validate their efficacy, optimize dosage, and establish safety profiles for therapeutic applications.

Keywords: Network Pharmacology, Phytosterols, Neuroprotection, Neurodegenerative Disorders, Neuropsychiatric Disorders, Brain Tumors

TM02

NANO ENCAPSULATED FORMULATION FOR ANTI-UROLITHIASIS

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ABSTRACT

Kidney stone disease, or nephrolithiasis, is a common urological disorder characterized by the formation of hard mineral deposits in the kidneys. Conventional treatments include pharmacotherapy and surgical interventions, which can be costly and have potential side effects. Increasing attention has been directed toward herbal remedies due to their natural origin, lower cost, and fewer adverse effects. Numerous medicinal plants, such as Phyllanthus niruri, *Boerhaavia diffusa*, Tribulus terrestris, and *Crataeva nurvala,* have demonstrated *antiurolithiatic*, diuretic, and antioxidant properties. These herbs work through mechanisms such as inhibiting stone formation, promoting stone dissolution, and enhancing urinary flow. This review explores the role of herbal medicines in the prevention and management of kidney stones, highlighting their phytochemical constituents and therapeutic potential. Further clinical studies are needed to validate their efficacy and safety for integration into mainstream medical practice.

Keywords: Urolithiasis, *Boerhaavia diffusa,* Calcium oxalate, Crystallyzation, Ethylene glycol

TM03

IN VITRO EVALUATION OF AERVA LANATA IN NEPHROLITHIASIS TREATMENT

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ABSTRACT

Kidneys are vital for filtering waste, balancing electrolytes and regulating blood pressure. Kidney stone causes severe abdominal pain, blood in urine and urinary blockage. Chronic kidney diseases (CKD) is a serious public health issues globally in India and 13-17% adults affected and also affecting millions. It causes enormous health and economic burdens in the hotter states particularly Rajasthan and Gujarat. *Aerva lanata* is also referred as the mountain knotgrass. The pharmacological actions of this plant are diuretic, lithotriptic, antioxidant, nephroprotective, anti-inflammatory and anti-microbial. Its extract is rich in quercetin, kaempferol, isorhamnetin glycosides This is one of the medicinal plants used in the treatment of kidney stones. This study aims at preparing the herbal formulations in the form of tablets, capsules and syrups which are safer and cheaper than the expense of surgery or dialysis. *A. lanata* offers a natural, safe, and effective approach for curing kidney stones and protecting kidney functions. This plant can be very useful especially in rural areas where modern treatment is less accessible.

Key Words: Kidney stone, *Aerva lanata, In vitro* analysis, Dosage forms

TM04

DIETARY LIGNANS AND THEIR ROLE AS BIOACTIVE COMPOUNDS AGAINST NON-COMMUNICABLE DISEASES: A CRITICAL REVIEW

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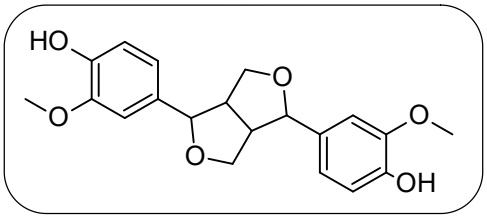
ABSTRACT

Oxidative stress, chronic inflammation, hormonal imbalances, and metabolic dysfunction are the main causes of non-communicable diseases (NCDs), which include heart disease, cancer, type 2 diabetes, obesity, and metabolic syndrome. NCDs are a major global health concern. The gut microbiota converts dietary lignans such as phytoestrogenic polyphenols found in flaxseeds, sesame seeds, whole grains, legumes, and vegetables into bioactive enterolignans (enterodiol and enterolactone), which increase their bioavailability and systemic effects.

Preclinical, epidemiological, and clinical data regarding lignans' multi-targeted bioactivity against NCDs are assessed in this critical review. Improved insulin sensitivity, lipid management, selective estrogen receptor modulation, antioxidant and anti-inflammatory activities (such as radical scavenging and NF-κB inhibition), and antiproliferative effects in cancer models are among the mechanisms. Higher levels of lignan or enterolignan have been linked, frequently through microbiota-dependent conversion, to lower risks of cardiovascular events, hormone-dependent malignancies, diabetes incidence, and associated mortality in observational studies.

Despite encouraging data, there are few large-scale trials and most of the evidence is observational or preclinical. Through nutritional modulation of important pathways, lignans provide a safe dietary strategy for NCD prevention. This calls for additional randomized trials to establish efficacy, optimal intake, and therapeutic uses.



Key words: Dietary lignans, Enterolignans, Enterolactone, NCDs

TM05

FAST DISSOLVING STRIP FOR SERENE RELIEF FROM DEPRESSION IN WELLNESS INSPIRED WORLD

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ABSTRACT

Depression is a prevalent mental health disorder that significantly impairs quality of life and often necessitates long-term pharmacotherapy. Herbal medicines are gaining increasing attention owing to their safety, better tolerability, and minimal side effects. *Withania somnifera* (Ashwagandha) is a well-documented medicinal plant known for its antidepressant, adaptogenic, and neuroprotective properties. The present study will aim to formulate and evaluate a fast-dissolving oral thin strip containing *Withania somnifera* extract for the effective management of depression. The oral thin strips will be prepared using Hydroxypropoyl Methylcellulose (HPMC) as a film-forming polymer by the solvent casting technique, incorporating suitable plasticizers and excipients. The formulations will be evaluated for physical characteristics, thickness, folding endurance, disintegration time, and drug content uniformity. Advanced characterization studies, including particle size analysis, zeta potential measurement, and entrapment efficiency determination, will be performed to assess formulation stability and drug incorporation. The morphology and crystallinity of the optimized formulation will be examined using scanning electron microscopy (SEM) and X-ray diffraction (XRD), respectively. The study is expected to establish the fast-dissolving herbal oral thin strips that represent a promising and patient-friendly dosage form, offering effective antidepressant therapy and improved patient compliance within a wellness-inspired therapeutic approach.

Keywords: *Withania somnifera* Depression, Fast-dissolving oral thin strips, Herbal antidepressant, (HPMC), Solvent casting technique, Oral film formulation, Patient compliance.

PS01

POWDER FORMULATION OF ACHYRANTHES ASPERA AND TRIDAX DAISY FOR HERPES ZOSTER AND WOUND HEALING

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ABSTRACT

This project introduces a novel topical powder formulation integrating the therapeutic properties of *Achyranthes aspera* and *Tridax daisy* to manage Herpes zoster and accelerate wound recovery. The formulation addresses the critical challenge of painful, blistering eruptions that impair natural tissue repair, increase infection risks, and diminish the quality of life for vulnerable populations, including elderly, diabetic, and immunocompromised patients. By synergizing these botanical extracts, the solution provides a multi-action approach that reduces inflammation, controls microbial growth, and promotes epithelial repair for faster recovery. The development roadmap encompasses rigorous phases, including preclinical studies, clinical trials, and regulatory validation to ensure product efficacy and safety. Designed as a cost-effective and plant-based alternative to synthetic treatments, the product targets the growing market for herbal remedies through strategic digital engagement and modern distribution channels.

Keywords: Herpes Zoster, Wound Healing, Achyranthes aspera, Tridax daisy, Topical Powder, Phytomedicine

PS02

SMART RECYCLING OF PHARMACEUTICAL BLISTER PACKS

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ABSTRACT

Pharmaceutical blister packaging waste has become a significant environmental challenge due to its complex composition of polyvinyl chloride (PVC) and aluminum layers that are tightly bonded together. This multi-material structure makes recycling extremely difficult, and as a result, most blister packaging waste generated by pharmaceutical companies, hospitals, and pharmacies is either disposed of in landfills or incinerated. Incineration of PVC releases harmful substances such as dioxins and other toxic emissions, which contribute to air pollution, soil contamination, and long-term health hazards. Meanwhile, landfill disposal is also problematic because PVC is highly resistant to natural degradation and can persist in the environment for many years. With the rapid growth of the pharmaceutical industry, the generation of blister packaging waste is increasing annually, creating an urgent need for sustainable recycling technologies. To address this issue, our proposed solution focuses on developing an innovative bio-recycling process that utilizes specialized microorganisms and enzyme formulations to break down the PVC layer in blister packaging. This approach enables the efficient separation and recovery of reusable PVC residues and aluminum without generating harmful emissions. The process is carried out in controlled bioreactors operating at ambient temperatures (20–35°C), which reduces energy consumption and enhances sustainability. This technology offers a scalable, environmentally friendly, and cost-effective method to convert pharmaceutical blister waste into reusable resources while supporting sustainable waste management in the pharmaceutical industry.

Keywords: Pharmaceutical waste, Blister packaging, PVC recycling, Bio-recycling, Enzymes, Microorganisms, Aluminum recovery, Sustainable waste management, Bioreactor technology, Environmental sustainability.

PS03

BIOFABRICATION OF SILVER NITRATE NANOPARTICLES FROM MORINGA OLEIFERA FLOWERS: SYNERGISTIC ANTIOXIDANT, ANTIMICROBIAL AND ANTICANCER ACTIVITES.

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ABSTRACT

Bio-fabrication of silver nanoparticles (Ag-NPs) using Moringa oleifera flower extract offers a sustainable, non-toxic, and highly efficient approach for developing multifunctional nanomaterials. In this study, Moringa flower extract served as both a reducing and stabilizing agent for the green synthesis of Ag-NPs, enabling rapid nanoparticle formation under mild conditions. The bio-fabricated Ag-NPs exhibited strong antioxidant activity due to the presence of phytochemicals such as flavonoids, phenols, and alkaloids that enhanced their free radical–scavenging potential. Additionally, the synthesized nanoparticles demonstrated potent antimicrobial effects against selected pathogenic bacteria and fungi, indicating broad-spectrum inhibitory action. The Ag-NPs also revealed significant anticancer potential, showing dose-dependent cytotoxicity toward cancer cell lines, highlighting their possible application in therapeutic formulations. Overall, the synergistic influence of Moringa oleifera phytochemicals and silver nanoparticles suggests a promising platform for biomedical, pharmaceutical, and therapeutic applications.

Keywords: Moringa oleifera flower, bio-fabrication, silver nanoparticles (Ag- NPs), antioxidant activity, antimicrobial activity, anticancer activity, green synthesis, phytochemicals, synergistic effect.

PS04

EXPLORING THE MULTI-TARGET THERAPEUTIC MECHANISMS OF ELADHI CHOORANAM IN ENDOMETRIOSIS VIA Invitro propagation PHARMACOLOGY APPROACH

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ABSTRACT

Endometriosis is a chronic estrogen-dependent inflammatory disorder characterized by the growth of endometrial-like tissue outside the uterus, leading to pelvic pain, dysmenorrhea, and infertility. Despite the availability of hormonal therapies and surgical interventions, long-term management remains challenging due to recurrence, side effects, and limited therapeutic targets. Traditional Siddha formulations, such as Eladhi Chooranam, contain multiple medicinal herbs with reported anti-inflammatory, antioxidant, and hormone-modulating properties, suggesting potential benefits in the management of complex diseases like endometriosis. The present study aims to explore the multi-target therapeutic potential and underlying molecular mechanisms of Eladhi Chooranam in endometriosis using a network pharmacology approach. Bioactive compounds present in the constituent herbs will be identified through phytochemical databases and literature sources. Potential targets of these compounds will be predicted using pharmacological databases and mapped against endometriosis-related genes obtained from disease databases. A compound–target–disease interaction network will be constructed, followed by protein–protein interaction (PPI) network analysis to identify key hub targets. Gene Ontology (GO) and KEGG pathway enrichment analyses will be performed to understand the biological processes and signaling pathways potentially involved. This study is expected to reveal the multi-component and multi-target mechanisms of Eladhi Chooranam and identify key molecular targets and pathways associated with inflammation, angiogenesis, oxidative stress, and hormonal regulation in endometriosis. The findings may provide a scientific basis for the traditional use of this Siddha formulation and support further experimental validation for its potential role as a complementary therapeutic strategy in endometriosis management.

Keywords: Endometriosis, Eladhi Chooranam, Siddha medicine, Network pharmacology, Multi-target therapy.

PS05

OPTIMIZATION OF EXTRACTION AND PHARMACOLOGICAL ASSESSMENT OF INDIAN BAEL LEAVES AND MALABAR NUT FOR RESPIRATORY RELIEF

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ABSTRACT

This study focuses on the extraction and optimization of bioactive compounds from Aegle marmelos (Indian Bael) and Justicia adhatoda (Malabar Nut) leaves for respiratory relief. The collected plant materials were shade dried, powdered, and subjected to extraction using suitable solvents through Soxhlet Extraction. The obtained extracts were concentrated and evaluated for percentage yield. Preliminary phytochemical screening was performed to identify the presence of important secondary metabolites such as alkaloids, flavonoids, tannins, and phenolic compounds. The optimized extract obtained from this phase serves as the basis for further pharmacological evaluation in second phase. The optimized extracts of *Aegle marmelos* and *Justicia adhatoda* were further evaluated for their pharmacological activities related to respiratory relief. The extracts were assessed for antioxidant activity using the DPPH Radical Scavenging Assay, antimicrobial activity by the Agar Well Diffusion Method, and anti-inflammatory activity using protein denaturation assay. Based on the results, a suitable herbal formulation for respiratory support is proposed. The study aims to scientifically validate the traditional use of these medicinal plants for respiratory disorders

Key words: Asthma, herbal formulation, Phytomedicine,

PS06

THERAPEUTIC POTENTIAL OF *COCOS NUCIFERA* BEE POLLEN AGAINST LIFESTYLE-INDUCED ENDOCRINE DYSFUNCTIONS: AN INTEGRATIVE PHARMACOLOGICAL STUDY IN FEMALE SD RATS

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ABSTRACT

Lifestyle-associated disorders such as cardiometabolic syndrome and endocrine dysfunctions, including polycystic ovarian disorder (PCOD), have become a growing global health concern, particularly among women of reproductive age. The increasing prevalence of these conditions necessitates the exploration of safe, sustainable, and natural therapeutic alternatives with minimal side effects. Bee pollen derived from *Cocos nucifera* represents a nutrient-rich natural product known for its diverse pharmacological properties. The present study aimed to investigate the therapeutic potential of *Cocos nucifera* bee pollen through an integrated in vitro, in vivo, and in silico pharmacological approach, with special emphasis on endocrine-related metabolic disturbances using female Sprague Dawley rats as the experimental model. DNA barcoding was employed to confirm the botanical origin of the pollen sample. Phytochemical characterization revealed the presence of bioactive compounds, including terpenoids, flavonoids, phenols, sterols, and fatty acids. In vitro screening demonstrated significant pharmacological activities such as anti-obesity, anti-diabetic, anti-hypertensive, anti-hypercholesterolemic, and anti-inflammatory potential. In vivo physiological, haematological, and behavioural assessments in high-fat-diet-induced female rats indicated notable improvements in metabolic parameters and endocrine balance. Computational analysis further identified key molecular interactions between triterpenoid compounds and major cardiometabolic targets, including HMG-CoA reductase, angiotensin-converting enzyme, pancreatic lipase, and lipoprotein lipase. PTGS2, CYP2C9, MAPK8, ALOX5, AKR1C3 and SRD5A2 emerged as central hub targets. Enrichment analyses indicated modulation of arachidonic acid metabolism, MAPK signalling and lipid-regulatory pathways. Molecular docking demonstrated strong binding affinities (-8.0 to -11.9 kcal/mol) of the triterpenes toward key targets, with binding scores comparable to or exceeding those of reference compounds. These findings provide systems-level mechanistic insight into the PCO's-related dysfunctions potential of triterpenes and steroids from *Cocos nucifera* bee pollen. The multi-target modulation of lipid and inflammatory pathways supports the traditional use of bee pollen for cardiovascular health and warrants further experimental and translational investigation. Among the identified phytochemicals, beta-amyrin exhibited strong binding affinity with multiple metabolic enzymes, suggesting a multi-target therapeutic mechanism. The findings collectively highlight *Cocos nucifera* bee pollen as a promising biocompatible nutraceutical candidate for managing cardiometabolic-driven endocrine disorders in females. This study provides a scientific basis for future translational research aimed at developing bee-derived natural therapeutics for lifestyle-related metabolic diseases.

PP01

NEXT-GENERATION PHYTOPHARMACEUTICAL: A FERMENTED HERBAL–MICROBIAL FORMULATION

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ABSTRACT

This study aims to develop an innovative bio-enhanced phytopharmaceutical by integrating pharmaceutical technology, herbal medicine, and microbial biotechnology. Although medicinal plants possess well-established therapeutic properties, the clinical efficacy of many herbal formulations is often limited by poor bioavailability, chemical instability, and variability in pharmacological activity. To address these limitations, the present work proposes microbial fermentation as a novel strategy to enhance phytochemical potency and bioactivity. Ethnomedicinally important plants—*Ocimum sanctum*, *Zingiber officinale*, *Phyllanthus amarus*, *Withania somnifera*, and *Trigonella foenum-graecum*—will be collected, authenticated, processed, and extracted using aqueous and hydroalcoholic solvents. Controlled fermentation will be conducted using beneficial microbial consortia, including lactic acid bacteria, yeasts, and actinobacteria, to facilitate biotransformation of bioactive compounds. The fermented formulations will be comparatively evaluated against non-fermented extracts for antioxidant, antimicrobial, and anti-inflammatory activities using standard in vitro assays. Microbial strains involved in the fermentation process will be isolated, characterized, and identified through morphological, biochemical, and molecular techniques, including 16S rRNA and ITS sequencing. Comprehensive phytochemical profiling of the final formulation will be performed using HPLC, FTIR, and GC–MS analyses, along with stability and safety assessments. This approach aims to establish a standardized, stable, and therapeutically potent fermented herbal–microbial formulation, offering a next-generation phytopharmaceutical with enhanced bioavailability and clinical potential

Keywords: *Ocimum sanctum* - Tulsi, *Zingiber officinale* - Ginger, *Phyllanthus amarus* - Keezhanelli, *Withania somnifera* – Ashwagandha, and *Trigonella foenum-graecum* – Fenugreek.

PP02

EXTRACTION, CHARACTERIZATION AND BIOACTIVITY EVALUATION OF FUCOIDAN FROM BROWN SEEWEED

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ABSTRACT

Fucoidan is a sulphated polysaccharide predominantly found in the cell walls of brown seaweeds and is widely recognized for its diverse biological activities. In recent years, fucoidan has attracted significant attention due to its potential applications in pharmaceutical, nutraceutical and biomedical fields. The present study focuses on the extraction, characterization and evaluation of fucoidan from brown seaweed species. Brown seaweed is considered a rich and sustainable source of bioactive compounds that can be utilized for various therapeutic purposes. In this study, dried brown seaweed biomass was processed and subjected to different pre Treatment steps to remove unwanted pigments, lipids and impurities. The fucoidan was extracted using appropriate extraction methods such as acid or salt-assisted extraction followed by precipitation using ethanol. The obtained polysaccharide was further purified and dried to obtain fucoidan in powdered form. The extracted compound was characterized through various analytical techniques including carbohydrate estimation and sulphate content analysis to confirm the presence of fucoidan. The biological activities of fucoidan such as antioxidant potential were also evaluated to determine its possible health benefits. Fucoidan has been reported to possess several beneficial properties including anti-inflammatory, anticoagulant, antiviral and anticancer activities. Therefore, the extraction of fucoidan from brown seaweed offers a promising approach for developing natural bioactive compounds for therapeutic applications. This study contributes to the understanding of efficient extraction methods and highlights the potential of fucoidan as a valuable biomolecule in biomedical research and drug development.

Keywords: Fucoidan, Brown Seaweed, Sulphated Polysaccharide, Extraction, Bioactive Compounds, Antioxidant Activity, Biomedical Applications.

PP03

PHYTOCHEMICAL CONSTITUENTS AND THERAPEUTIC POTENTIAL OF CASSIA TORA: A FOCUS ON ANTIMICROBIAL, ANTIOXIDANT, ANTI-INFLAMMATORY AND ANTICANCER ACTIVITIES

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ABSTRACT

Tanner's Cassia (Senna auriculata), a plant traditionally used in Ayurveda and Siddha medicine, is known for its multifaceted medicinal properties. Previous studies have reported its efficacy as an antidiabetic, antimicrobial, anti-inflammatory, and antioxidant agent. The plant contains a rich profile of bioactive phytochemicals, including flavonoids, phenolic acids, tannins, alkaloids, saponins, and glycosides, which are responsible for its therapeutic effects. However, limited studies have focused on its anticancer potential, which remains largely unexplored.

The present study aims to investigate the phytochemical composition and pharmacological activities of S. auriculata, followed by evaluation of its anticancer potential. Initially, qualitative and quantitative phytochemical analyses will be conducted to identify the presence and concentration of active compounds. These analyses will provide insight into the bioactive constituents that may contribute to the plant's therapeutic effects.

Subsequently, the plant extracts will be subjected to in vitro antimicrobial assays to assess their efficacy against selected bacterial and fungal strains. The anti-inflammatory activity will be evaluated using established in vitro models such as protein denaturation and membrane stabilization assays. Furthermore, the antioxidant potential will be assessed through free radical scavenging assays, including DPPH and ABTS methods, to determine the extract's capacity to neutralize reactive oxygen species and reduce oxidative stress. These preliminary pharmacological evaluations will establish a foundation for exploring the cytotoxic potential of S. auriculata against cancer cells.

The final phase of the study will involve anticancer evaluation of the plant extracts using in vitro cytotoxicity assays, including the MTT assay, against selected human cancer cell lines. The study will also investigate possible apoptotic pathways, including caspase activation, DNA fragmentation, and cell cycle arrest, to elucidate the mechanisms underlying the cytotoxic effects. By correlating the phytochemical composition with observed biological activities, this study aims to provide comprehensive scientific validation for the therapeutic potential of Tanner's Cassia.

Keywords: Ethnomedicinal grasses, microbial biotransformation, oxidative stress, green biotechnology, herbal formulations.

PP04

ISOLATION AND CHARACTERIZATION TION OF ENDOPHYTIC BACTERIA FROM SELECTED MEDICINAL PLANTS

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ABSTRACT

Endophytic bacteria isolated from medicinal plants have showed much interest from researchers as they showed antibacterial and antifungal activities. They also known to produce wide range of secondary metabolites with various activities like antioxidant, antimicrobial, anti-inflammatory and cytotoxicity. In the present study isolates were identified using 16SrRNA sequencing and the sequence was submitted in NCBI for future reference. In this study crude secondary metabolites from *O.mungos* bacterial endophytes showed antitumor activities showing *invitro* cytotoxic effects against two cancer cell lines. Gas chromatography–mass spectrometry (GC-MS) analysis of three bacterial metabolites revealed the presence of several bioactive secondary metabolites that have been reported previously to possess anticancer propertiesAntimicrobial activity of isolated endophytic bacteria shows variable size of inhibition zones in the test organisms as Bacillus, Escherichia coli, protease, and Pseudomonas. These results indicate that endophytic bacteria isolated from medicinal plants could be a potential source for bioactive compounds and may find potential use in pharmaceutical industry.

Keywords: *Ophiorrhiza mungos,* Cytotoxic assay, GC-MS analysis, Bioactive metabolites

PP05

FORMULATION STRATEGIES TO IMPROVE STABILITY AND ORAL BIOAVAILABILITY OF GINGER EXTRACT IN SOLID ORAL DOSAGE FORMS

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ABSTRACT

Ginger (Zingiber officinale) extract possesses significant pharmacological activities, including anti-inflammatory, antioxidant, antiemetic, and gastroprotective effects, mainly attributed to bioactive compounds such as gingerols, shogaols, and related phenolics. Despite its therapeutic potential, the clinical efficacy of ginger extract in solid oral dosage forms is limited due to poor aqueous solubility, chemical instability under environmental stress, rapid first-pass metabolism, and variable gastrointestinal absorption. These factors collectively contribute to low and inconsistent oral bioavailability.This review focuses on formulation strategies designed to enhance the stability and oral bioavailability of ginger extract in solid dosage forms such as tablets, capsules, and granules. Approaches including solid dispersions, lipid-based drug delivery systems, self-emulsifying drug delivery systems (SEDDS), nanoencapsulation, phytosome complexes, cyclodextrin inclusion complexes, and polymeric nanoparticles are critically discussed. The impact of excipient selection, microenvironmental pH control, incorporation of antioxidants, and advanced coating technologies on stability improvement is also evaluated. Furthermore, emerging manufacturing techniques such as spray drying, hot-melt extrusion, and nanocrystallization are examined for their scalability and industrial feasibility. By integrating modern drug delivery systems with herbal formulations, enhanced stability, improved dissolution, and optimized systemic exposure of ginger bioactives can be achieved. This review provides a comprehensive scientific framework for the rational design of stable and bioavailable solid oral formulations of ginger extract.

Keywords: Ginger extract; Oral bioavailability; Solid oral dosage forms; Stability enhancement; Solid dispersion; Self-emulsifying drug delivery system (SEDDS); Nanoencapsulation; Phytosomes; Cyclodextrin complexes; Lipid-based formulations; Herbal drug delivery; Pharmacokinetics.

PP06

EXPLORATION OF PHYTOCONSTITUENTS AND MEDICINAL PROPERTIES OF NARDOSTACHYS JATAMANSI

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ABSTRACT

India is blessed with the richest flora having many medicinal plant species which can be used as substitute for Allopathy medicines. From ancient times, medicinal plants have been used as herbal drugs for the treatment of different diseases. Among the different medicinal plants in Ayurvedic systems, the plant *Nardostachys jatamansi* have an important role. Almost all parts of the plants are having different therapeutic properties. The Ayurvedic name of this *Nardostachys jatamansi* species is jatamanasi and belongs to the family Valerianceae while the trade name is Balchhar.

To deliver scientific confirmation of its phytochemical and pharmacological activities, an updated information about this plant is very much essential. Hence, our present study focused to explore its phytoconstituent compositions and pharmacological activites. Extraction of this plant with different solvents revealed that diverse composition of molecules such as flavonoids, alkaloids, terpenoids, steroids, phenols, cardiac glycosides, tannins and saponins are present in the extract. Elemental analysis of this plant revealed many minerals such as calcium, magnesium, potassium, phosphorous and sodium are present in the plants. These elements are very much essential for the daily routine activities of human body.

The results of bioactivity study have shown that different extracts depict notable therapeutic activity. Leaf extract of this plants has been used for anti cancer, anti oxidant, antibacterial, anti diabetic, antidepressant, Radioprotective, anti stress, anti amnesic, anxiolytic, nootropic, hypertension, anticataleptic, pancreatic, hair growth studies, antimicrobial, insomnia, antihypertensive, diuretic,

neuroprotective, insecticidal, hypolipidaemic, anti ulcer hepatoprotective, mycarodial, anticonvulsant, anti inflammatory and other activity of *Nardostachys jatamansi* DC. It has been traditionally used as a brain tonic and sedative in many herbal systems of medicine. In addition, the plant contains essential minerals that support normal physiological functions and contribute to overall health. In conclusion, our study insisting to increase the awareness and public consciousness about the various nutritional, therapeutic and medicinal value of the "*Nardostachys jatamansi*" for the welfare and favor of mankind.

Keywords: Nardostachys jatamansi, phytoconstituents, pharmacological activities, Neuroprotective activity, Therapeutic properties.

PP07

HERBAL BASED WOUND HEALING PATCH FOR THE MANAGEMENT OF FOOT ULCER

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ABSTRACT

Foot ulcers, particularly diabetic foot ulcers, represent a significant clinical challenge due to delayed healing, high risk of infection, and potential complications. Conventional treatments often rely on synthetic drugs, which may lead to side effects and increased antimicrobial resistance. Therefore, there is a need for safer and more effective alternative therapies.

The present study aims to develop a herbal-based wound healing patch for the management of foot ulcers. The formulation incorporates natural ingredients such as Gymnema sylvestre (Gurmar), Aloe vera, black turmeric, and honey extract, known for their antimicrobial, anti-inflammatory, and wound healing properties.

These herbal components are embedded in a biocompatible hydrogel matrix to provide sustained release of active constituents and maintain a moist wound environment, which is essential for faster healing. The prepared patch will be evaluated for its physicochemical properties, drug release profile, antimicrobial activity, and wound healing efficiency.

This study highlights the potential of herbal formulations as a cost-effective, safe, and efficient alternative to conventional wound care systems, thereby improving patient outcomes in the management of chronic foot ulcers.

BM01

DEVELOPMENT AND QUALITY ASSESSMENT OF LOW-SUGAR, LOW-FAT BISCUITS FOR DIABETIC-FRIENDLY CONSUMPTION

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ABSTRACT

Biscuits are widely consumed flour-based snack products, and their texture, appearance, and sensory qualities largely depend on the proportion of sugar and fat used in the formulation. However, reducing these components may alter the product's physical and organoleptic attributes. In this study, three biscuit varieties—cocoa biscuit, cream biscuit, and cream-and-jam biscuit—were selected for comparison. Experimental samples were formulated with reduced sugar and fat contents relative to the respective control samples. The stevia molecules were finalized following multiple iterative experimental trials. To maintain product quality, modifications to the control recipe, particularly in the levels of leavening agents, were made to ensure that the weight, thickness, length, and breadth of the trial samples closely matched those of the controls. The bulk density of the dough along with the moisture loss of the sample during baking was observed. The desired appearance and texture were achieved through the incorporation of suitable emulsifiers. The findings indicate that biscuits with reduced sugar and fat can be successfully developed without compromising key physical characteristics. Sensory evaluation was conducted to determine if the sensorial of the biscuit was matching with the desirable nature of diabetic patients. Such healthier biscuit formulations may serve as a supportive dietary option for individuals seeking to manage diabetes, obesity, and related lifestyle disorders.

Keywords: Biscuits; Sugar Reduction; Fat Reduction; Value Addition.

BM02

FORMULATION AND EVALUATION OF HERBAL INSITU GEL USING *CALOTROPIS GIGANTEA* FOR WOUND HEALING

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ABSTRACT

Wound healing is a complex biological process that requires effective and sustained drug delivery to promote tissue regeneration and prevent infection. Herbal-based formulations have gained considerable interest due to their safety and therapeutic potential. The present study aimed to formulate and evaluate a herbal in-situ gel containing *Calotropis gigantea* leaf extract for wound healing activity using a natural polymer. The leaves were shade-dried, powdered, and extracted using ethanol. The plant extract was subjected to preliminary phytochemical screening, which confirmed the presence of bioactive constituents such as flavonoids, tannins, saponins, terpenoids, glycosides, and phenolic compounds responsible for therapeutic activity. Then the in-situ gel formulation was prepared using natural polymers and ion-activated gelation technique, enabling transformation from sol to gel under physiological conditions. Various formulations were developed by optimizing the concentration of gelling agents and cross-linking components. Prepared formulations were evaluated for physicochemical parameters including pH, viscosity, gelation capacity, clarity, and stability. The optimized formulation exhibited appropriate gel strength, acceptable pH, and stable persistent gel formation, indicating its suitability for controlled drug release. The results suggest that the herbal in-situ gel containing *Calotropis gigantea* possesses promising characteristics for wound healing applications. Thus, the developed formulation may serve as an effective and patient-compliant alternative for topical wound management.

Keywords : *Calotropis gigantea*, Herbal in-situ gel, Natural polymer, Ion-activated gelation, Ethanolic extract, Wound healing, Controlled release formulation.

BM03

DEVELOPMENT AND OPTIMIZATION OF BIOACTIVE POLYHERBAL GEL FOR TREATMENT OF DERMAL PATHOLOGIES

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ABSTRACT

Skin infections caused by bacterial pathogens are a public health concern due to the increasing antibiotic resistance. The present study focuses on the formulation and evaluation of a bioactive polyherbal gel incorporating extracts of *Hemigraphis alternata*, *Jatropha multifida*, *Dioscorea alata*, and *Rubia cordifolia* for the management of dermal infections. The formulated gel was optimized to enhance antibacterial activity and promote skin healing. Antibacterial efficacy was assessed using the agar well diffusion method against *Staphylococcus aureus*. In addition to experimental validation, in silico molecular docking studies were performed to evaluate interactions between selected phytochemicals and bacterial virulence or resistance-associated protein targets. The results demonstrated significant antibacterial activity of the polyherbal gel, suggesting its potential as a safe and effective alternative to conventional antibiotic therapies. Overall, this study integrates formulation development, microbiological evaluation, and computational analysis to propose a promising herbal approach for dermal infections.

Keywords: Polyherbal gel; Skin infections; Antibacterial activity; Molecular docking; Antibiotic resistance

BM04

ANTIBIOFLIM EFFECT OF ANANAS COMOSUS EXTRACT AGAINST FUSOBACTERIUM NUCLEATUM

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ABSTRACT

Biofilms formed by Fusobacterium nucleatum play a crucial role in oral infections and periodontal disease due to their strong resistance to antibiotics. This study investigates the ant biofilm and antibacterial potential of Ananas comosus (pineapple) peel extract, a natural source of bioactive compounds such as bromelain, flavonoids, and phenolics. The peel extract was obtained through cold extraction using a hydroalcoholic solution and tested for its efficacy against F. nucleatum using conventional microbiological techniques and fluorescence-based assays. Minimum inhibitory concentration (MIC) and IC_{50} values were determined, with the extract showing significant biofilm inhibition in a concentration-dependent manner (IC_{50}: 18.01 µg/ml). Dual staining with acridine orange and ethidium bromide (AO/EtBr) revealed strong cytotoxic effects, with red/orange fluorescence indicating substantial membrane damage and bacterial death. The findings demonstrate the potential of A. comosus peel extract as a natural antibiofilm agent, offering a promising alternative to synthetic antimicrobials for managing biofilm-associated infections.

Keywords: Ananas comosus, Fusobacterium nucleatum, Biofilm inhibition, Periodontal pathogens, Phytochemicals.

BM05

BIOPROSPECTING MARINE MICROORGANISMS FOR THE DEVELOPMENT OF GREEN ANTIFOULING STRATEGIES AGAINST BIOFOULING COMMUNITIES

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ABSTRACT

This study aimed to isolate marine microorganisms and evaluate their anti-biofilm potential against freshwater bio fouling communities. Bio fouling is the undesirable accumulation of microorganisms on submerged surfaces, leading to operational and environmental challenges in various systems. Marine soil, sediment, and water samples were serially diluted and plated on Nutrient Agar for bacterial isolation. A total of 11 isolates were obtained. Bio fouling samples collected from pond, lake, and well water in Tiruvallur and Chennai exhibited visible biofilm formation. Anti biofilm activity was assessed using the crystal violet assay at 590 nm. Among the isolates, SS-4-1B showed 28.5% inhibition, while W-4-1B and W-6-2B demonstrated higher inhibition of 42.8% and 35.7%, respectively.

Further evaluation using the Lowry method revealed significant Extracellular Polymeric Substances protein reduction, with SS-4-1B (80%) and W-4-1B (70%) showing strong disruption of the biofilm matrix. SS-4-1B was selected for metabolite extraction using ethyl acetate, and the concentrated extract of 3.5 ml was given to GC–MS analysis to identify potential anti biofilm compounds.

Overall, the study demonstrates the potential of marine microorganisms as a novel source of antifouling agents against freshwater biofouling communities. The research examines both biofilm inhibition and disruption of the biofilm matrix through reduction of Extracellular Polymeric Substances (EPS) protein, providing insight into the mechanism of biofilm control. Additionally, analysis of marine-derived bacterial extracts reveals bioactive metabolites that may contribute to the development of sustainable antifouling strategies.

Keywords: Bio fouling, biofilm inhibition, marine bacteria, EPS, crystal violet assay, GC–MS.

BM06

BIODERIVED MATERIALS FOR ENVIRONMENTAL, FOOD, BIOMEDICAL, AND ENERGY APPLICATIONS

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ABSTRACT

Transforming waste into high-value biomaterials is a great step towards a sustainable circular bioeconomy. Bioderived materials like cellulose and chitosan can be obtained from waste materials and it is exploited for various applications including environmental remediation, food technology, drug delivery, and green energy. There are several studies where waste-derived cellulose was used for removing hazardous materials from wastewater and aids in water treatment. Membrane made with cellulose can be used for biofiltration, in microbial fuel cell for bioelectricity generation. Crab shell derived chitosan is known to possess several bioactivity including antibacterial activity, antioxidant activity and also used as a natural clarifying agent in food processing. When these two biopolymers are combined these can be used for drug delivery, enabling sustained release of a drug. Thus, waste-derived biopolymers can be used as sustainable, cost-effective materials for diverse technological applications.

Keywords: Waste valorization; Cellulose; Chitosan; Circular bioeconomy

BM07

SYNTHESIS AND CHARACTERIZATION OF SPIONs AND CHITOSAN COATED SPIONs FOR DYE REMOVAL

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ABSTRACT

The rapid industrialization creates many environmental pollution. The water pollution is most considerable pollution. Water is the main source on the earth. The water is polluted by the dyes from the various industries like paper, textile, plastic and other chemical industries. This dyes are discharged into fresh water bodies they are complex structure and non-biodegradable in nature that can cause human health and environment.Various methods are used to remove this dyes from water but batch adsorption studies gives promising results and eco-friendly method. SPIONs (superparamagnetic iron oxide nanoparticle) which is used for various applications like drug delivery, contrast agents for imaging, hyperthermia, tissue engineering and environmental remediation for its unique properties.One of the unique characteristics of SPIONs are they immediately obey applied external magnetic field and lose it's magnetism when the external field is removed.Chitosan is the non-toxic, biodegradable biopolymer and it is used in the various application due to it is biocompatible, and it has antibacterial properties. The chitosan has amine group which us positively charged that are attracted towards the negatively charged particle. The bare SPIONs shows the highest removal but the chitosan were coated to SPIONs to increase high efficiency of dye removal.

Keywords: SPIONs, chitosan, batch adsorption, dye removal.

BM08

BIODERIVED PIGMENTS AND THEIR INDUSTRIAL APPLICATIONS

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ABSTRACT

The fabric industry is one of the important sectors leading to ecological and environmental problems due to the damaging impact of synthetic colorants on the environment and public health. As an alternative the biopigments derived from plant and microorganism sources and are considered renewable and naturally degradable. These pigments also have the ability to change it's colour due it's structure properties which can be used as a biosensor to identify different pH. The pigments can be used for other applications like synthesis of silver nanoparticles (AgNPs), which have multiple properties like antimicrobial and antioxidant activities etc. Additionally the silver nanoparticles from natural dyes can be analyzed using analytical methods such as UV-Visible spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR). Dynamic Light Scattering (DLS). X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), and Nuclear Magnetic Resonance (NMR). There by these natural dyes and their nanoparticle derivatives have potential applications in environmental bioremediation and various bio-technology fields.

Keywords: Biopigments , Natural dyes, Silver nanoparticles, pH detection, Environmental bioremediation

BM09

WASTEWATER TREATMENT AND ELECTRICITY GENERATION USING MICROBIAL FUEL CELLS

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ABSTRACT

Wastewater contains different types of pollutants including organic matter, heavy metals, toxic chemicals, dye, nutrients, and pathogenic microorganisms. Dairy waste water contain more organic load due to that are contaminated easily, so suitable wastewater for the treatment in microbial fuel cell. That causing many types non-communicable disease to the human including cardiovascular issues, chronic kidney disease (CKD), and cancer. Various treatment methods are there but the microbial fuel cells are treat wastewater at the same time generate electricity using electrogeneic microorganisms. The performance under studies two configurations; Single chamber with and without membrane, is a bio electrochemical device. That converts chemical energy from organic matter into electrical energy. Organisms oxidize organic compounds in the anode that releasing electrons travel through an external circuit to the cathode, where they combine with oxygen to produce electricity. Water parameter analysis including, Biological Oxygen Demand(BOD), Chemical Oxygen Demand, Total Suspended Solids(TSS), Total Dissolved Solids(TDS), Chloride and Sulphide analysis, pH and Electrical conductivity were analysed before and after treatment evaluated the efficiency of pollutant removal The single-chamber MFC with a proton exchange membrane that helps better electrical output and pollutant removal efficiency compare to without membrane system. Chamber also used to many application, that cultivated to mycelium mat in various fungus media such as, HS media , sabouraud dextrose agar, potato dextrose agar.

Keywords: Wastewater treatment, Electrical energy, Water parameter analysis, Pollutant removal, Microbial fuel cell, Single-chamber, Proton exchange membrane.

BM10

INVITRO PROPAGATION OF MACROALGAE AND ITS BIOACTIVITY

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ABSTRACT

Marine macroalgae represent a valuable and sustainable source of structurally diverse bioactive compounds with significant pharmacological potential. The present investigation aimed to establish molecular authentication, develop an optimized in vitro propagation protocol, and evaluate the metabolic bioactivity of *Kappaphycus alvarezii*, a commercially important red alga widely utilized in nutraceutical industries.

Species authentication was performed using 18S rRNA gene sequencing to ensure taxonomic accuracy of the collected specimens. Sequence alignment and phylogenetic analysis confirmed the identity of the samples as *Kappaphycus alvarezii*, validating their suitability for downstream experimental studies.

For biomass enhancement, healthy thallus explants were cultured under sterile conditions in enriched seawater medium. Critical culture parameters, including salinity, temperature, light intensity, and photoperiod, were systematically optimized to maximize regeneration efficiency and biomass accumulation. The standardized in vitro propagation system enabled cotntinuous and sustainable biomass production independent of environmental and seasonal constraints.

Methanolic extracts derived from the regenerated biomass were assessed for anti-obesity and anti-diabetic activities through in vitro enzyme inhibition assays. Anti-obesity potential was evaluated via pancreatic lipase inhibition, while anti-diabetic activity was determined using α-amylase and α-glucosidase inhibition assays. The extracts exhibited significant inhibitory activity against these key metabolic enzymes, indicating the presence of potent secondary metabolites capable of modulating lipid digestion and carbohydrate metabolism.

In summary, the integrated strategy encompassing molecular validation, controlled propagation, and functional bioactivity assessment demonstrates the therapeutic promise of *Kappaphycus alvarezii* as a marine-derived candidate for managing obesity and diabetes. This study reinforces the role of marine biotechnology in sustainable resource utilization and the development of novel bioactive compounds for metabolic disorder management.

Keywords: *Kappaphycus alvarezii*, molecular characterization, 18S rRNA, in vitro culture, metabolic enzyme inhibition, anti-obesity, anti-diabetic, marine biotechnology.

BM11

SYNTHESIS OF GREEN-SYNTHESIZED SPIONs AND CHITOSAN-SPIONs FOR SUSTAINABLE ENVIRONMENTAL CLEANUP APPLICATIONS

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ABSTRACT

Water pollution has become a major environmental concern in recent years across the world. This creates a need of finding alternative solution to protect the aquatic ecosystems. Superparamagnetic iron oxide nanoparticles (SPIONs) show the super-paramagnetism potential and have their unique magnetic properties. This makes it easier to collect them after the dye removal mechanism. In this research, SPIONs were synthesized by green-synthesis method and functionalized with the chitosan biopolymer to enhance their potential in environmental remediation. Several characterizations were performed to analyze their functional and morphological properties. And the antibacterial activity was also examined. Application in pollution removal were assessed by the batch adsorption studies to determine the dye removal potential and isotherm analysis was done using several industrial dyes, to check the interaction mechanism and adsorption behavior between the dye and the nanoparticle. This study highlights the efficiency of green-synthesized SPIONs and chitosan-coated SPIONs as sustainable materials for wastewater treatment applications.

Keywords: Water pollution, Superparamagnetic iron oxide nanoparticles (SPIONs)**,** Green-synthesis SPIONs**,** Chitosan biopolymer**,** Antibacterial activity**,** Batch adsorption studies**.**

BM12

EXPLOITATION OF PROPOLIS EXTRACTS AND THEIR GREEN-SYNTHESIZED SILVER NANOPARTICLES FOR ANTIBACTERIAL ACTIVITY

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ABSTRACT

Propolis is a complex of phytocompounds which is made from resinous materials that are harvested by bees, pollen, branches and tree exudates. It is widely known for it's diverse biological activities and phytochemical composition. In recent years, the exploration of natural products as potential sources of bioactive compounds for nanotechnology and antimicrobial applications are increasing worldwide. The current study scrutinize the phytochemical profile and antibacterial activity of propolis extracts developed using various solvents including acidified ethanol, propylene glycol and PEG 400 and to investigate their potential in green synthesis of silver nanoparticles (AgNPs). For identifying crucial bioactive compounds present in propolis extracts, phytochemical screening was carried out initially. It is then characterized using UV-Vis, FTIR and GC-MS analysis. The antioxidant compounds were identified using Thin Layer Chromatography (TLC) and TLC Bioautography. Moreover, a green synthesis approach was applied for synthesizing silver nanoparticles using the prepared extracts. Both the crude extracts and silver nanoparticles extracts were then subjected to antibacterial assessment against selected bacterial strains. Overall, the outcome suggest that propolis may assist in the expansion and growth of natural and novel antimicrobial agents for pharmaceutical and biomedical applications.

Keywords: Propolis, green synthesis, TLC Bioautography, antibacterial activity, silver nanoparticles.

BA01

AN INTERPRETABLE MULTIMODAL FRAMEWORK FOR KNEE OSTEOARTHRITIS USING SWIN TRANSFORMER

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ABSTRACT

Accurate early-stage detection of knee osteoarthritis (KOA) from radiographic images remains challenging due to subtle structural changes and the limited interpretability of existing artificial intelligence–based diagnostic systems. To address this issue, this study proposes an interpretable Swin Transformer–based framework for early KOA detection and severity grading using knee X-ray images and patient clinical data. The proposed system employs a Swin Transformer model to extract radiographic features, while a multilayer perceptron (MLP) processes patient clinical attributes. A diffusion-based fusion mechanism integrates imaging and clinical representations to enhance diagnostic performance, and an explainability module highlights the key factors influencing model predictions. The framework performs automated severity grading based on the Kellgren–Lawrence classification system, enabling both detection and disease progression assessment. Experimental evaluation demonstrates improved diagnostic accuracy and consistent performance compared to conventional image-only approaches. By combining multimodal learning with interpretable artificial intelligence, the proposed framework enhances diagnostic reliability and supports transparent, clinician-assisted decision-making in osteoarthritis screening. Future work will evaluate the system on larger multi-center datasets to improve robustness and generalization across different hospitals and imaging environments.

Keywords: Knee Osteoarthritis; Swin Transformer; Explainable AI; Multimodal Fusion.

BA02

ROBUST INSTRUMENTAL VARIABLE INDICATORS IN CAUSAL INFERENCE: A FRAMEWORK FOR IDENTIFICATION AND VALIDATION

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ABSTRACT

Causal inference from observational data is fundamentally challenged by the presence of unobserved confounding variables, which bias standard statistical estimators. Instrumental Variables (IVs) offer a powerful theoretical mechanism to isolate the true causal effect of a treatment on an outcome by exploiting exogenous sources of variation. However, identifying and validating an appropriate IV indicator remains exceptionally difficult, as candidate variables frequently violate the strict structural assumptions required for unbiased estimation. This paper proposes a comprehensive framework for the robust selection and application of IV indicators, integrating high-dimensional thresholding algorithms with automated evaluation pipelines. By rigorously structuring the identification process, this methodology aims to mitigate the risks of invalid instruments and enhance the reliability of causal discovery in complex empirical settings.

BA03

ARTIFICIAL INTELLIGENCE IN CORONARY ARTERY DISEASE: EMERGING TECHNOLOGIES AND THERAPEUTIC APPLICATIONS

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ABSTRACT

Coronary artery disease (CAD), which is among the most common non-communicable diseases, remains one of the largest causes of morbidity and mortality worldwide. The rising rates of CAD underline the necessity to introduce sophisticated methods, which can help to diagnose the disease earlier, forecast risks, and develop tailor-made treatment plans. Machine learning (AI) and deep learning (AI) and data-driven predictive models have become a revolutionary application in cardiovascular medicine. The review analyses the current trends in AI-based interventions and how they can be used therapeutically to manage CAD. Artificial intelligence is becoming the foundation of collaboration with various healthcare data, such as electronic health records, clinical parameters, wearable devices, and medical imaging systems such as electrocardiography, coronary computed tomography angiography, and cardiac magnetic resonance imaging. Such systems will allow better identification of coronary abnormalities, correct risk stratification, and disease advancement. Also, clinical decision support systems based on AI can support physicians in maximizing treatment options, such as pharmacological and lifestyle management and interventional procedures such as percutaneous coronary intervention. Remote monitoring and digital health platforms are also areas of AI implementation, as it helps to regulate patients all the time and address complications early on. In spite of these positive developments, issues of data privacy, algorithm transparency, clinical validation, and integration into healthcare processes are acute problems. Altogether, AI-based technologies can transform CAD prevention, diagnosis, and therapy to facilitate precision medicine and enhance clinical outcomes in cardiovascular care.

Keywords: Coronary artery disease, Non-communicable diseases, Artificial intelligence, Machine learning, Deep learning, Cardiovascular imaging, Precision medicine.

BA04

BIOMEDICAL TECHNOLOGY AND ITS APPLICATIONS IN MODERN HEALTHCARE

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ABSTRACT

Biomedical technology is an interdisciplinary field that integrates principles of biology, medicine, and engineering to improve healthcare systems. It plays a vital role in the diagnosis, treatment, and prevention of diseases, thereby enhancing the quality of patient care and monitoring. This field encompasses a wide range of technologies including medical imaging, biosensors, artificial organs, nanotechnology, and robotic surgery.

Medical imaging techniques such as X-ray, CT scan, MRI, and ultrasound enable non-invasive visualization of internal body structures, facilitating early disease detection. Biosensors are essential tools that convert biological signals into electrical signals and are widely used in disease diagnosis and continuous monitoring, such as glucose monitoring in diabetic patients. Artificial organs, including artificial hearts, dialysis machines, and cochlear implants, replace or support the function of damaged organs, improving patient survival and quality of life.

Nanotechnology has further advanced biomedical applications by enabling targeted drug delivery, improving treatment efficiency, especially in cancer therapy, and contributing to innovative drug development. Overall, biomedical technology has revolutionized healthcare by making diagnosis more accurate, treatments more effective, and patient monitoring more efficient. Continued research and innovation in this field are expected to lead to even more advanced medical solutions in the future.

Keywords : Biomedical technology, Medical imaging, Biosensors, Nanotechnology.

BA05

DEVELOPMENT OF A WEARABLE MICROFLUIDIC COLORIMETRIC SALIVA PATCH FOR RAPID DETECTION OF PATHOLOGICAL BIOMARKER CHANGES

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ABSTRACT

The increasing demand for non-invasive, rapid and cost-effective diagnostic tools has led to the development of wearable biosensing technologies. In the present study, a wearable microfluidic colorimetric saliva patch was developed for the rapid detection of pathological biomarker changes. Saliva is an easily accessible biofluid that contains various biomarkers useful for early disease diagnosis.

In this study, the patch was designed using microfluidic channels to collect and transport saliva into multiple sensing zones containing specific colorimetric reagents. These reagents react with target biomarkers such as glucose, pH, uric acid and cortisol, resulting in a visible color change that indicates abnormal physiological conditions. The device was fabricated using low-cost and flexible materials, making it suitable for continuous monitoring.

The performance of the patch was evaluated based on sensitivity, response time and color variation analysis. The observed color changes can be visually interpreted or further analyzed using a smartphone-based detection system for improved accuracy. The developed patch provides a non-invasive, user-friendly and rapid diagnostic solution for early disease detection and health monitoring.

This study concludes that the saliva-based wearable microfluidic patch is an efficient, eco-friendly and sustainable diagnostic tool with potential applications in point-of-care testing and future healthcare systems.

Keywords: Wearable patch, Saliva biomarkers, Microfluidics, Colorimetric detection, Non-invasive, Rapid diagnosis, Biosensor

BA06

DETECTION OF ADULTERATION IN PANEER USING KIT

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ABSTRACT

Paneer is a common part of the Indian diet, and because it is made fresh and sold widely, it often ends up being adulterated by small-scale producers who want to cut costs or extend shelf life. Over the last few years, reports and studies have shown that paneer sold in many local markets contains starch, synthetic milk components, detergents, urea and even chemicals like formalin or hydrogen peroxide. These substances may make paneer look firmer or last longer, but they can also cause stomach problems, kidney strain and long-term health issues if consumed regularly. While laboratories have established methods to test for these adulterants, most of these tests require equipment, trained technicians or time— none of which are easily available to everyday consumers. This project aims to create a simple and affordable paneer adulteration detection kit that anyone can use without specialised knowledge. The idea is to bring together a set of colour-based tests that react quickly to common adulterants like starch, urea, detergents and preservatives. Each test would give a clear colour change so that even a consumer or shopkeeper could understand the result within a few minutes. By combining scientific findings from earlier studies with the need for a practical, field-ready solution, the project hopes to bridge the gap between laboratory detection and real-world use. Ultimately, the goal is to help people make safer choices, improve awareness and support food safety efforts by offering an easy way to check the purity of paneer sold in the market.

Keywords: Paneer adulteration, Detection kit, Food safety, Colorimetric testing

BC01

VIRTUAL SCREENING OF NATURAL AND SYNTHETIC MOLECULES AGAINST SARS-CoV-2 SPIKE PROTEIN

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ABSTRACT

The COVID-19 pandemic created an urgent need for rapid drug discovery to control viral infections. This study focuses on the identification of potential antiviral compounds against SARS- CoV-2 using *in-silico* drug design methods. Various phytochemical and synthetic compounds were analyzed using computational tools such as Protein Data Bank, PubChem, ChemSketch, Open Babel, and iGEMDOCK. Molecular docking was performed to evaluate the interaction between ligands and the viral protein (6VSB). The results showed that Hesperidin exhibited the best binding affinity among phytochemicals, while Nirmatrelvir showed strong interaction among synthetic drugs, indicating their potential as antiviral candidates.

Keywords: COVID-19, *In-silico* drug design, Molecular docking, binding affinity

BC02

NETWORK PHARMACOLOGY–BASED IDENTIFICATION OF MULTI-TARGET MECHANISMS OF *SYZYGIUM CUMINI* PHYTOCHEMICALS AGAINST TYPE 2 DIABETES MELLITUS AND ALZHEIMER'S DISEASE

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ABSTRACT

Type 2 Diabetes Mellitus (T2DM) and Alzheimer's disease (AD) are complex disorders that share overlapping mechanisms involving oxidative stress, inflammation, metabolic dysfunction, and neuronal impairment. Conventional single-target drugs often fail to effectively modulate these interconnected pathways. This study uses an integrated bioinformatics and network pharmacology approach to explore the multi-target therapeutic potential of *Syzygium cumini* seed phytochemicals. 112 phytochemicals were compiled from the IMPPAT database and literature, and canonical SMILES were retrieved from PubChem. ADME profiling was performed using SwissADME, toxicity prediction using ProTox-3.0, and potential human targets were predicted using SwissTargetPrediction. Tissue-specific expression of predicted targets was assessed using the Human Protein Atlas. Protein–protein interaction networks and pathway enrichment were analysed using STRING. To determine clinical relevance, Cytoscape-based compound–target and drug–target networks were constructed, along with phytochemical–drug target networks comparing phytochemicals with antidiabetic and anti-Alzheimer's drugs. AD-associated target dysregulation across major brain regions was evaluated using AlzData and visualised through target–disease interaction networks. The analysis revealed phytochemicals with favourable pharmacokinetics, low toxicity, predicted blood–brain barrier (BBB) permeability, and strong overlap with drug targets. Overall, *S. cumini* seed phytochemicals exhibit promising multi-target activity against metabolic–neurodegenerative pathways and highlight the potential of network pharmacology–driven strategies for phytochemical-based drug discovery.

Keywords: Diabetes Mellitus, Alzheimer's disease, *Syzygium cumini,* Phytochemical, Network Pharmacology.

BC03

STRUCTURE BASED DRUG DESIGN OF EGFR TYROSINE KINASE INHIBITORS IN NON-SMALL CELL LUNG CANCER

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ABSTRACT

Epidermal Growth Factor Receptor (EGFR) mutations are a primary driver of non-small cell lung cancer (NSCLC), with acquired resistance limiting the long-term efficacy of early-generation tyrosine kinase inhibitors. The first-generation inhibitor Gefitinib demonstrated significant activity against activating EGFR mutations but failed to overcome secondary resistance mutations such as T790M and C797S. Recently, fourth-generation inhibitors including BLU-945 have shown improved selectivity toward resistant mutant EGFR. In this study, a rational structure-based drug design (SBDD) approach was employed to develop a novel hybrid scaffold integrating critical pharmacophoric features of Gefitinib and BLU-945. Ligands were constructed using ChemSketch and subjected to molecular docking analysis in PyRx to evaluate binding affinity, hydrogen bonding, and hydrophobic interactions within the EGFR kinase domain. The novelty of this work lies in designing a resistance-targeted hybrid inhibitor aimed at enhancing binding stability and mutation coverage. Future studies will involve molecular dynamics simulations, in silico ADMET profiling, and experimental validation to facilitate further therapeutic development**.**

Keywords: EGFR, Structure-Based Drug Design, Molecular Docking, NSCLC, Gefitinib, BLU-945, Tyrosine Kinase Inhibitors, Drug Resistance

BC04

IN-SILICO DRUG DISCOVERY OF ANTI-OSTEOARTHRITIC AGENTS FROM *SPHAERANTHUS INDICUS* VIA MAPK11 TARGET MODULATION

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ABSTRACT

Osteoarthritis (OA) is a chronic degenerative joint disease characterised by progressive cartilage degradation, inflammation, and joint pain. The mitogen-activated protein kinase pathway plays a crucial role in the inflammatory processes associated with OA, and MAPK11 (p38β MAP kinase) has been identified as a key regulator involved in cartilage destruction and inflammatory signalling. Targeting MAPK11 may therefore provide a promising therapeutic strategy for the management of osteoarthritis.

The present study aimed to evaluate bioactive compounds from *Sphaeranthus indicus*, a medicinal plant widely used in traditional medicine, as potential inhibitors of MAPK11 using in-silico computational approaches. Phytochemical compounds reported from *Sphaeranthus indicus* were retrieved from phytochemical and chemical databases and prepared for molecular docking analysis. The three-dimensional structure of the MAPK11 protein was obtained from the Protein Data Bank and processed to remove water molecules and bound ligands. Molecular docking was performed using appropriate docking software to predict the binding affinity and interaction patterns between the selected plant compounds and the active site of MAPK11. Additionally, drug- likeness and pharmacokinetic properties of the compounds were evaluated using ADMET prediction tools.

Keywords: Osteoarthritis, MAPK11 (p38β MAP kinase), *Sphaeranthus indicus,* in-silico computational approaches.

BC05

NETWORK PHARMACOLOGY AND MOLECULAR DOCKING STUDY OF LM22A-4 IN THE TREATMENT OF TRAUMATIC BRAIN INJURY

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ABSTRACT

Traumatic Brain Injury is a major cause of mortality and long-term neurological disability worldwide, characterized by neuronal damage, neuroinflammation, oxidative stress, and impaired synaptic function. Current therapeutic options remain limited, highlighting the need for novel neuroprotective strategies. LM22A-4 is a small-molecule mimetic of Brain-Derived Neurotrophic Factor that activates the Tropomyosin receptor kinase B signaling pathway and has demonstrated potential neuroprotective properties. However, the multi-target mechanisms underlying its therapeutic effects in traumatic brain injury remain unclear. In the present study, a network pharmacology approach was employed to investigate the potential molecular mechanisms of LM22A-4 in the treatment of TBI. Potential targets of LM22A-4 and TBI-associated genes were retrieved from publicly available databases. Common targets were identified and used to construct a protein–protein interaction network using STRING and visualized through Cytoscape. Functional enrichment and pathway analyses were performed to explore the biological processes and signaling pathways associated with the overlapping targets. Furthermore, molecular docking analysis will be conducted to evaluate the binding affinity and interaction patterns between LM22A-4 and key hub proteins obtained from the network analysis. The analysis is expected to reveal potential molecular targets and biological processes involved in the therapeutic action of LM22A-4 in Traumatic Brain Injury. It is anticipated that LM22A-4 may exert neuroprotective effects through the modulation of pathways related to neuronal survival, apoptosis regulation, and synaptic signaling. These findings are expected to provide a systems-level understanding of the potential mechanisms of LM22A-4 and may offer a theoretical basis for future experimental validation in traumatic brain injury.

Keywords: Traumatic Brain Injury, LM22A-4, Network Pharmacology, Molecular Docking, Neuroprotection, Tropomyosin receptor kinase B

BC06

REPURPOSING OF FDA APPROVED DRUGS AGAINST UROPATHOGENIC *E. FAECALIS*: IN-SILICO, IN-VITRO ANALYSIS

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ABSTRACT

Urinary tract infections (UTIs) are among the most common bacterial infections worldwide, and increasing antimicrobial resistance among uropathogens has become a major clinical challenge. This study aimed to determine the antibiotic resistance patterns of *Enterococcus faecalis* isolated from UTI samples and explore the possibilities for drug repurposing. A cross-sectional laboratory study was conducted using 300 urine samples collected from patients suspected of having UTI. Samples were cultured on blood and MacConkey agars, and bacterial identification was performed using colony morphology and standard biochemical tests. Antibiotic susceptibility testing was performed using the Kirby–Bauer disk diffusion method against commonly used antibiotics, including ampicillin, ciprofloxacin, tetracycline, linezolid, and vancomycin. The results revealed a high level of resistance to ampicillin, ciprofloxacin, and tetracycline among the isolates. In contrast, linezolid and vancomycin demonstrated good sensitivity against the tested strains. These findings indicate that *E. faecalis* is an important multidrug-resistant uropathogen, highlighting the need for continuous surveillance of antimicrobial resistance patterns. Understanding these resistance trends may aid clinicians in selecting appropriate therapy and support the exploration of drug repurposing strategies as potential alternative treatment options for resistant infections.

Keywords: Urinary tract infection, Enterococcus faecalis, Antibiotic resistance, Kirby–Bauer method, Drug repurposing, Uropathogens.

BC07

PHYTOTARGET-DB:AN INTEGRATED PHYTOCHEMICAL-PROTIEN TARGET DATABASE FOR INDIAN MEDICINAL PLATS

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ABSTRACT

PhytoTarget-DB is a structured database developed to investigate the relationships among Indian medicinal plants, their phytochemicals, and potential human protein targets for drug discovery. Traditional medicinal plants such as Tulsi (*Ocimum sanctum*), Neem (*Azadirachta indica*), Turmeric (*Curcuma longa*), Amla (*Phyllanthus emblica*), and Ginger (*Zingiber officinale*) are rich sources of bioactive compounds known for anti-inflammatory, antioxidant, antimicrobial, and anticancer activities. These properties make them valuable candidates for modern therapeutic research. Phytochemical data were collected from the IMPPAT database, which provides comprehensive information on Indian medicinal plants and their chemical constituents. Detailed chemical properties including molecular formula, molecular weight, 2D structure, IUPAC name, and SMILES were retrieved from PubChem. Potential human protein targets for each phytochemical were predicted using computational tools such as the STITCH database and Swiss Target Prediction, focusing specifically on *Homo sapiens* to ensure clinical relevance. Additionally, pharmacokinetic and drug-likeness properties, including absorption, distribution, metabolism, excretion, and toxicity (ADMET), were evaluated using Swiss ADME. All information was systematically organized into a relational database comprising interconnected tables for plants, phytochemicals, protein targets, interactions, and ADMET profiles. This design enables efficient data storage, retrieval, and large-scale analysis. A user-friendly web interface was developed to facilitate easy searching and exploration of phytochemicals, associated targets, and pharmacological properties. Network analysis using Cytoscape was conducted to visualize phytochemical protein interactions, aiding in the identification of key compounds and therapeutic targets. Overall, PhytoTarget-DB integrates traditional medicinal knowledge with modern bioinformatics tools, providing a comprehensive platform to support natural product-based drug discovery and molecular research.

KEYWORDS: Medicinal plants; Phytochemicals; Protein targets; IMPPAT database; PubChem; ADMET; Drug discovery; Bioinformatics; Cytoscape; Network analysis.

BC08

COMPUTATIONAL PREDICTION OF MISCARRIAGE USING GENE EXPRESSION AND AI APPROACHES

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ABSTRACT

Early pregnancy loss (EPL) is a dominant health concern, affecting an estimated 10–15% of clinically recognized pregnancies worldwide, with higher risks reported in women undergoing assisted reproductive technologies such as IVF and ICSI. Miscarriage not only impacts maternal physical health but also carries profound psychological and social consequences. To address this, our research leverages machine learning to enhance prediction of EPL and to differentiate between typical pregnancies and those at elevated risk during the first trimester. This study uses gene expression profiles from the publicly available GEO dataset to predict miscarriage-related outcomes, with a focus on recurrent spontaneous abortion (RSA). RSA is characterized by the loss of two or more consecutive pregnancies. By applying Random Forest and XGBoost classifiers to these gene expression signatures, our study aims to identify early biomarkers of miscarriage risk and provide clinical insights into the molecular underpinnings of RSA and implantation failure, which are common following IVF/ICSI. We employed different machine learning methodologies, from conventional models to more advanced ones such as deep learning and multilayer perceptron models. Predictive analysis of miscarriage risk plays a crucial role in advancing personalized medicine by enabling early detection and prevention strategies. In this study, machine learning (ML) techniques, specifically Random Forest and XGBoost algorithms, were applied to evaluate miscarriage risk using gene expression profiles. The dataset was obtained from the publicly available GEO repository and included 15 patient samples divided into three categories: Control, Implantation Failure, and Recurrent Abortion. Finally, Random Forest achieved an accuracy of 98%, while XGBoost achieved 68%. The study highlights the potential of ML-based models in predicting miscarriage, providing valuable insights to identify the gene-level biomarkers that may serve as future clinical indicators for early intervention.

Key words: Random Forest, XGboost, control, Recurrent absorption, Implantation Failure.

AM01

MULTIMODAL AI DIAGNOSIS

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ABSTRACT

Early detection of diseases plays a crucial role in improving treatment outcomes and reducing healthcare costs. Artificial Intelligence (AI) has emerged as a powerful technology for analyzing complex medical datasets and supporting clinical decision-making. However, many existing diagnostic systems primarily rely on laboratory parameters while often overlooking pharmaceutical information such as patient drug history. Since medication usage can significantly influence disease progression and therapeutic outcomes, integrating pharmaceutical data with clinical parameters may enhance the accuracy of predictive diagnostic models.

This study proposes a multimodal artificial intelligence-based approach for early disease prediction by combining laboratory parameters with patient drug history. Publicly available medical datasets containing clinical and biochemical parameters will be utilized for model development. The collected data will undergo preprocessing steps including data cleaning, normalization, and feature selection to improve the quality of input variables. Machine learning algorithms will then be applied to develop predictive models capable of identifying potential disease risks. The developed model aims to analyze patient-specific data and generate diagnostic predictions that may assist healthcare professionals in making informed clinical decisions.

The proposed system is expected to enhance diagnostic accuracy by integrating pharmaceutical and clinical data within an AI-driven framework. Such an approach may contribute to early disease detection, improved therapeutic monitoring, and personalized healthcare management. In future applications, the model can be expanded to include multiple disease conditions and integrated with hospital information systems for real-time clinical support.

Keywords: Artificial Intelligence; Disease Prediction; Machine Learning; Pharmaceutical Data

AM02

ARTIFICIAL INTELLIGENCE IN MEDICINE

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ABSTRACT

Artificial intelligence (AI) is Pharma's next frontier in life sciences. This article analyze about the recently techniques of AI that aims to imitate human intelligence functions i.e. with the help of Artificial intelligence & Robots 'Automation become the result of Industrialization', driven by the need to increase productivity, to achieve consistent quality products & to remove hazardous and heavy work from workers. Recent trends of AI in pharmacy are PAT, CFD, Pharmaceutical automation in research & development which give detailed information about techniques that has already been used in healthcare such as inhaler designs, drug absorption & dissolution and is disease focused. A robot for pharmaceutical applications has a bright future but with the rapidly aging population that urgently requires sophisticated medical devices & newer drugs, robotics systems are increasingly adopted for improved productivity and efficiency to meet this growing demand. However, robots manufacturers face several challenges in their effort to establish themselves in pharmaceutical applications. AI with robotics in the life of mankind has several advantages & disadvantages. Despite the increasingly rich AI literature from the drug discovery to care options AI techniques are used such as in ANN [artificial neural network], machine learning, AI in healthcare, AI in clinical practice. This research mainly concentrates around a few disease types: Cancer, Nervous system and cardiovascular diseases as they are life threatening. The future is always hard to predict, but it will be determined by AI as it would become the next frontier in pharmacy.

Keywords: Artificial Intelligence (AI), Machine Learning, Medical Imaging, Disease Diagnosis

AM03

INFO MED

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ABSTRACT

Medical information plays an important role in improving healthcare services. It includes details about a patient's health condition, medical history, diagnosis, treatment, and medications. Proper management of medical information helps doctors and healthcare providers make accurate decisions and provide better treatment. With the help of modern technology, medical information can be stored and accessed easily through digital systems. This improves communication between doctors and hospitals, reduces errors, and saves time during emergencies. Therefore, managing medical information effectively is essential for better patient care and the overall development of the healthcare system

AM04

AI-BASED SMARTPHONE-ASSISTED SCREENING SYSTEM FOR EARLY DETECTION OF ORAL CANCER

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ABSTRACT

Oral cancer is one of the most common non-communicable diseases in developing countries, particularly in India, mainly due to the widespread use of tobacco products, alcohol consumption, and lack of early diagnosis. Early detection plays an important role in improving the survival rate and treatment outcome of patients. However, in many rural and semi-urban areas, limited access to specialized healthcare facilities and screening programs often leads to delayed diagnosis and poor prognosis. This project proposes an AI-based smartphone-assisted screening system for the early detection of oral cancer. The proposed system utilizes a Convolutional Neural Network (CNN) model to analyze images of oral lesions captured using a smartphone camera. The AI model processes the uploaded images and classifies them into three categories: normal tissue, potentially malignant lesions, and high-risk cancerous lesions. The system also generates a risk score that helps in identifying individuals who may require immediate medical consultation. The developed prototype demonstrates a conceptual workflow that includes image capture, image upload, automated AI-based analysis, and generation of recommendations for further clinical evaluation. This approach combines artificial intelligence with mobile technology to create a low-cost, portable, and accessible screening solution suitable for primary healthcare settings. The proposed system has the potential to support early diagnosis, reduce mortality rates, and improve patient outcomes, especially in resource-limited and remote areas where access to specialized medical care is limited.

Keywords: Oral Cancer, Artificial Intelligence, Convolutional Neural Network, Early Detection.

AM05

ENGINEERING GUT BACTERIA WITH SYNTHETIC GENE CIRCUITS TO ENHANCE CAR-T CELL THERAPY FOR SOLID TUMORS

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ABSTRACT

Chimeric Antigen Receptor T-cell (CAR-T) therapy has demonstrated remarkable clinical success in hematological malignancies; however, its efficacy in solid tumors remains limited due to poor tumor infiltration and an immunosuppressive tumor microenvironment. The present study proposes an innovative approach that integrates microbiome engineering and synthetic biology to enhance CAR-T cell activity within solid tumors. In this strategy, non-pathogenic gut bacteria, particularly *Escherichia coli*, are genetically engineered with synthetic gene circuits capable of sensing tumor-associated signals such as hypoxia and elevated lactate concentrations. Upon detection of these signals, the engineered bacteria are programmed to secrete immune-modulatory molecules and chemokines, including cytokines such as Interleukin-12, to recruit and activate CAR-T cells at the tumor site. The project involves microbiome analysis to identify suitable bacterial hosts, construction of hypoxia-responsive gene circuits, and functional validation using in vitro tumor organoid models and in vivo mouse studies. Additionally, biosafety mechanisms such as programmable bacterial kill-switches are incorporated to ensure controlled bacterial activity. This engineered microbial system acts as a living therapeutic delivery platform that enhances CAR-T cell localization and activation in solid tumors. The proposed strategy offers a promising translational approach to overcome current limitations of CAR-T therapy and improve therapeutic outcomes in resistant solid cancers.

Keywords: CAR-T Cell Therapy; Synthetic Biology; Microbiome Engineering; Tumor Microenvironment; Hypoxia-Responsive Gene Circuits; Engineered Bacteria; Immunotherapy; Interleukin-12.

AM06

AN INTELLIGENT AI CHATBOT FRAMEWORK FOR RELIABLE AND EMPATHETIC DRUG INFORMATION RETRIEVAL

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ABSTRACT

The rapid expansion of artificial intelligence in healthcare has introduced novel opportunities for enhancing patient care and streamlining clinical workflows. Among these technological advancements, AI chatbots have emerged as highly promising tools for bridging health literacy gaps and offering real-time medical guidance. However, delivering highly accurate, empathetic, and secure drug information remains a complex challenge due to the risk of AI hallucinations and stringent data privacy regulations. This paper proposes a comprehensive, multi-modular framework for an AI chatbot dedicated specifically to pharmacotherapy and drug interaction retrieval. By integrating hybrid document understanding models with privacy-preserving machine learning pipelines, the proposed architecture ensures factual reliability while maintaining the conversational empathy necessary for effective patient engagement.

AM07

A CONTEXT-AWARE SMART PILL BOX WITH A TOPIC-BASED CONVERSATIONAL REMINDER SYSTEM FOR ENHANCED MEDICATION ADHERENCE

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ABSTRACT

Medication non-adherence remains a pervasive and critical challenge in the management of chronic diseases, leading to suboptimal therapeutic outcomes and inflated healthcare expenditures. While various digital health interventions have been proposed to address this issue, they frequently suffer from a disconnect between physical medication dispensing and engaging digital communication. This paper proposes a novel framework for a smart pill box integrated with a topic-based conversational reminder system designed to optimize patient compliance. By merging physical dispensing verification with dynamic, context-aware conversational topics, this system aims to mitigate user fatigue associated with traditional alarm-based reminders. We detail the system's architecture, including its hardware sensing modalities and its software logic grounded in behavioral theory. Furthermore, we outline a comprehensive evaluation plan to assess its efficacy against conventional approaches, providing a scalable blueprint for bridging the gap between passive medication storage and active patient engagement.

AM08

ARTIFICIAL INTELLIGENCE IN ALZHEIMER'S DISEASE: FROM EARLY DETECTION TO PERSONALIZED THERAPEUTICS

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ABSTRACT

Alzheimer disease (AD) is a progressive neurodegenerative disease and a major cause of dementia associated with a lot of difficulty in diagnosis, prognosis, and treatment. As the global burden of Alzheimer's as a non-communicable disease (NCD) continues to rise, novel methods have become necessary to enhance the early detection, treatment, and management of the disease. Artificial intelligence (AI) has become a disruptive instrument in solving these problems. The review paper discusses the use of AI in the field of Alzheimer disease with references to machine learning (ML), deep learning (DL), and natural language processing (NLP). AI technologies make it possible to detect early biomarkers, create disease progression predictive models and new therapeutic targets. Moreover, the possibilities of AI to improve personalized medicine by combining genetic, clinical, and imaging data are addressed. The paper identifies some of the current challenges including data privacy, algorithm transparency and clinical implementation. Future perspectives of AI in the treatment of Alzheimer, its possible clinical validation, and regulatory approval are also discussed, providing insights into the future of the use of AI in the fight against the debilitating condition.

Keywords: Alzheimer disease, non-communicable disease, artificial intelligence, machine learning, deep learning, biomarkers, predictive modelling, therapeutic, personalized medicine, neuroimaging, data privacy, clinical uptake.

AM09

THE ROLE OF ARTIFICIAL INTELLGENCE IN IMPROVING OUTCOMES FOR CYSTIC FIBROSIS PATIENTS

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ABSTRACT

Cystic fibrosis (CF) is a non-communicable, genetic illness that is long-term, limiting and also impacts the digestive and respiratory systems mostly because of mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene. Though CF has been advanced in terms of diagnosis and treatment, it remains a major problem in terms of disease monitoring, prompt complication recognition, and individual treatment control. Artificial intelligence (AI) has become a revolutionary technology in the medical field in recent years with new solutions to enhance clinical outcomes in cystic fibrosis. The paper is a review of the current and future applications of AI in CF management and treatment, such as early diagnosis, based on medical imaging and genetic analysis, prediction of disease progression, optimization of treatment plan, and support of personalized medicine. Models of machine learning and deep learning have shown potential to analyse large volumes of clinical data, discover trends in lung images, anticipate pulmonary exacerbations and improve the process of drug discovery related to CF treatments. Also, patient care is enhanced through AI-based digital health tools and remote monitoring systems that allow tracking diseases in real-time and timely intervening with clinical treatment. Combining modern computational methods and clinical knowledge, AI can provide a major benefit to the therapeutic decision-making process and improve the quality of life of patients with cystic fibrosis. The review presents the present advances, the possible advantages, and the existing limitations of using AI-based interventions to manage CF.

Keywords: Cystic Fibrosis, Artificial Intelligence, Machine Learning, Deep Learning, Personalized Medicine, Digital Health, Remote Monitoring.

AM10

AI FOR STROKE DETECTION AND MANAGEMENT

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ABSTRACT

The non-communicable stroke disease is the major cause of disability and mortality in the world which is mainly caused by the disruption of blood flow to the brain as a result of ischemic or haemorrhagic accidents. Early diagnosis, correct diagnosis, and proper treatment are important issues that can help to achieve better patient results. The latest developments in the field of Artificial Intelligence (AI) have brought about efficient stroke treatment to a new level by allowing the quick processing of medical imaging data, stroke prediction, and individual therapeutic planning. Machine learning and deep learning algorithms, which are AI-related tools, can help clinicians to recognize patterns of strokes, assess brain damage, and guide making timely clinical decisions. Also, AI technologies are applied to rehabilitation in the form of intelligent monitoring and adaptive therapy programs. The current review illustrates the importance of AI in the detection, diagnosis, and therapeutic management of non-communicable stroke diseases and how AI could be used to enhance clinical efficiency, patient recovery, and healthcare delivery.

Keywords: Stroke, Artificial Intelligence, Machine Learning, Medical Imaging, Clinical Decision Support Systems, Stroke Rehabilitation, Personalized Medicine.

AM11

ARTIFICIAL INTELLIGENCE IN HYPERTENSION CARE

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ABSTRACT

Hypertension is a primary non-communicable disease (NCD) and one of the biggest causes of morbidity and mortality in the world. It exposes the person to the high risk of developing cardiovascular complications like stroke, coronary artery disease, heart failure, and chronic kidney disease. Increased strain of hypertension is linked to lifestyle modifications, ageing, poor dietary habits and less physical exercise. Despite the presence of effective pharmacological treatment and lifestyle changes, not all patients are diagnosed and treated properly because of lack of healthcare access, low medication compliance and lack of long term follow-up. In recent years, Artificial Intelligence (AI) made new opportunities to enhance hypertension prevention, diagnosis, and treatment. The analysis of big amounts of medical records received with the help of electronic health records, clinical studies, or wearable health devices can be done with the help of AI techniques, specifically machine learning and deep learning. Such technologies enable detection of hypertension early, predict risks, and determine factors that are specific to patients and can affect the development of the disease. AI-based decision support systems can be used to help the clinician create individualized treatment plans and maximise the use of antihypertensive therapy. Also, wearables with AI and mobile health apps enable real-time blood pressure monitoring and feedback to enhance patient compliance and adherence to treatment protocols. Along with the promising advantages, there are also challenges including data privacy, bias in the algorithm, clinical validation, and penetration into the healthcare system. In general, AI-based interventions and therapeutic uses can change the management of hypertension and help to decrease the burden of this significant non communicable disease on the planet.

Keywords: Hypertension, Artificial Intelligence, Machine Learning, Blood Pressure Monitoring, Personalized Medicine, Wearable Health Devices, Digital Health.

AM12

AI-BASED INNOVATIONS IN PARKINSON'S DISEASE DIAGNOSIS AND CARE

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ABSTRACT

Progressive movement, first tremors, stiff muscles, slow response, and balance problems are the first symptoms of the disease that can be observed at the very onset of the disease. Moreover, many of them discover themselves to experience memory lapses, insomnia and other evils that you could not even dream of. And as the number of people who are diagnosed with it in the world continues to grow, there is a need to diagnose it earlier, follow up on it, and in fact support people to live with it as they proceed with their lives. Most of the cases that the old way deals with are just observation of obvious symptoms and a few routine neuro diseases tests. They miss the less obvious and warning signs. Nowadays, everything is going upside down with artificial intelligence. Machine learning, deep learning-they have the potential to sift through medical stacks of data, data like brain scans, speech data or even handwriting or data on wearable devices. It is possible to suddenly observe the earlier appearance of Parkinson, pay more attention to the changes, as well as learn new online hints, which we did not have before. AI is also not only concerned with diagnosis. It is also finding its way into treatment too, helping the doctors tailor care plans, create smarter rehabilitation programs, and even invent technologies that could actually make everyday life a little bit easier to people living with Parkinson. This review is very attentive to the current state of affairs concerning AI in patient care in the case of Parkinson. It permeates the latest research, success stories of the practice, and even the ugly truths, such as how to store the data on the patients safely, these algorithms are not black boxes, and how to conduct large enough studies to demonstrate something. AI interventions have provided it with a genuine opportunity to revise the diagnoses, treatments and, frankly speaking, make the life of Parkinson diseases patients much easier.

Keywords: Parkinson's Disease, Artificial Intelligence, Machine Learning, Early Diagnosis, Brain Imaging, Wearable Sensors, Predictive Analytics.

AM13

AI FOR ASTHMA DIAGNOSIS AND MANAGEMENT

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ABSTRACT

Asthma is a common non-communicable disease (NCD) and is a chronic illness that impacts the bronchial tubes (airways) of the lungs. It has a blocking effect on airflow and recurrence of breathing symptoms that highly impact on quality of life and health systems globally. Despite advances in pharmacological therapies, challenges remain in early diagnosis, personalized treatment, and continuous monitoring of disease progression. Recent developments in Artificial Intelligence (AI) have demonstrated promising potential in transforming asthma management through data-driven decision-making and predictive analytics. AI techniques such as machine learning, deep learning, and natural language processing enable the analysis of large clinical datasets, electronic health records, wearable sensor data, and environmental factors to improve disease prediction, diagnosis, and treatment optimization. AI-based models can assist clinicians in identifying asthma phenotypes, predicting exacerbations, recommending personalized therapeutic strategies, and enhancing patient adherence through digital health platforms and smart inhaler technologies. Furthermore, AI-powered mobile applications and remote monitoring systems facilitate real time patient management and early intervention, thereby reducing hospitalizations and healthcare costs. This review highlights the current advancements in AI-driven interventions for asthma, including diagnostic tools, predictive models, digital therapeutics, and clinical decision support systems. It also discusses the therapeutic applications of AI in personalized medicine, drug discovery, and treatment monitoring. The integration of AI in asthma care has the potential to revolutionize disease management by enabling precision medicine approaches and improving clinical outcomes. However, challenges related to data quality, ethical considerations, algorithm transparency, and clinical implementation must be addressed to ensure safe and effective adoption of AI technologies in respiratory healthcare.

Keywords: Asthma, Artificial Intelligence, Machine Learning, Predictive Analytics, Personalized Medicine, Smart Inhaler Technology, Remote Patient Monitoring.

AM14

ARTIFICIAL INTELLIGENCE–DRIVEN PRECISION MEDICINE FOR EARLY DETECTION AND MANAGEMENT OF NON-COMMUNICABLE DISEASES

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ABSTRACT

Non-communicable diseases (NCDs) such as Diabetes Mellitus, Cardiovascular Disease, and Cancer are major causes of global morbidity and mortality. Early detection and effective therapeutic strategies are essential to reduce disease burden and improve patient outcomes. Recent advancements in Artificial Intelligence and data-driven healthcare approaches are transforming the way these diseases are diagnosed and managed. This study highlights the role of AI-driven precision medicine in enabling early diagnosis and personalized treatment of NCDs. Machine learning–based diagnostic systems analyze large volumes of clinical, imaging, and genomic data to identify disease patterns, predict risk factors, and support early detection. Integration of genomics with AI algorithms further enhances personalized medicine by enabling precise therapeutic decisions tailored to individual genetic profiles. In addition, smart wearable devices and biosensors provide real-time health monitoring and continuous data tracking, allowing clinicians to detect early physiological changes and intervene promptly. Emerging therapeutic approaches such as nanomedicine for targeted drug delivery and stem cell–based regenerative therapies are also contributing to more effective treatment strategies. Overall, the integration of artificial intelligence, genomics, wearable health technologies, and innovative therapies represents a promising framework for improving early diagnosis, reducing disease progression, and enhancing patient care in the management of non-communicable diseases. These advancements pave the way for next-generation healthcare systems focused on predictive, preventive, and personalized medicine.

Keywords: NCDs, Artificial Intelligence (AI), Early Disease Detection, Genomics, Personalized Therapy, Nanomedicine.

DP01

MICROBIAL BIOTRANSFORMATION OF ETHNOMEDICINAL GRASSES FROM KOLLI HILLS FOR HERBAL ANTIDIABETIC AND ANTIOXIDANT FORMULATIONS

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ABSTRACT

Traditional medicinal systems in India rely extensively on ethnomedicinal plants for the management of chronic diseases such as diabetes mellitus and oxidative stress–related disorders. However, the therapeutic potential of many medicinal grasses remains underexplored, particularly in terms of improving their bioavailability and pharmacological activity. Microbial biotransformation is an emerging green biotechnology approach in which microorganisms convert naturally occurring phytochemicals into structurally modified metabolites with enhanced biological activity, stability, and absorption.

In this focus , selected medicinal grasses—vetiver (*Chrysopogon zizanioides*), wild sugarcane (*Saccharum spontaneum*), and lemongrass (*Cymbopogon* species)—were collected from the Kolli Hills region and processed using aqueous and ethanol extraction methods. Phytochemical screening was performed to identify major classes of bioactive compounds such as flavonoids, alkaloids, and glycosides, which are known for their antidiabetic and antioxidant properties. Quantitative estimation of total flavonoid and alkaloid content provided baseline information on the bioactive potential of the extracts.

Microbial fermentation conditions were optimized with respect to temperature, pH, incubation time, and substrate concentration to achieve efficient metabolite transformation. During fermentation, microorganisms converted plant secondary metabolites into more bioactive derivatives with improved pharmacological potency. Advanced analytical techniques, including 16S rDNA sequencing and HPLC analysis, were used to identify microbial strains and characterize the transformed metabolites.

Antidiabetic activity was evaluated through in vitro assays related to carbohydrate digestion, while antioxidant activity was assessed using the DPPH radical scavenging assay. The results indicated enhanced biological activity following microbial biotransformation. Standardized herbal formulations were developed from the most active extracts, and quality evaluation included phytochemical standardization, microbial load testing, and stability studies. This study highlights the potential of Kolli Hills medicinal grasses as sustainable sources of bioactive compounds for developing evidence-based herbal therapeutics.

Keywords: Ethnomedicinal grasses, microbial biotransformation, oxidative stress, green biotechnology, herbal formulations.

DP02

FORMULATION AND DEVELOPMENT OF HERBAL – POLYMERIC FILM FORMING GEL LOADED WITH COUMARIN FOR WOUND MANAGEMENT

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ABSTRACT

Effective wound management remains a significant challenge in healthcare, as rapid tissue repair and protection from microbial contamination are essential for proper healing. The present study aims to develop and evaluate a film-forming topical gel containing coumarin for improved wound healing. Coumarin was selected as the active compound due to its well-known anti-inflammatory, antioxidant, and tissue-regenerating properties, which play an important role in accelerating the healing process.To create a biocompatible and efficient topical delivery system, chitosan was employed as the primary film-forming polymer because of its excellent film-forming ability and wound healing potential. Fenugreek mucilage, a natural polysaccharide, was incorporated as a viscosity-enhancing and stabilizing agent to improve the consistency and application of the formulation. The gel was prepared through controlled polymer dissolution in a mild acidic medium followed by the incorporation of other excipients to obtain a uniform and stable formulation.The prepared formulation was evaluated for various physicochemical and functional parameters including appearance, pH, viscosity, spreadability, drying time, and film-forming ability. Upon application to the skin, the gel is designed to form a thin, flexible protective film that adheres to the wound surface. This film acts as a barrier against external contaminants while allowing sustained release of the active compound, thereby supporting faster tissue regeneration and improved wound healing. Overall, this study highlights the potential of combining natural polymers with bioactive compounds to develop an effective and patient-friendly topical formulation for advanced wound care.

Keywords : Coumarin, Film forming gel, Chitosan, Fenugreek mucilage, Wound healing, Topical formulation.

DP03

DRUG LIKENESS AND ORAL BIOAVAILABILITY PREDICTION OF PHYTOCOMPOUNDS BY SWISS ADME

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ABSTRACT

Drug discovery is a complex and time-consuming process that requires the identification of compounds with suitable pharmacokinetic properties. In recent years, computational approaches have become an important part of early drug development because they help researchers predict the behavior of compounds quickly and cost-effectively. Phytochemicals, which are natural compounds derived from plants, possess significant therapeutic potential and are widely studied as possible drug candidates. The present study focuses on the prediction of drug-likeness and oral bioavailability of selected phytochemicals using the Swiss ADME tool. Swiss ADME is a widely used in-silico platform developed by the Swiss Institute of Bioinformatics that helps evaluate pharmacokinetic properties such as absorption, distribution, metabolism, and excretion (ADME). The selected phytochemicals were analyzed based on important parameters including Lipinski's Rule of Five, gastrointestinal absorption, bioavailability radar, and other pharmacokinetic properties. The results of the analysis indicated that several phytochemicals exhibited favorable drug-likeness characteristics and acceptable oral bioavailability. These findings suggest that such compounds may serve as potential candidates for further drug development studies. Overall, this study highlights the importance of in-silico tools in accelerating the early stages of drug discovery while reducing time and cost.

Key Words: Edible straw, White yam, Kaffir lime, Antioxidant, Proximate analysis

MH01

VISION TRANSFORMER-BASED BRAIN STROKE ANALYSIS WITH SHAP-DRIVEN SEVERITY, PROGNOSIS, AND CLINICAL RECOMMENDATION IN HEALTHCARE

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ABSTRACT

A Leading Cause of Long-Term Disability Stroke is one of the largest contributors to long-term disability. Timely clinical decision-making is critical in reducing the risk of permanent neurologic damage. While many AI systems have improved stroke detection, most have only been able to detect the presence of stroke, but they do not have sufficient information regarding the severity of the stroke, the region of the brain that has been impacted, and whether there may be functional impairment. In addition, many deep learning models still function strictly as "black-boxes", resulting in a lack of transparency and limited clinical trust in the AI-assisted diagnosis. This project proposes an explainable AI-based framework for a complete brain stroke evaluation using Diffusion-weighted Imaging (DWI) MRI images. The Vision Transformer (VIT) model is used to analyze the brain images to allow stroke detection to occur through the use of global contextual features, which helps to improve interpretation. The SHAP (Shapley Additive explanations) model will be integrated with the VIT model so that it can help identify the areas of the images that are most important to the prediction of the VIT model .The identification of the significant regions of brain imaging is used to map those regions on a functional brain atlas to determine which anatomical regions have been affected and to estimate the likelihood of certain neurologic impairments (i.e., motor, speech, and memory) occurring as a result of the stroke. The identification of the affected regions will be used to classify the severity of the stroke based on the characteristics of the lesion and the impact on the affected region. The severity classification will be processed through a structured clinical reasoning layer (IF-THEN) to create transparent recommendations for prognosis.

Keywords: VIT, SHAP, DWI MRI image, Functional Brain mapping

MH02

ISOLATION AND PURIFICATION OF MYCELIAL MAT FROM *Candida tropicalis* AND ITS POTENTIAL APPLICATIONS

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ABSTRACT

The need for sustainable and biodegradable materials from low-cost waste materials as an renewable in environment. In the present study, using agro waste to production of mycelium mat. Pineapple peel is a agro waste contain rich cellulose and nutrients to promote growth of fungi. The pineapple peel is low cost and sustainable in environment. The pineapple peel was cut in small pieces and to take the extraction of pineapple peel. The extraction was inoculated on Hestrin & Schramm media and incubated optimum condition to promote growth of fungal strain. After incubation, the mycelial mat formed top of the media and the fungal strain isolated by morphology and molecular technique. The biomass production of mycelial mat by using rice husk powder. Rice husk is a agro waste it contain cellulose, lignin and hemicellulose. The mycelium mat is characterization using by FTIR, TGA, XRD, SEM, DSC and EDS. The mycelial mat was using various application such as packaging, food production, leather production, scaffolds in biomedical, to design construction, biosensors and biosurfactant application. In the study, the mycelium based biocomposite using to make bricks and plate, production of biosurfactant and isothermal study. This study concluded the mycelium based material is sustainable, biodegradable, less toxicity in the environment.

Keywords: Mycelium mat, Fungal biomass, Biodegradable, Agro- waste, Eco-friendly, Biosurfactant.

MH03

ELECTROSPUN FE-DOPED ZNO NANOFIBROUS FILMS DERIVED FROM *ACORUS CALAMUS* RHIZOME EXTRACT: OPTIMIZATION OF FABRICATION AND ITS ANTIMICROBIAL ACTIVITY

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ABSTRACT

In 21st century, synthesis of nanofibrous film with phytoextracts is being explored to minimize toxic biological effects has been considered as an advanced treatment strategy especially in treating the wound disease. Our present research demonstrated the synthesis of Fe doped ZnO NPs from *Acorus calamus* rhizome and formulation of nanofibrous film. The prepared plant extract was characterized by FT-IR and GC-MS analysis which revealed the presence of O-H, C-H-, C=C, -CH_2-, N-H, C-N bonds with peaks between 3500 and 500 cm^{-1} and also according to the GC-MS analysis we found the presence of important phytochemicals. Then, Fe doped ZnO NPs were characterized and evaluated by UV-Vis, FT-IR, Particle size, Zeta potential and X-Ray Diffraction analysis. Furthermore, developed topical Nanofibrous film was characterized by SEM and physical parameters and also its anti-microbial activity was evaluated. Then characterization studies like UV analysis, Particle size, Polydispersity Index (PDI), Zeta potential and XRD of the synthesized Fe doped NPs were found to be 300 nm, 277.1 nm, 0.350, -28.3 mV and the average crystallite size is 278 nm respectively. Topical nanofibrous film formulation was evaluated for physical parameters such as thickness of around 0.30 mm, surface pH (5.95 pH) with a folding endurance of 180 times. SEM analysis of nanofibrous film showed the morphology of the Fe doped ZnO nanofibrous film. Conversely, the *in vitro* antimicrobial studies revealed this nanofibrous film as a potential antimicrobial agent against major bacteria's and fungi's responsible for progression of wound and fire burns are *C. albicans, E. coli, P. aeruginosa,* and *S. aureus*.

Keywords: *Commiphora wightii*, Guggulu, photochemical, pharmacological activities

MH04

CONSERVATION TREATMENT OF WASTE WATER AND REUSE FOR DOMESTIC PURPOSE

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ABSTRACT

The pharmaceutical industry is a significant source of complex wastewater, characterized by the presence of active pharmaceutical ingredients (APIs), organic solvents, and recalcitrant compounds that resist degradation. Conventional biological treatment methods, including effluent treatment plants (ETPs) that employ specific microbial consortia such as Ralstonia and Pseudomonas putida, often prove inadequate for achieving complete mineralization of these emerging contaminants. This review critically evaluates the transition towards advanced ETP configurations that mitigate the limitations of traditional biodegradation, offering robust and efficient treatment independent of specialized microbial cultures. Technologies such as Moving Bed Biofilm Reactors (MBBR) are examined for their enhanced biomass resilience and demonstrated efficacy in degrading poorly soluble APIs. Furthermore, the synergistic integration of physical separation processes—including Membrane Bioreactors (MBR) and Reverse Osmosis (RO)—with chemical Advanced Oxidation Processes (AOPs) like ozonation and photocatalysis is analyzed. These hybrid advanced treatment trains facilitate the near-complete removal of COD and BOD, ensure the breakdown of persistent organic pollutants into harmless byproducts, and enable high-quality water recovery for reuse. By adopting these advanced ETP designs, pharmaceutical manufacturers can achieve stringent regulatory compliance, minimize environmental discharge of micropollutants, and implement sustainable water management practices, thereby significantly reducing their operational freshwater footprint.

Keywords: Cupriavidus necator, *Ralstonia eutropha* (former name), Alcaligenes eutrophus (former name),Gram-negative bacteria

MH05

DEVELOPMENT OF AN HERBAL ANTI-NAUSEA INHALER FOR THE MANAGEMENT OF VOMITING SENSATION

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ABSTRACT

Nausea and vomiting are common symptoms associated with conditions such as motion sickness, pregnancy, migraine, gastrointestinal disorders, and post-operative complications. Conventional anti-emetic drugs are effective but may cause side effects such as drowsiness and dizziness. Hence, there is growing interest in the development of natural and safer alternatives. The present study focuses on the formulation of an herbal anti-nausea inhaler using natural essential oils known for their anti-emetic and soothing properties. The proposed inhaler formulation contains essential oils such as ginger oil, peppermint oil, and lemon oil incorporated into an inhaler device for rapid relief from nausea. Ginger oil possesses well-known anti-emetic activity, while peppermint oil provides a cooling sensation and helps in relaxing the gastrointestinal tract. Lemon oil contributes a refreshing aroma that helps reduce nausea perception. The inhalation route provides rapid onset of action by stimulating olfactory receptors, which may influence the central nervous system and reduce the sensation of nausea. The herbal inhaler is designed to be portable, easy to use, and convenient for individuals experiencing sudden nausea during travel or illness. Compared to conventional oral medications, inhalation offers faster relief with minimal systemic side effects. The development of this natural inhaler may serve as a promising alternative approach for the management of nausea and vomiting using herbal ingredients.

Keywords: Herbal inhaler, Essential oil, Lemon oil, Ginger oil.

MH06

FORMULATION AND BIOACTIVE EVALUATION OF A POLYHERBAL TEA FOR INSOMNIA MANAGEMENT: PHYTOCHEMICAL, ANTIOXIDANT AND ANTI-INFLAMMATORY STUDIES

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ABSTRACT

Insomnia is a common sleep disorder characterized by difficulty in initiating or maintaining sleep and is often associated with stress, anxiety, and lifestyle disturbances. The present study aimed to formulate and evaluate a herbal tea using *Nelumbo nucifera*, *Papaver somniferum*, *Anisomeles malabarica*, *Mucuna pruriens*, *Cycas circinalis*, *Myristica fragrans*, *Glycyrrhiza glabra*, and *Coriandrum sativum* for insomnia management. The formulation was optimized using Design-Expert D-optimal mixture design with 18 experimental runs. Qualitative phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, phenolics, terpenoids, and saponins, while quantitative analysis showed phenolics (0.5456), flavonoids (0.4730), alkaloids (0.4308), terpenoids (0.4278), and tannins (0.30007). FTIR spectra revealed characteristic peaks around 3400 cm^{-1} (O–H), 2920 cm^{-1} (C–H), 1650 cm^{-1} (C=O), and 1100 cm^{-1} (C–O) confirming the presence of bioactive functional groups. LC-MS analysis identified key compounds such as neferine, nuciferine, morphine, L-DOPA, myristicin, glycyrrhizin, and linalool. The mixed herbal formulation exhibited strong antioxidant activity with 81.6 % DPPH radical scavenging and 77.6 % hydrogen peroxide scavenging activity, along with 78 % anti-inflammatory inhibition. Physicochemical evaluation showed pH 5.6–5.8, moisture content 6.4 %, ash value 4.12 %, and extractive value 18.6 %. Flow property analysis indicated angle of repose 28.6°, bulk density 0.42 g/cm^3, tapped density 0.49 g/cm^3, compressibility index 14.2 %, and Hausner ratio 1.16, confirming good powder flow. Sensory evaluation using a 9-point hedonic scale showed overall acceptability of 7.6, indicating good consumer preference. The optimized herbal beverage demonstrated significant antioxidant, anti-inflammatory, and calming properties that may improve sleep quality. These findings suggest that the developed herbal tea can serve as a safe and effective natural alternative for the management of insomnia.

Keywords: Insomnia; Herbal tea formulation; Phytochemical analysis; Antioxidant activity; Natural sleep aid.

MH07

FABRICATION OF MEDICATED CHOCOLATE BY USING ANDROGRAPHIS PANICULATA

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ABSTRACT

Andrographis paniculata is referred to as the "King of bitters." It contains various essential components, including diterpenes, lactones, andrographolide, and flavonoids, which are renowned for their biological actions as antioxidants, anti-inflammatories, and antiseptics. It also has a therapeutic role in human disorders. Chocolate has long been associated with its delicious flavor and potential health benefits. In this study, various formulations were used to create medicated chocolate with the therapeutic qualities of Andrographis paniculata. FTIR analysis revealed that a paniculata powder and medicated chocolate share the same functional group, which represents chemicals such as flavonoids, lactones, and so on. Sensory analysis was conducted. The nutritional study was performed to verify the nutritional value of this medicated chocolate.

Keywords: Andrographis paniculata, lactones, flavonoids, Chocolate, medicated chocolate.

MH08

ANALYSIS OF FUNCTIONAL METABOLITES AND THEIR ANTIMICROBIAL ACTIVITY IN VEGETABLES

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ABSTRACT

Thousands of polyphenols identified in plants can be classified into different groups. Vegetables are an essential part of the human diet and provide important bioactive compounds such as vitamins, dietary fiber, antioxidants. The metabolic process depends on seed germination. This determine which compounds are present in the plant body. Metabolic activity plays a significant role in plant nutrients. Approximately 50,000 metabolites are present in plants. Compounds such as carbohydrates, organic acids, amino acids, vitamins, hormones, flavonoids, phenolics and glucosinolates are essential for plant growth. The biosynthesis of phenolic compounds involves several metabolic pathways. Most phenolic compounds exhibit important biological properties. The compounds are determine the colour, taste, smell and food quality. A mixture of pure bioactive compounds or phytochemical-rich plant extracts can enhance anti-inflammatory. The nutrient composition of vegetables is complex and difficult to evaluate. The levels of plant metabolites depend on genetic and environmental factors. Solvent is essential for the extraction of vegetables. Because they are highlight in metabolic compounds. Mainly water, ethanol and methanol. Ethanol is better than water extract. The colour difference is based on secondary metabolic activity. The identification these compounds methods are thin layer chromatography, phytochemical tests with various solvent combinations. Then I will synthesize of silver nanoparticles in selected vegetables. They also against the antimicrobial activity. These compounds protect against oxidative stress, reduce inflammation. Therefore, these compounds have many health-related properties and marketing.

Keywords: Vegetables, Secondary metabolic activity, Solvent extraction, Silver nanoparticles.

MH09

NISIN PRODUCTION FROM LACTOCOCCUS LACTIS FOR SUSTAINABLE PHARMACEUTICAL PRESERVATIVE

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ABSTRACT

The increasing demand for safe and sustainable preservatives in pharmaceutical formulations has encouraged the exploration of natural antimicrobial compounds. Nisin, a bacteriocin produced by the lactic acid bacterium *Lactococcus lactis*, has gained significant attention due to its strong antimicrobial activity against a wide range of Gram-positive bacteria, including several pathogenic and spoilage microorganisms. This study focuses on the production, optimization, and potential application of nisin derived from *Lactococcus lactis* as a sustainable preservative in pharmaceutical products. *Nisin* is a ribosomally synthesized antimicrobial peptide widely recognized for its safety and biodegradability. The production process involves cultivating *Lactococcus lactis* under controlled fermentation conditions using nutrient-rich media to maximize bacteriocin yield. Key parameters such as pH, temperature, incubation time, and nutrient composition play crucial roles in enhancing nisin production. After fermentation, nisin is extracted and purified through techniques such as centrifugation, precipitation, and chromatographic separation to obtain a bioactive compound suitable for further evaluation. The antimicrobial efficacy of the produced nisin is tested against common pharmaceutical contaminants including *Staphylococcus aureus*, *Bacillus subtilis*, and *Listeria monocytogenes*. Results demonstrate significant inhibition of microbial growth, indicating that nisin can effectively prevent contamination and extend the shelf life of pharmaceutical formulations. Additionally, nisin shows advantages such as low toxicity, natural origin, stability under acidic conditions, and compatibility with various pharmaceutical ingredients. The use of nisin as a preservative offers an environmentally friendly alternative to synthetic chemical preservatives that may cause toxicity or microbial resistance. Its application can contribute to safer drug formulations, reduced environmental impact, and improved patient safety. Furthermore, advances in fermentation technology and bioprocess optimization can enhance large-scale production, making nisin a cost-effective and sustainable solution for the pharmaceutical industry. In conclusion, nisin produced by *Lactococcus lactis* demonstrates strong potential as a natural and sustainable pharmaceutical preservative. Continued research on production optimization, purification methods, and formulation compatibility will further support its integration into modern pharmaceutical preservation systems.

Keywords: Nisin; *Lactococcus lactis*; Pharmaceutical preservative; Antimicrobial peptide

MH10

SMART BANDAGES FOR INFECTION DETECTION: INTEGRATING WEARABLE SENSOR TECHNOLOGIES FOR CONTINUOUS WOUND MONITORING

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ABSTRACT

The rapid development of wearable sensor technologies has opened new frontiers in continuous health monitoring and personalized medicine. While significant progress has been made in tracking macro-level physiological and biomechanical parameters, the application of micro-level continuous monitoring for wound care remains an emerging field. This paper explores the conceptualization and theoretical implementation of a smart bandage designed for the early detection of localized infections. By integrating advanced biosensors, energy-autonomous systems, and machine learning algorithms, the proposed framework aims to transform traditional, static wound dressings into dynamic diagnostic tools. Ultimately, this approach seeks to reduce the clinical burden of chronic wounds by enabling real-time, objective, and non-invasive infection monitoring.

MH11

INFECTION CONTROL PRACTICES IN HEALTHCARE SETTINGS

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ABSTRACT

Infection control is a vital component of healthcare that aims to prevent the spread of infectious diseases in hospitals and community healthcare environments. It involves a series of standardized procedures and guidelines followed by healthcare professionals to minimize the transmission of microorganisms among patients, healthcare workers, and the surrounding environment. Key infection control measures include proper hand hygiene, sterilization and disinfection techniques, the use of personal protective equipment (PPE), biomedical waste management, and patient isolation practices. These strategies are essential for reducing hospital-acquired infections and maintaining a clean and safe healthcare setting. Effective infection control also requires active participation from healthcare workers, patients, and hospital management. Proper implementation of these practices can significantly reduce the spread of infectious diseases such as COVID-19, tuberculosis, and hepatitis B, thereby ensuring patient safety and improving the overall quality of healthcare services.

Key words: Healthcare – safety - Infection – prevention - control

MH12

MULTIFUNCTIONAL EDIBLE STRAW

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ABSTRACT

Plastics a major problem in our environment, though we ban plastics in current scenario. Straws account for roughly 0.03% of plastic waste in the ocean. Worldwide more than 1000 million plastic straws are used to serve environmental issues. This project is concerned with replacement of plastic straws with natural edible straw. The main objective of this project is to extract starch from Dioscorea palatably sedimentation method, the starch extracted from this method is subjected to optimization and production of edible straw, the yield obtained was 200g of starch for 1kg of Dioscorea alata. Citrus hystrix is used for isolation of pectin by using hydrochloric acid at temperature of 100°C at pH of 2.8, the yield obtained was 60g pectin in 100g peel. The selected ingredients are icing sugar, carboxymethyl cellulose and glycerine. The paste preparation was the process where specific amount of stabilizer, gelling agent and humectant were mixed through kneader. The paste being shaped through a straw shaping mould process before placing them in to drying oven. This edible straw is now analysed for its stability, nutrition analysis, antioxidant content, DPPH, biodegradability test, moisture absorption test, toxicity test, these edible straws are flavoured and designed for the sustainability of the future. It can be used as post snacks. Their powerful antioxidants may help reduce your blood pressure and blood sugar levels and also versatile with a vibrant colour, it can act as cancer deterrent, it helps to increase the production of red blood cells in the body.

Key Words: Edible straw, White yam, Kaffir lime, Antioxidant, Proximate analysis

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