

ANNUAL SCIENCE RESEARCH SYMPOSIUM

2025



PROCEEDINGS





Proceedings of
3rd Annual Science Research Symposium
3rd September 2025

“Advancing Health Through Science”

Preface

It is with great pride and excitement that we present the proceedings of the Annual Science Research Symposium 2025 (ASRS '25) - the 3rd Undergraduate Research Symposium organized by the Faculty of Science, NSBM Green University.

This year's collection of research abstracts highlights the hard work, creativity, and curiosity of our young researchers. ASRS '25 is more than just a platform to present research - it is a place where ideas grow, collaborations begin, and students gain the skills and confidence to make a difference in the future.

We are deeply grateful to Prof. E. A. Weerasinghe, Vice-Chancellor of NSBM Green University, for his inspiring leadership; Prof. Chaminda Rathnayake, Deputy Vice-Chancellor; and Prof. Baratha Dodankotuwa, Head of Academic Development and Quality Assurance, for their guidance and encouragement. Our sincere thanks also go to the participants, faculty members, mentors, and the wider NSBM Green University community, who have contributed their time, expertise, and passion to make this event possible. Above all, we extend special appreciation to Dr. Nuwanthi Katuwavila, Dean of the Faculty of Science, whose vision and dedication have been the driving force behind ASRS '25.

Within these pages, you will find a rich variety of research projects covering biomedical science, psychology, nursing, nutrition and health, each reflecting the dedication, talent, and innovative thinking of our students. We hope these proceedings will not only inform and inspire, but also spark new conversations, connections, and opportunities for collaboration.

We invite you to explore these works with curiosity and to join us in celebrating the achievements of our young scientists, as they help shape the future of science, health, and beyond.

Organizing Committee of ASRS 2025



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Message from the Dean, Faculty of Science



Dr. Nuwanthi Katuwavila,
Dean/ Senior Lecturer,
Faculty of Science,
NSBM Green University.

It is with great pride and enthusiasm that I extend my warmest greetings to all participants, presenters, and guests of the Annual Science Research Symposium of the Faculty of Science, NSBM Green University. This symposium stands as a testament to our unwavering commitment to fostering a vibrant research culture that inspire curiosity, innovation, and collaboration across disciplines.

Scientific research is the lifeblood of academic excellence. It not only advances our understanding of the world but also provides practical solutions to pressing challenges facing our society, environment, and industry. As a faculty, we faced by nurturing an environment where students, academics, and industry partners come together to share ideas, exchange knowledge, and explore the frontiers of science.

This year's symposium brings together a rich diversity of research this topics, in Life Science and Health Science disciplines. From fundamental discoveries to applied innovations, the work presented here underscores the dedication, creativity, and scholarly rigour of our academic community. It is particularly inspiring to witness the active engagement of our undergraduates, whose enthusiasm and commitment affirm the bright future of scientific inquiry in our nation and beyond.

I wish to extend my heartfelt gratitude to our faculty members, student researchers, keynote speaker, and industry collaborators whose contributions made this event a success. I also commend the organizing committee for their tireless efforts in curating a programme that reflects both excellence and inclusivity.

Message from the Head of the Department of Life Sciences



Dr. Miruna Rabindrakumar,
Head/ Senior Lecturer,
Dept. of Life Sciences,
Faculty of Science,
NSBM Green University.

It gives me great pleasure to extend my warmest welcome to all participants of the Annual Science Research Symposium of the Faculty of Science. This event is an important platform for our undergraduates to share the outcomes of their research and develop critical thinking and scientific communication skills. We remain committed to nurturing a research-driven learning environment across all disciplines. This year's symposium proudly features research abstracts from the final year students of the BSc. (Hons) Biomedical Science and BSc. (Hons) Nutrition and Health degree programmes, as well as the University of Plymouth BSc. (Hons) Biomedical Science students from the Department of Life Sciences. Our students begin their research journey as early as their second year, laying a critical foundation that enables them to develop and finalise their research proposals during the third year. They then conduct and complete their full research projects in the final year, making this symposium a celebration of years of sustained commitment, hard work, and academic growth. Further, it is particularly encouraging that our 23.1 batch has been offered the opportunity to publish their literature reviews, demonstrating the strong research culture within the Department and the Faculty of Science.

I take this opportunity to thank Dean, the Symposium Co-Chair, reviewers, all academic and administrative staff for their guidance and support in making this symposium a success. I also extend my warm congratulations to all student presenters and wish them every success in their future academic and professional endeavours.

Message from the Head of the Department of Health Sciences



Dr. Madhavi Hewadikaram,
Head/ Senior Lecturer,
Dept. of Health Sciences,
Faculty of Science,
NSBM Green University.

I am delighted to extend my warmest wishes to all contributors to this Annual Science Research Symposium magazine. The pages that follow reflect the curiosity, discipline, and resilience of our students, as well as the steadfast guidance of their supervisors. Together, you advance knowledge with a shared purpose improving health and wellbeing in our communities. I am grateful to the organising committee, reviewers, and partners for their tireless efforts in bringing this showcase to life. I invite readers to engage critically with the work, foster new collaborations, and carry these conversations beyond these pages. May this symposium spark fresh ideas, meaningful impact, and a lasting commitment to scientific integrity. Congratulations to all authors and presenters.

Publishing your work is not simply an academic milestone, it is a professional responsibility. Publication turns data into evidence and ideas into impact by making your findings discoverable, citable, and open to scrutiny. Through peer review, you learn to refine arguments, strengthen methods, and present results with clarity. These habits of rigorous writing, responsible data sharing, and transparent reporting will serve you throughout your careers as clinicians, scientists, educators, or policy makers.

Showcasing research at the symposium is equally important. Presenting sharpens essential skills: communicating complex results to diverse audiences, defending methodology with confidence, and receiving constructive feedback that improves the science. It also helps students build a scholarly identity establishing authorship, forming networks, and signalling readiness for postgraduate study, clinical training, or industry roles.

For the department, student publications and conference presentations are a measure of our collective quality. They demonstrate the relevance of our curriculum, the strength of our mentorship, and our contribution to national health priorities. They also help us attract partnerships, resources, and internships for future cohorts. Every abstract published and paper accepted strengthens our research culture, informs teaching, and supports accreditation and continuous improvement.

My heartfelt congratulations to our students, supervisors, and the organising team. Your dedication elevates our Department and advances the health sciences in meaningful ways. I wish you every success in your scholarly journey.

Message from the Symposium Chair



Ms. Lakshani Jayasinha,
Lecturer,
Department of Health Sciences,
Faculty of Science,
NSBM Green University.

I am pleased to welcome you to the Annual Science Research Symposium 2025 – the 3rd Undergraduate Research Symposium organized by the Faculty of Science, NSBM Green University. This event is the result of months of planning, preparation, and commitment from our undergraduate students and staff.

Our undergraduate students are at the heart of this symposium. Your dedication to learning, perseverance in overcoming challenges, and commitment to quality research have made this event possible. Each project presented today reflects your effort and your willingness to explore new ideas.

I would like to thank our supervisors, reviewers, and faculty members for their guidance and support, which have been essential to the success of our students. Your encouragement and mentorship have helped them turn their ideas into valuable research.

I extend my sincere thanks to Prof. E. A. Weerasinghe, Vice-Chancellor of NSBM Green University, for his visionary leadership, as well as to Prof. Chaminda Rathnayake, Deputy Vice-Chancellor, and Prof. Baratha Dodankotuwa, Head of Academic Development and Quality Assurance, for their guidance and support. I especially acknowledge Dr. Nuwanthi Katuwavila, Dean of the Faculty of Science, whose dedication and encouragement have been key to the success of ASRS '25 and in strengthening our research culture. I also extend my thanks to Dr. Madhavi Hewadikaram, Head of the Department of Health Sciences, and Dr. Miruna Rabindrakumar, Head of the Department of Life Sciences, for their continuous support and leadership, which have been crucial in making this symposium a reality.

My appreciation also goes to the members of the Young Scientists' Circle and the Circle of Nursing and Psychology Students, whose teamwork and effort in organizing this event have ensured its smooth running.

I hope ASRS '25 will be a platform for sharing knowledge, developing new ideas, and building collaborations. I wish all our presenters success in their presentations and in their future academic and professional journeys.

All the best!

Organizing Committee

Symposium Advisors

Dr. Nuwanthi Katuwavila
Dr. Miruna Rabindrakumar
Dr. Madhavi Hewadikaram

Symposium Chair

Ms. Lakshani Jayasinha

Symposium Secretary

Prasadi Hettiarachchi

Committee Members

Mr. Lavan Kumar
Ms. Sharini Samaranayaka
Ms. Nivedha Uthayarajan
Mr. Sachindu Madhushara

Editorial Committee

Ms. Lakshani Jayasinha
Ms. Navodi Liyanage

Programme of the Symposium

Time	Event
09.30 am - 09.40 am	Welcoming the Guests and Lighting the Oil Lamp
09.40 am - 09.50 am	Welcome Speech
09.50 am - 10.15 am	Keynote Speech
10.15 am - 10.20 am	Distribution of the Token of Appreciation - Keynote Speaker
10.20 am - 10.30 am	Speech by Prof. Baratha Dodankotuwa
10.30 am - 01.00 pm	Oral Presentation Session I/ Poster Presentation Session I
01.00 pm - 02.00 pm	Lunch Break
02.00 pm - 03.00 pm	Oral Presentation Session II/ Poster Presentation Session II
03.15 pm - 03.35 pm	Distribution of Awards
03.35 pm - 03.45 pm	Vote of Thanks

Profile of the Keynote Speaker



Dr. Nadeeka D. Tissera,
Senior Lecturer,
Textile and Clothing Division,
Institute of Technology,
University of Moratuwa.

Dr. Nadeeka D. Tissera is a Senior Lecturer at the Institute of Technology, University of Moratuwa, specializing in Textile and Clothing Engineering. With over 12 years of experience in materials, nanotechnology, and advanced polymer research, she has held pivotal roles as a senior research scientist and academic leader. Her professional journey spans industry collaborations, technology transfer initiatives, and intellectual property development, marked by multiple prestigious awards. Dr. Tissera's dedication extends beyond research; she actively contributes to scientific discourse through workshops and high-impact scholarly publications, significantly influencing the fields of sustainable and advanced textile technologies.

Innovations in Advanced Materials: From Bio-Derived Composites to Functional Smart Surfaces

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The worldwide momentum for sustainable high-performance materials has produced an innovation frenzy in materials engineering, nanotechnology, and polymer science. My research exists at the intersection of nanotechnology, materials engineering, and sustainability. The focus is on developing high-performance advanced materials that both meet performance requirements and meet demands of sustainability.

An important part of this work includes the development of graphene–textile and other carbon nano structures-textile composites capitalizing on the intrinsic flex, drape, and comfort of the fabric, and the extraordinary properties of graphene with regards to electrical, thermal, and mechanical performance. Utilizing the optimization of dispersion, surface functionalization, and layer-by-layer assembly approaches, non-conductive textile substrates were converted into conductive, lightweight, and durable substrates for applications which include sensing, and thermal management.

By using an inorganic element in Surface Metallization processes, there is an expanded use of textiles/composites as lightweight, conductive substrates for wearables, electromagnetic interference (EMI) shielding, thermal regulation, and sensing. Overall, the resulting composites have substantially improved surface conductivity, tensile strength, and abrasion resistance while maintaining the textile handle (important for wearable applications). In addition to synthetic nanostructures, the research work collaborates with studies on bio-derived fibres, focusing on wool-derived keratin nanofibres. Keratin nanofibres are generated from wool via a top-down extraction process whereby wool fibres are deconstructed into the nanoscale, and keratin nanofibres (α -helical) are produced, which may be manipulated into biocompatible nanofibre sheets for use in medical, filtration, and tissue engineering applications.

This project has indicated that naturally-derived protein-based fibres can be nano scaled and perform on par or outperform synthetic fibres when targeted for high-value or technical applications. In addition, this project addressed the development of tweaked Merino wool fibres for treating wastewater to remove dangerous dye molecules, a minor, but environmentally significant issue for the textile industry that embodies a circular economy.

Another significant direction involved the surface modification of fabrics without changing their usage through the use of polyaniline (PANI) grafting. research has demonstrated several methods of grafting and controlled oxidative polymerization, which produced electrically conductive, pH-responsive, and antimicrobial cotton fabrics with tuned properties.

As noted throughout my peer-reviewed publications, the processes for synthesizing these PANI/cotton systems are lightweight, washable, and can be utilized for the construction of flexible electrodes or environmental sensors. We employ a range of sophisticated surface modifications (e.g. anchoring of nanoparticles and chemical grafting) on the cotton fabric to enhance the interaction between the cotton fabric, the PANI, and the product durability and enhance the multifunctionality of the coated cotton fabric.

All of these research efforts suggest a future where textile substrates no longer have a passive role as a material but are active, intelligent, and sustainable components of a system. With the combination of high-performance nanomaterials with renewable-based materials, we have the opportunity to create functional next-generation materials that consider comfort, performance, and the environment. In the years ahead, attention will turn to additive manufacturing methods of scale, development into design, and evaluation of performance in the real-world sense. My project combines the expertise of material science at a new level in conjunction with the responsiveness of materials engineering, as we reflect a stronger urgency toward novel functional and sustainable materials that can meet our evolving technological needs and ecological responsibilities.

Keywords - graphene–textile composites, bio-derived materials, wool keratin, polyaniline-grafted cotton, surface modification, smart textiles, sustainability

ABSTRACTS

ORAL PRESENTATIONS

HSOR 01

Assessing Long-Term Functional Impairments and Daily Living Challenges in Patients Affected by Chikungunya Virus

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Chikungunya virus (CHIKV) infection, a mosquito-borne illness, is widely acknowledged not only for its acute symptoms but also for its persistent long-term effects on physical and functional well-being. This review aimed to systematically review the literature on long-term physical, psychological, and functional impairments associated with Chikungunya virus infection. A structured literature search was conducted through Google Scholar, PubMed, Science Direct using keywords related to post-chikungunya disabilities. The selection process followed PRISMA 2020 guidelines, and data were extracted using structured Excel framework. A total of 32 articles published between 2015 and 2025 were reviewed. Across multiple studies, persistent joint pain was the most common long-term symptom, reported by 77.1% to 92.3% of participants. Fatigue affected up to 97.5%, while sleep disturbances ranged from 26.4% to 64.7%. Arthralgia and musculoskeletal pain persisted in over 50% of individuals for several months to years' post-infection. Cognitive and emotional challenges were also observed, with 22.7% experiencing depressive symptoms and 70% experiencing memory complaints. In terms of daily life challenges include reduced mobility, activity limitations, and impaired physical functioning. Over 60% reported difficulty in walking or climbing stairs, and up to 86 % of ceased all physical activity. Overall, the findings confirm that Chikungunya caused long-lasting impacts on both physical and psychosocial well-being. long-term complications following chikungunya are frequent and diverse, significantly affecting physical and psychosocial well-being. These findings emphasize the need for improved follow-up, rehabilitation, and public health strategies to support patient recovery.

Keywords - chikungunya, daily functioning, disability, long-term symptoms, post-viral complication, quality of life

HSOR 02

Optimizing Pressure Ulcer Prevention: Evidence-Based Strategies for Medical-Surgical Nursing

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Preventing pressure ulcers is a critical component of quality patient care, particularly in acute and medical-surgical settings where vulnerable populations are at a higher risk. These injuries can lead to multifactorial patient deterioration, prolonged hospital stays, and increased healthcare costs. The identification of effective prevention strategies is important in improving patient outcomes, strengthening nursing practice, minimizing workplace stress, and ensuring adherence to care standards. A rapid review of literature was conducted on twenty-five articles published between 2015 and 2025, retrieved from databases of PubMed, Google Scholar and Science Direct using keyword combinations. Articles were reviewed based on relevance, study design, and clarity of findings, with thematic synthesis used to extract and organize key themes across selected studies. The review identified five core themes: predictive risk screening, bedside prevention practices, nutritional support, nursing competency development, and technology-driven collaborative care. These themes were examined in relation to their applicability within interdisciplinary frameworks and institutional settings in Sri Lankan medical and surgical units. Effective prevention of pressure injuries requires a combined and well-planned approach that includes evidence-based clinical protocols, comprehensive staff training, and technological support. Findings highlight that nurses are central to the effective application of these strategies in direct patient care. Prioritizing prevention enhances patient safety and reduces the long-term burden on healthcare systems. Sustainable improvements depend on addressing institutional limitations, promoting interdisciplinary collaboration, and maintaining ongoing updates to clinical practice based on the latest evidence.

Keywords - clinical protocols, nursing, pressure injuries, prevention strategies, risk assessment

HSOR 03

Literature Review of Mental Health Literacy and Access to Psychological Care in Sri Lanka

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Mental Health Literacy (MHL) and equitable access to psychological services are urgent public health priorities in Sri Lanka, where stigma, misinformation, and systemic barriers persist. Vulnerable groups often remain underserved, with early intervention hindered by poor symptom recognition and reluctance to seek care. This review synthesized qualitative and quantitative studies (2010–2024) on MHL and access to psychological services in Sri Lanka, identified via PubMed, PsycINFO, Google Scholar, and grey literature using terms such as mental health literacy, stigma, help-seeking, and Sri Lanka. Inclusion criteria targeted university students, schoolteachers, internally displaced persons (IDPs), and primary healthcare professionals. Thematic analysis identified patterns in symptom recognition, help-seeking, and systemic challenges, with particular focus on national interventions Sisu Sitha Noridawa (SSN) and COM-GAP. Findings reveal consistently low levels of symptom identification, limited trust in mental health services, and poor help-seeking behavior. Key barriers include cultural stigma, shortage of trained personnel, and urban-centric service delivery models. Both SSN and COM-GAP provided short-term, skills-based training to teachers and primary healthcare workers, improving awareness, referral practices, and service engagement. However, limitations included poor sustainability, absence of validated assessment tools, and insufficient cultural adaptation. Urgent priorities include integrating mental health education into national curricula, developing culturally relevant MHL tools, and securing long-term policy commitments. Future interventions should adopt trust-building, community-based strategies reflecting Sri Lanka's sociocultural diversity. Strengthening MHL through inclusive, sustainable approaches is essential to reducing stigma, empowering communities, and ensuring equitable access to psychological care.

Keywords - access to care, community intervention, mental health literacy, psychological services, stigma

HSOR 04

Shifts in Global Maternal Depression: A Comparative Review of Prevalence Before and During COVID-19

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Maternal depression is a critical public health concern affecting mothers and their babies worldwide. Whilst its prevalence has been well documented in stable settings, the COVID-19 pandemic introduced new stressors such as lockdowns, economic hardship, social isolation, and disrupted maternity care creating an evidence gap on its global impact on maternal mental health. This review aims to examine how the occurrence, risk and protective factors of maternal depression differed during the pandemic compared to pre-pandemic times. This review synthesized findings from nine peer-reviewed studies, published after 2002, identified through PubMed and Google Scholar with keywords "maternal depression," "COVID-19," "perinatal mental health," and "suicidal ideation in pregnancy." Before COVID-19, maternal depression rates typically ranged from 10% to 15%, influenced by socioeconomic and cultural factors. However, during the pandemic, these rates surged significantly, with perinatal and postpartum depression prevalence reported between 20% and 49%. Key contributors included reduced social interaction, limited healthcare access, disrupted birth experiences, and an increased caregiving burden. The literature consistently found that women in their first or third trimester, and postpartum women especially those without partner or social support faced elevated risk. Marginalized groups including immigrant women, low-income communities, and ethnic minorities experienced amplified distress due to unequal access to health services and unstable living conditions. Notably, suicidal ideation, previously reported at around 8% overall (10% antenatal, 7% postpartum), increased to 14.3% during the pandemic. While protective factors such as emotional resilience, family support, and digital mental health interventions were helpful, they were not universally accessible. In conclusion, the global maternal burden of depression drastically increased during the COVID-19 pandemic, exposing critical mental health preparedness gaps. Maternal mental health gaps can be bridged by long-term monitoring, culturally sensitive screening, and ready support systems.

Keywords - COVID-19, maternal depression, perinatal mental health, postpartum depression, suicidal ideation

HSOR 05

The Impact of Emotional Intelligence Training and Mindfulness-Based Interventions on Emotional Intelligence and Empathy in Healthcare Professionals: A Literature Review

Kumar RWR, Nicholas LA, Kalu Arachchige SS, Hewadikaram M* and Jayasinha BLE
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For healthcare workers, emotional intelligence (EI)—the ability to recognize, understand, and manage one's own emotions and those of others—and empathy—the capacity to understand and share the feelings of another—are essential skills that directly impact patient outcomes, job satisfaction, and communication. These skills can lower burnout, improve teamwork, and elevate the quality of care in high-stress environments like hospitals. This literature review examines the effectiveness of interventions aimed at enhancing EI and empathy among healthcare professionals. Twenty-three peer-reviewed studies published between 2017 and 2024 were retrieved using keywords "emotional intelligence," "empathy," "mindfulness-based interventions," "healthcare professionals," "role-play," and "burnout" across PubMed, ScienceDirect, ResearchGate, Google Scholar, and Scribd. Research done with healthcare professionals with an emphasis on empathy, EI, or mindfulness-based interventions, and quantifiable results concerning burnout, emotional resilience, or job performance were included for the review. Both experimental and observational designs were included. The results demonstrated that role-playing and simulation techniques greatly increased clinical competence and empathetic communication, while EI training decreased burnout, increased job performance, and strengthened emotional resilience. Programs like Mindfulness-Based EI Program and Mindfulness-Based Stress Reduction have also been shown to enhance healthcare personnel' EI, job happiness, and interpersonal communication. These findings provide compelling evidence for the inclusion of empathy and EI training in healthcare education and professional development programs to enhance patient care and employee well-being.

Keywords - emotional intelligence, empathy, healthcare professionals, mindfulness intervention, simulation-based learning

HSOR 06

A Review of the Current State of Person-Centered Medicine in Mental Illness in South Asian Countries

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Person-centered medical practice is a method of providing healthcare that respects the patient's values and involves them in choices regarding their care. It gives priority to the dignity, autonomy, and personal needs of the people entrusted to the process. In mental illness, it generates trust, empathy, and collaboration in recuperation. This review evaluates the existing status of person-centered medical practice in the mental health systems of South Asian countries and its 'determinants through cultural, structural, and institutional factors. A thematic analysis of literature published between 1993 and 2023 was conducted, reviewing the work of several authors. The findings reveal that while person-centered principles are increasingly recognized, implementation is inconsistent. Barriers include limited funding, shortages of trained professionals, rigid hierarchical medical models, and lack of integration with local cultural practices. Despite these challenges, initiatives such as community-based rehabilitation and the "Home Again" housing model for women with severe mental illness have shown promising outcomes. Traditional and family-based approaches, when culturally respected and ethically integrated, may enhance acceptance and sustainability. The expansion of person-centered medical practice in mental health care across South Asia requires contextually sensitive strategies, improved infrastructure, greater investment in community-based services, and national policies that support inclusive and individualized care models. This kind of change is necessary to guarantee that mental health services in the area are equal, humane, and accessible.

Keywords - cultural adaptation, health systems, mental illness, person-centered care, South Asia

HSOR 07

Exploring the Psychological Effects of Menopause: A Review of Current Evidence

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Menopause is a significant biological and psychological transition in a woman's life, typically occurring between the ages of 45 and 55. It is marked by the cessation of menstruation and a substantial decline in the levels of estrogen and progesterone. This period is linked with mental health challenges such as depression, anxiety, and cognitive changes. This review aims to explore and synthesize current evidence on the psychological effects of menopause, with a focus on mood disorders, cognitive changes, and overall mental well-being in midlife women. A comprehensive literature search was conducted using Google Scholar and ResearchGate with the keywords "mental health" and "menopause." Twelve peer-reviewed full-text papers that examined the psychological impact of menopause, published in English between 2003 and 2025 were included based on relevance. Research shows a strong link between menopause and the risk for depression and anxiety, particularly among women with a history of mental illness. As Estrogen declines, the cognitive functions decline. Our findings show that the decline of estrogen levels impacts serotonin and dopamine pathways, which increases the risk of mood disturbances. Many women experience vasomotor symptoms during menopause, and the suicide rate in menopausal women is notably concerning. Moreover, psychosocial factors such as shifts in identity, self-image, perceptions of aging, and sleep disturbances can heighten emotional vulnerability. In response, several interventions such as Hormonal Replacement Therapy (HRT), Cognitive Behavioral Therapy (CBT), and Selective Serotonin Reuptake Inhibitors (SSRIs) are used to manage the menopausal mood and cognitive symptoms. Many studies highlight the need to raise awareness and reduce stigma to ensure adequate mental health care after menopause. Understanding the psychological implications of menopause is essential for developing timely, personalized, and effective support strategies that promote long-term mental well-being in midlife women.

Keywords - anxiety, depression, menopause, mental health, women

HSOR 08

The Influence of Sensory Modalities on Memory and Emotional Status: A Literature Review

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The human senses, including sight, sound, smell, taste, and touch are essential not only for perceiving the environment but also for shaping memory and emotional experiences. Recent research has shown that each sensory modality can affect what we remember and how we feel. Despite growing interest in this area, research focused on the distinct influence of each sensory modality remains limited. This literature review synthesizes findings from 15 peer-reviewed articles, post-2002, on how different sensory modalities affect memory and emotions, sourced via Google Scholar and PubMed. Research suggests that each sense contributes in different ways to memory. Visual and auditory cues are often linked to memories that are recent, clear, and detailed. Smells and tastes, while less commonly recalled, are especially powerful in bringing back memories from early life, such as childhood experiences. Touch has also been shown to support emotionally rich and socially meaningful memories. In addition to influencing memory, sensory input has a strong effect on emotions. Pleasant scents and calm sounds can improve mood, while unpleasant sensory experiences may trigger feelings of discomfort or stress. When multiple senses are activated in a coordinated way, they can enhance both emotional responses and the vividness of memory. These effects are supported by brain regions such as the amygdala and hippocampus, which are involved in emotion and memory processing. Sensory experiences have a meaningful impact on both memory and emotional states. Understanding the influence of each sensory modality can help improve learning, emotional well-being, and therapeutic practices. Using multiple senses together may be especially effective in supporting memory and regulating emotions.

Keywords - emotional processing, memory, multisensory integration, sensory memory, sensory modalities

LSOR 01

Diagnosis of Prostate Cancer in Sri Lankan Patients and Future Directions

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Prostate cancer (PCa), the second most diagnosed malignancy among men globally, presents a rising health burden in Sri Lanka, where limited screening, late diagnoses, and resource constraints contribute to disproportionately high mortality. The unique anatomical and cellular features of the prostate gland underpin its vulnerability to malignancy, with most cancers originating in the peripheral zone. Epidemiological trends reveal increasing incidence rates in Sri Lanka, primarily affecting older men, though regional disparities in the age of onset exist. Current diagnostic practices in Sri Lanka rely on serum prostate-specific antigen (PSA) testing and digital rectal examination (DRE), with histopathology providing confirmatory evidence. However, limitations in sensitivity, specificity, and access impede early detection. Advanced methods, including multiparametric magnetic resonance imaging (MRI) and MRI-targeted biopsies, are underutilized due to infrastructural limitations. Molecular diagnostics based on prostate cancer antigen 3 (PCA3), glutathione S-transferase Pi 1 (GSTP1 promoter methylation, and exosomal microRNAs offer enhanced specificity and reduced overdiagnosis yet remain largely absent in routine practice. These significant gaps in diagnostic accuracy, standardization, and accessibility underscore the need for locally validated, cost-effective molecular tools. Advancing PCa diagnostics in Sri Lanka requires a strategic shift towards molecular assays tailored to local epidemiology and clinical realities. Emphasis on early detection, accurate risk stratification, and equitable accessibility will contribute to improved outcomes. Future research must focus on validation of non-invasive biomarkers, capacity building in molecular pathology, and integration of diagnostics into national cancer control strategies.

Keywords - diagnostic biomarkers, molecular diagnosis, non-invasive, PCA3, prostate cancer

LSOR 02

Use of Zebrafish as a Model Organism in Neuroscience with Different Observational Studies and Techniques

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Zebrafish (*Danio rerio*) have emerged as a powerful vertebrate model in neuroscience due to their genetic tractability, optical transparency, and conserved brain architecture. This review comprehensively explores zebrafish applications across diverse observational and experimental approaches in neuroscience. We examine behavioural studies, highlighting both reflexive and goal-directed responses, and their use in modelling neurodevelopmental and psychiatric disorders. Sensory systems, including vision, olfaction, audition, and mechanosensation are analysed using behavioural assays and mutant models to explain gene-function relationships. The review also addresses drug-induced behavioural changes, emphasizing zebrafish's value in neuropharmacology and addiction research. Advanced imaging techniques such as two-photon microscopy, light-sheet imaging, and super-resolution microscopy enable real-time brain activity monitoring and subcellular localization. Emerging molecular tools like clustered regularly interspaced short palindromic repeats (CRISPR), transcriptomics, and ascorbate peroxidase (APEX) - based proteomics further examine neuronal mechanisms. Notably, integration with artificial intelligence and computational brain atlases [e.g., *zebrafish activity prediction benchmark* (ZAPBench)] has enhanced behaviour quantification and neural circuit mapping. Despite a focus on larval stages, we highlight the need to expand adult zebrafish research and standardize behavioural protocols. Overall, this review highlights zebrafish as a versatile and developing platform for clarifying vertebrate brain function, advancing neurological disease modelling, and enhancing drug discovery through high-throughput, integrative approaches.

Keywords - behavioral assays, model organism, neuroscience, subcellular localization, zebrafish

LSOR 03

Pharmacogenomics Analysis of Selected Beta Blockers

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Beta-blockers are an extensive category of drugs frequently used to treat cardiovascular diseases like heart failure, hypertension, as well as some uncommon indications. Their pharmacologic profiles vary for many reasons, which impact their metabolism. This narrative review focuses on the compiling the pharmacogenomics with related to selected beta blockers. Their differences affect several factors influencing the clinical utility of beta-blockers, including hemodynamics, metabolic characteristics, and tolerability due to differences in adrenoceptor selectivity, partial agonist activity, membrane-stabilizing, and vasodilatation. There are numerous beta-blockers available, and the most prescribed include atenolol, propranolol, carvedilol, metoprolol, and bisoprolol. Pharmacogenomic variations can significantly impact the safety and effectiveness of beta-blockers, and the potential for personalized beta-receptor antagonist treatment is possible in some populations. CYP2D6, a key enzyme in drug metabolism, affects a range of drugs, including metoprolol, carvedilol, and propranolol, which means that cardiac patients may be more prone to adverse effects, for example, bradycardia for metoprolol. Atenolol and bisoprolol are less influenced by CYP2D6 metabolism. Polymorphisms in adrenergic receptor genes, particularly in ADRB1 gene-Arg389Gly and Gly49Ser and ADRB2 gene-Gln27Glu and Gly16Arg, can affect the activity and down-regulation of adrenergic receptors and can also impact the clinical response to adrenergic receptor antagonists such as metoprolol, carvedilol, and atenolol. These polymorphisms and the interactions involved in their genetic effect on clinical outcomes can help lay the groundwork for further studies to possibly optimize beta-blocker therapy.

Keywords - adrb1, beta-blockers, cyp2d6, pharmacogenomics, polymorphisms

LSOR 04

Genetic Predictors of Cholinesterase Inhibitor Toxicity

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Galantamine, rivastigmine, and donepezil are commonly prescribed cholinesterase inhibitors (ChEIs) used as adjunct treatments for cognitive impairments, particularly in Alzheimer's disease and related dementias. While these agents offer symptomatic benefits, their clinical utility is often limited by interindividual variability in pharmacokinetics and pharmacodynamics, which can lead to adverse effects (AEs). This literature review explores the current pharmacogenetic evidence on predictors of ChEI-related toxicity, with a focus on genetic polymorphisms in CYP2D6, CYP3A4/5, BCHE, and APOE. Individuals with CYP2D6 poor metabolizer genotypes have reduced enzymatic activity, resulting in slower drug clearance, elevated plasma concentrations, and an increased risk of dose-dependent toxicity. However, clinical outcomes are inconsistent across studies, making the evidence base somewhat conflicting. Polymorphisms such as the BCHE-K variant and the homozygous APOE- ϵ 4 allele have also been associated with poorer cognitive outcomes in patients treated with donepezil, particularly those with mild cognitive impairment. Preliminary findings from pharmacogenetic studies suggest that genotype-guided dosing strategies may influence both therapeutic response and toxicity profiles. Nonetheless, current studies face several limitations, including small sample sizes, overlapping comorbidities, heterogeneity in study populations, and the confounding effects of polypharmacy. Moreover, there remains uncertainty regarding the precise concentration-toxicity thresholds for these agents. Overall, while evidence is still emerging, pharmacogenetic testing holds promise for personalizing ChEI therapy to optimize efficacy and minimize adverse effects. Further large-scale, well-controlled studies are needed to establish robust clinical guidelines for genotype-based dosing in cognitive impairment management.

Keywords - alzheimer's disease, APOE, cholinesterase inhibitors, CYP2D6, pharmacogenetics

LSOR 05

Hybrid Nanocarriers: The Smart Vessels of CRISPR Gene Therapy

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Advancements in nanotechnology have greatly enhanced the precision and effectiveness of gene therapy by enabling the development of advanced delivery systems for various genetic materials, including CRISPR-Cas9 ribonucleoprotein complexes. Nanocarrier-based platforms help address critical challenges, such as enzymatic degradation, inefficient cellular uptake, and off-target effects, by facilitating the targeted, controlled, and biocompatible delivery of therapeutic agents. In this context, gold and hybrid nanocarriers have emerged as promising non-viral vectors for gene therapies and CRISPR-based treatments. Although gold nanoparticles possess advantageous properties, such as high potential for surface functionalization, efficient cellular internalization, and the ability to enable externally stimulated release, their clinical applications are limited due to non-biodegradability, a restricted capacity for encapsulating large genetic materials, and reliance on external triggers for effective endosomal escape. In contrast, hybrid nanocarriers, which typically consist of a polymeric core and a lipid shell, offer improved encapsulation efficiency, enhanced biodegradability, and greater structural adaptability. These features allow for the co-delivery of CRISPR components. Hybrid systems can also be functionalized with targeting ligands and surface modifications, such as PEGylation, which helps achieve prolonged circulation and tissue-specific delivery. Their ability to incorporate stimuli-responsive elements enables controlled intracellular release, allowing for precise regulation of gene editing activity over time. Despite challenges, hybrid nanocarriers present a more favorable profile than gold nanoparticles in terms of biocompatibility, delivery efficiency, and potential clinical applications. Overall, these findings underscore the promise of hybrid nanocarriers as a next-generation non-viral delivery platform for CRISPR-based genome editing and broader gene therapy applications.

Keywords - CRISPR, gene delivery, genetic cargo systems, gold nanoparticle, hybrid nanoparticles

LSOR 06

Heterocyclic Three-Fused Ring Systems as Scaffolds in Anti-Cancer Drug Discovery: A Review

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The discovery and development of novel anti-cancer agents remains a major focus in medicinal chemistry due to the global burden of cancer and limitations of its existing therapies. Heterocyclic compounds have emerged as core structures in numerous clinically approved drugs. Among these heterocyclic systems, evidence suggests that three fused-ring systems are promising candidates in anticancer drug development. This review aims to determine the role of heterocyclic three-fused ring systems as scaffolds in anti-cancer drug discovery. Here, three representative ring systems, namely carbazole, phenothiazine, and phenanthridine, are comparatively analyzed by relating their core structural features of planarity, aromaticity, heteroatom distribution, and lipophilicity to their potential anti-cancer activity. Additionally, the change in anti-cancer activity resulting from modifications to these features is also discussed in terms of structure-activity relationships, focusing on modulating mechanisms such as DNA intercalation, enzyme inhibition, and membrane interaction, as well as the relevance of functional group substitutions in specific positions. Moreover, this review highlights the clinically approved and investigational leads derived from these scaffolds and their structural correlations with their anti-cancer activity. By comparative analysis, the study emphasizes the significance of three fused ring systems as promising scaffolds in the development of novel anti-cancer drugs. Further, it emphasizes phenanthridine, a relatively understudied moiety, as a promising candidate in anticancer drug discovery due to its favorable structure activity relationships akin to those of established scaffolds.

Keywords - anticancer drugs, carbazole, drug discovery, phenanthridine, phenothiazine, scaffolds, three-fused ring systems

LSOR 07

Enhancing the Functional Properties of Chitosan-Seaweed Polysaccharide Blends for Biodegradable Food Packaging Films: A Review

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The increasing environmental burden of synthetic plastics and the growing incidence of food waste, largely due to inadequate packaging and microbial spoilage have intensified the demand for sustainable packaging alternatives. Biodegradable food packaging films offer a promising solution, particularly those derived from natural biopolymers such as chitosan and seaweed polysaccharides. This review investigates the potential of chitosan–seaweed polysaccharide blends as viable replacements for conventional plastic packaging. Chitosan, a deacetylated derivative of chitin, exhibits inherent antimicrobial and film-forming capabilities. When blended with seaweed-derived polysaccharides such as alginate, carrageenan, agar, fucoidan, laminarin, and ulvan the resulting films demonstrate enhanced functional properties including improved mechanical strength, thermal stability, barrier efficiency, biodegradability, and bioactivity. Strategies to further enhance film performance, such as nanoparticle incorporation, cross-linking, addition of bioactive compounds, and advanced fabrication techniques (e.g., layer-by-layer assembly and solvent casting), are critically reviewed. Emphasis is also placed on the extraction methods for these polymers, where green extraction techniques stand out for their environmental sustainability and scalability. Among the seaweed polysaccharides, alginate is particularly abundant and forms highly compatible blends with chitosan, and exhibit excellent functional properties, such as minimal oxygen and water vapor permeability, increased mechanical strength, and biodegradability. Overall, the synergistic properties of chitosan–seaweed composites highlight their significant potential in the development of next-generation, eco-friendly materials for food packaging applications.

Keywords - biodegradable films, chitosan, food packaging, green extraction, seaweed polysaccharides

LSOR 08

Synthesis and Characterization of Folic Acid Loaded Alginate-Chitosan Nanoparticles: A Primary Approach Toward Addressing Folate Deficiency

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Nanotechnology-based delivery systems offer an innovative method to enhance the therapeutic efficacy and bioavailability of essential micronutrients through a precisely controlled release mechanism. Among these systems, polysaccharide-based nanoparticles, particularly those made from alginate and chitosan, are specific for their biocompatibility, biodegradability, and distinctive physicochemical properties. This research focuses on the formulation and evaluation of folic acid-loaded nanoparticles composed of alginate and chitosan, specifically engineered for intravenous (IV) administration. The study addresses folate deficiency, a significant nutritional issue that can lead to severe health problems, including neural tube defects (NTDs) and megaloblastic anemia, particularly in vulnerable populations. Using a refined ionic gelation technique, the developed nanoparticles achieved an impressive encapsulation efficiency (EE) of approximately 80%. Detailed particle size analysis (PSA) using the Dynamic Light Scattering (DLS) method showed an average diameter of 819.6 nm, indicating a moderate level of size variation among the particles. In vitro release studies revealed a biphasic release profile, with approximately 20% of the encapsulated folic acid released in the initial phase, followed by a sustained release of 55% over 72 hours. This controlled release mechanism is particularly advantageous for IV supplementation, as it helps maintain stable plasma levels of the nutrient over time. The findings from this study highlight the promising potential of alginate-chitosan nanoparticles as an effective delivery system for micronutrient therapy. However, further optimization is needed to reduce particle size and enhance distribution characteristics. Additionally, further characterization and in vivo trials are essential to establish the therapeutic efficacy of these nanoparticles. This research proposes a scalable and significant approach to addressing folate deficiency and enhancing health outcomes for high-risk populations.

Keyword - alginate, chitosan, folic acid, folate deficiency, ionic gelation

LSOR 09

Integrative Transcriptomic Analysis of Prostate Cancer: Identifying Key Regulatory Networks and Therapeutic Targets

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Prostate cancer remains one of the most common malignancies in men, yet its pronounced molecular heterogeneity continues to hinder early detection, robust prognostication, and the design of effective targeted therapies. We performed an integrative transcriptomic analysis of RNA-seq data from NCBI GEO (GSE89223), including tumor and matched normal prostate tissues. High-throughput processing and quality control were conducted on Galaxy; alignment, quantification, and differential expression were executed in OmicsBox v3.4 using STAR and edgeR. Normalization employed trimmed mean of M values and counts-per-million thresholds, and exploratory PCA and hierarchical clustering confirmed sample-type separation. After filtering, 2,931 expressed features were retained, with eight differentially expressed genes ($FDR < 0.05$; $|\log_2FC| > 1.5$) distinguishing tumor from normal samples. Functional annotation and pathway enrichment revealed dysregulation of PI3K–Akt, MAPK, and TGF- β signaling, accompanied by immune-modulatory signatures consistent with tumor immune evasion. Network-level crosstalk between oncogenic and metabolic programs highlighted mechanisms underpinning proliferation, epithelial–mesenchymal transition, and therapeutic resistance. Together, these signals recapitulate established hallmarks while nominating candidate biomarkers and druggable nodes for further validation in larger, independent cohorts. Beyond specific gene lists, our study showcases a transparent, reproducible workflow that integrates open datasets with standard analysis tools, facilitating rapid hypothesis generation for precision oncology. By systematically decoding transcriptomic heterogeneity, this work provides a focused catalogue of pathways and regulators with translational potential for risk stratification, target prioritization, and rational combination therapy design in prostate cancer.

Keywords - biomarker, differential expression genes, pathway analysis, prostate cancer, transcriptomic

LSOR 10

Emerging Molecular and Synthetic Biology Tools for Precision Early Detection of Breast Cancer

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Breast cancer remains one of the most prevalent malignancies among women worldwide, underscoring the critical importance of early and precise detection for improving patient outcomes. Traditional diagnostic methods, including mammography, ultrasound, and immunohistochemistry, exhibit limitations in sensitivity, specificity, and non-invasiveness, particularly for early-stage detection. In response, molecular techniques have emerged as powerful tools for high-resolution tumor profiling, enabling detection of genetic, epigenetic, proteomic, and transcriptomic biomarkers such as estrogen and progesterone receptors, HER2, BRCA1/2, circulating tumor DNA, microRNAs, and circulating tumor cells. Advances in technologies like Immunoassay, Polymerase Chain Reaction (PCR), Enzyme-linked Immunosorbent Assays (ELISA), Microarrays, MammaPrint and BluePrint, Next-Generation Sequencing, and Liquid Biopsy have significantly enhanced diagnostic accuracy and clinical utility. Complementing these approaches, synthetic biology has revolutionized breast cancer diagnostics by integrating engineered biological systems, nanotechnology, biosensing, and computational tools. Platforms employing DNA logic gates, dynamic nanostructures, CRISPR/Cas9-based mutation detection, cell-based reporters, and micro fluidic devices enable highly specific, sensitive, and rapid detection of tumor biomarkers, including those associated with aggressive sub types such as triple-negative breast cancer. Furthermore, biosensors, exosome-based assays, and AI-guided molecular probes allow non-invasive, real-time, and high-throughput monitoring, facilitating personalized diagnostic strategies and early therapeutic intervention. Collectively, these molecular and synthetic biology innovations are redefining precision oncology by providing clinicians with powerful, versatile, and minimally invasive tools for early breast cancer detection, ultimately aiming to reduce mortality, optimize treatment decisions, and improve patient outcomes.

Keywords - biomarkers, breast cancer, diagnosis, molecular techniques, synthetic biology

LSOR 11

Formulation and Evaluation of Egg Yolk Lecithin-Based Liposomes for the Encapsulation Efficiency of *Moringa oleifera* and *Centella asiatica* Extracts

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The rising demand for natural, biocompatible therapeutic agents has driven growing interest in plant-derived compounds with antioxidant, anti-inflammatory, and regenerative properties. From these, *Centella asiatica* and *Moringa oleifera* stand out for their content of flavonoids and phenolic acids as bioactive phytochemicals. However, their cosmetic and therapeutic applications are restricted by poor solubility, poor stability, and poor permeability through biological barriers. This study aimed to improve the stability and delivery of extracts of *Centella asiatica* and *Moringa oleifera* by co-encapsulating them in liposomes synthesized from natural chicken egg yolk-derived lecithin. The natural lecithin that is comprised of phosphatidylcholine and phosphatidylethanolamine was utilized as the matrix of the lipid bilayer. Maceration was employed for the preparation of ethanol extracts of both herbs, whereas their phytochemical content was quantified through UV-Visible spectrophotometry. *Moringa* had higher flavonoid content ($649 \pm 21.4 \mu\text{g/mL}$), while *Centella* had higher total polyphenol content ($302.5 \pm 9.0 \mu\text{g/mL}$), confirming their complementary roles. Liposomes were prepared by thin-film hydration method. Lecithin dissolved in chloroform was first used to form a thin lipid film, which was then hydrated with PBS solution containing the diluted extracts. The post-loading method was adopted to prevent heat degradation of susceptible compounds. Sonication was used to reduce vesicle size. Encapsulation efficiency (EE%) for *Centella asiatica* was 37.8%, and for *Moringa oleifera*, it was 28%, which is in line with expected values for post-loading (average efficiency 20%-40%). Combining both extracts into one liposomal system enables multifunctional action, while using egg-yolk lecithin supports biocompatibility and meets the increasing demand for plant-based, eco-friendly formulations.

Keywords - *Centella asiatica*, encapsulation efficiency, liposomes, *Moringa oleifera*, natural lecithin, phytochemicals

LSOR 12

Sustainable Packaging Design Using *Lasia spinosa*-Derived Nanocellulose and Kaolinite Clay for Delayed Banana Ripening

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The purpose of this study was to create biodegradable and high-quality packaging material using cellulose and nanocellulose made from *Lasia spinosa* fibers, and kaolinite clay to improve its strength and ability mechanical strength and ethylene adsorption capacity. The aim was not only to provide an eco-friendly alternative to petroleum-based plastics, but also to help reduce post-harvest fruit losses by slowing down ripening. Bananas were chosen as the model fruit, because it is a climacteric fruit with high post-harvest losses in Sri Lanka, ripening rapidly due to ethylene production. Even a few extra days of shelf life can significantly reduce waste and improve market value. The process involved measuring 100g of cleaned *Lasia spinosa* rhizomes, removing lignin and hemicellulose, and then turning the cellulose into nanocellulose through a high-pressure homogenization process. The resulting nanocellulose dispersion was stable, indicating effective fibrillation. Kaolinite clay was dispersed in distilled water and sonicated for 30 min which was then mixed with the nanocellulose to form a composite. It was found that using 3% (w/v) of clay gave the best results for forming films, with uniform thickness. The composite was applied to bananas using the dipping method, with single and repeated applications tested. Compared to the uncoated control, the coating delayed visible ripening signs by approximately 4-5 days, likely due to the ethylene adsorption ability of both cellulose and kaolinite. Some challenges were identified, like the short-term stability of the mixture, and slight cloudiness from mineral impurities in the kaolinite. Despite these issues, the study clearly shows how nanocellulose from plants can be combined with natural clay minerals to make an eco-friendly and useful packaging system that can extend the shelf life of fruits that ripen quickly. Future research will look into better ways to purify the materials and explore more uses for this framework.

Keywords - biodegradable packaging, cellulose, ethylene scavenger, kaolinite clay, Lasia spinosa

LSOR 13

Assessment of Dietary Patterns and Anthropometric Profiles of Undergraduate Students at NSBM Green University, Sri Lanka

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Overweight and obesity are growing global health concerns, driven by poor dietary habits among adolescents, especially university students. Anthropometric measurements, including weight, height, and waist circumference (WC), provide a valuable understanding of an individual's health. This study assessed the dietary patterns and anthropometric measurements of undergraduate students at NSBM Green University, Sri Lanka. This descriptive cross-sectional study was conducted among 102 undergraduate students through an online self-administered questionnaire between March and May 2025. Mass Index (BMI) and abdominal obesity were categorized using Asian-specific cut-offs. Mean age is 21.92 (SD $\pm$ 1.651) years and the majority were between 21-23 years (63.73%). Based on BMI, 15.69% underweight ($>18.5\text{kg/m}^2$), 39.22% were normal ($18.5\text{-}22.9\text{kg/m}^2$), 15.69% overweight ($23\text{-}24.9\text{kg/m}^2$), and 29.41% obese ($\geq 25\text{kg/m}^2$). Among females, 18.82% underweight, 36.47% normal, 15.29% overweight, and 29.41% were obese. Among males, 52.94% were normal, 17.65% overweight, and 29.41% obese, with no underweight cases. Abdominal obesity was observed in 41.18% of students, including 45.88% of females ($>80\text{cm}$) and 17.65% of males ($>90\text{cm}$). A significant association was found between BMI and eating or not between meals ($p = 0.030$) and abdominal obesity ($p < 0.001$), with abdominal obesity being most prevalent among students classified as obese. 17.5% of students with a normal BMI had abdominal obesity. No significant association was observed between BMI and breakfast skipping, daily snack consumption, dietary preferences, meal frequency, food sources, alcohol intake, smoking habit, and sociodemographic factors. The findings reveal high obesity and abdominal obesity rates, especially among females, emphasizing the need for targeted dietary interventions in university settings to support long-term health.

Keywords - abdominal obesity, Body Mass Index (BMI), dietary patterns, nutritional status, university students

LSOR 14

The Involvement of Small Noncoding RNA in Neurodegenerative Diseases: From CAG Repeat Biology to Therapeutic Nodes

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Small regulatory non-coding RNAs (sncRNAs), microRNAs (miRNAs), PIWI-interacting RNAs (piRNAs), and small interfering RNAs (siRNAs) are increasingly being linked to the development of neurodegenerative diseases (NDs) such as Alzheimer's and Parkinson's disease. As populations age, a large share of global disease burden and disability-adjusted life years is being attributed to NDs, while available treatments are largely symptomatic and do not change disease course. In this study, the biogenesis of sncRNAs and the formation of Argonaute/PIWI-guided RNA-induced silencing complexes are summarized, and context-dependent effects on neuronal homeostasis are highlighted. miRNAs with neuroprotective and pathogenic actions are outlined. Evidence is also reviewed that piRNAs, once considered restricted to the germline, are active in somatic neurons where regulation of transposons, synaptic plasticity, and stress responses are being observed. Overlap between endogenous/exogenous siRNAs and miRNA pathways is described, and the potential of siRNAs for programmable, target-selective silencing is noted. Dysregulated sncRNA-mRNA networks across major NDs are mapped and linked to proteostasis failure, neuroinflammation, mitochondrial dysfunction, and axonal transport defects. Translational opportunities are assessed, including use of circulating and cerebrospinal fluid sncRNAs as minimally invasive biomarkers, and development of miRNA mimics/inhibitors and antisense or siRNA-based agents with delivery systems designed to cross the blood-brain barrier. Key hurdles as cell-type specificity, durability, off-target effects, and immune activation are identified. It is proposed that clearer maps of sncRNA networks will enable disease-modifying strategies. Priority next steps are defined as longitudinal, cell-type-resolved profiling, causal perturbation screens in human neurons, and adaptive clinical trials that integrate pharmacodynamic biomarkers with precision delivery, alongside attention to ethics, safety, manufacturability, and equitable access.

Keywords - gene regulation, miRNA, piRNA, RNA based therapeutics, siRNA

ABSTRACTS

POSTER PRESENTATIONS

HSPO 01

Exploring the Impact of Nursing Practice on Antibiotic Stewardship and Resistance Prevention: A Rapid Review of Literature

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Antibiotic resistance poses a major threat to global health, increasing morbidity, mortality, and overall healthcare expenditure; thus, effective antibiotic stewardship is essential in hospitals, as they serve as prime locations for the transmission of antibiotic-resistant organisms. Nurses, as multifaceted frontline healthcare providers, are key figures in the implementation of stewardship guidelines and infection control practices. A rapid review was conducted to explore nurses' roles, perceptions, and practices regarding antibiotic stewardship in preventing the spread of antibiotic-resistant organisms within medical and surgical wards. Twenty-two research articles published between 2020 and 2025 were retrieved from databases of PubMed, CINAHL, and Science Direct using a structured search strategy with defined inclusion criteria. Thematic synthesis was employed to analyze and categorize findings from the selected studies. The review identified five key themes; the need for pre and post clinical practice education and training, attitudinal changes toward ongoing professional development, addressing persistent challenges of excessive workload and resource limitations, inconsistency in protocol compliance, and the importance of interdisciplinary collaboration. Specific education programs, standardized procedures, and collaborative practice frameworks are essential to enhance nursing knowledge and stewardship efforts. The findings highlight the importance of nursing practice that aids in directly shaping the effectiveness of antibiotic stewardship and its pivotal role in limiting resistance within hospital settings. These strategies are vital for healthcare managers and policymakers, to optimize the role of nursing practice to strengthen infection control and in ensuring sustainable resistance prevention.

Keywords - antibiotic stewardship, antibiotic resistance, hospital care, infection control, nurses

HSPO 02

Recognizing and Responding to Auras: A Nursing Guide to Preictal Signs and Patient Safety

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Auras are early warning signs that often occur before seizures and can help predict when a seizure will happen. Recognizing these pre-ictal signs are important for nurses to provide timely care, prevent injuries, and improve patient safety. This rapid review examines common aura types, skill levels, and strategies to enhance patient safety and seizure management. This review aims to synthesize existing literature on the recognition and clinical significance of auras in epilepsy, with a focus on the nursing role in early identification and intervention. A full-text literature search was conducted in PubMed, ScienceDirect, ResearchGate, and Google Scholar databases, and studies published in English between 2018 - 2025 were included. Patient safety, nursing care, preictal symptoms, auras, and seizure management were the primary focus of the study. A total of 10 studies were reviewed, covering diverse research designs including experimental, retrospective, prospective, qualitative and systematic reviews, conducted across six countries. 6 studies identified auras as subjective and often underreported, with patients recalling mainly motor and subjective symptoms while forgetting autonomic and postictal elements. Recognizing seizures early through identifying auras such as unusual sensations, visual changes, or intense emotions, can significantly enhance patient safety. Studies show the importance of nurse training, clear response protocols, and open nurse-patient communication about aura experiences. Developing a structured nursing guide is strongly recommended to support timely interventions and reduce the risk of seizure-related complications through early detection of auras. Improving nurse training, standardized care protocols, and effective communication strategies is crucial for enhancing seizure management.

Keywords - auras, nursing guide, patient safety, preictal signs, seizure management

HSPO 03

Review of Adult Pressure Ulcer Prevention: A Dynamic Approach to Care

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Pressure ulcers, also known as bedsores or decubitus ulcers, are localized injuries to the skin and underlying tissue. To promote more comfort, minimize complications, and improve overall quality of life, prevention of pressure ulcers is essential in the care of the elderly. This review aims to investigate successful tactics and measures for reducing adult pressure ulcers in diverse healthcare environments. A total of 20 original articles in English language from 2013 to 2022 accessed via ScienceDirect and Google Scholar to gather data using key words related to pressure ulcers. In most studies, pressure ulcer risk has been estimated by patient care evaluation and patient interviewing or through cross-national surveying. The important preventive interventions that were studied comprised early detection, pressure-reducing devices, frequent repositioning, nutrition, and cleanliness techniques. Immobility, sensory impairment, and intubation are major risk indicators of pressure ulcers in spinal cord injury patients according to multiple studies. Systemic skin care and absorptive pads reduced facility-acquired ulcers by 67%, according to one cohort. Fatty acid emollients, barrier creams, and pH-balanced cleaners all influenced moisture lesions (85%). Evidence-based practices demonstrated that 95% of ulcers are preventable, with diet lowering risk by 20-40% and support surfaces by 60%. Tight bundles in most hospitals reduced rates below 2%, lowering incidence by up to 80%. Reducing the risk of pressure ulcers in adults will improve their quality of life, and lessen the financial load on healthcare systems, enhance early intervention and regular preventative care.

Keywords - bedsores, elderly care, pressure ulcers, prevention, risk factors

HSPO 04

A Comprehensive Literature Review on the Impact of Maternal Absence During Childhood on Psychological Outcomes in Later Life

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Early experiences with mother play a crucial role in shaping long-term psychological outcomes. Understanding how early maternal presence influences later life mental health can inform interventions and support strategies. This review aims to synthesize existing research on the impact of childhood maternal absence, neglect, or unavailability on psychological outcomes later in life. Peer-reviewed articles published between 2000 and 2025 were identified through PubMed, ResearchGate, and Google Scholar. Inclusion required studies to examine psychological development in relation to maternal absence or neglect, while those focusing solely on physical health outcomes were excluded. A comprehensive literature review was conducted with twelve studies that met the inclusion criteria. Many studies consistently identify maternal absence or affective neglect as key predictors of adverse long-term effects, including impaired intellectual functioning, psychological distress, and academic underachievement. The findings also highlight how psychological absence where a mother is physically present but emotionally unavailable can hinder socio-emotional development. Furthermore, maternal figure deprivation in early childhood is strongly associated with increased risks of adult depression and psychiatric disorders, suggesting that early emotional bonds are foundational to mental health. Studies from Thailand, China, and African countries such as Nigeria, Uganda, Kenya etc. show that a mother's absence is often primarily influenced by socioeconomic factors. Therefore, the effects of maternal employment are complex, shaped both by the economic advantages it provides and by the quality and emotional support available through childcare. Some studies suggest that surrogate mother figures can foster resilience in children experiencing maternal absence. These studies collectively affirm that maternal availability remains central to children's developmental well-being. However, the evidence also highlights systemic issues such as poverty and lack of culturally responsive support systems. Therefore, interventions must prioritize early strategies that address socioeconomic disparities and promote culturally sensitive practices to effectively mitigate the negative impacts of maternal absence.

Keywords - child development, early childhood, emotional neglect, maternal absence, psychological resilience

HSPO 05

Effectiveness of Digital Health Interventions on Maternal Mental Health Issues: A Literature Review

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Maternal mental health is an increasingly recognized global concern, with many mothers experiencing emotional distress, anxiety, and depression, particularly during the postpartum. These challenges not only affect the well-being of mothers but also have significant implications for child development and family dynamics. Traditional mental health services are often underutilized due to stigma, limited access, and resource constraints, highlighting the need for innovative and scalable solutions. The aim of this review is to synthesize studies published between 2015 and 2024 to evaluate the effectiveness of digital health interventions in improving maternal mental health. Twenty-four peer-reviewed studies identified through PubMed, PsycINFO, Scopus, and Google Scholar, focusing on pregnant or postpartum women, that involve digital or mobile health interventions, and include measurable outcomes such as depression, anxiety, or stress were included. The review identified several key features of digital platforms such as mood tracking, cognitive-behavioral therapy (CBT) tools, stress-reduction techniques, and peer support groups as effective components in supporting emotional regulation and resilience among mothers. Emphasis is placed on the value of cultural sensitivity and user-driven customization, especially in multicultural and low-resource environments. Common challenges included limited access to technology, low digital literacy, and concerns around scalability. However, potential solutions such as offline functionality, integration with local healthcare services, and hybrid models were noted as promising approaches to overcome these barriers. The review also highlighted the importance of professional oversight, integration with existing maternal health systems, and the use of data-driven personalization to enhance user engagement and long-term effectiveness. It is suggested that future studies examine the wider effects of digital tools on child development, maternal-child attachment, and the financial viability of digital mental health treatments. In conclusion, the findings indicate that well-designed, inclusive digital solutions can play a transformative role in improving maternal mental health and empowering mothers during the postpartum period.

Keywords - cognitive behavioral therapy, cultural sensitivity, digital interventions, maternal mental health, m-health

HSPO 06

Efficacy of Animal-Assisted Therapy and Activities on Mental Health: A Literature Review

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Animal-Assisted Therapy (AAT) and Animal-Assisted Activities (AAA) refer to structured and unstructured interactions with animals aimed at supporting physical, emotional, and social well-being. AAT typically involves goal-directed sessions facilitated by trained professionals, while AAA includes informal animal interactions intended to uplift mood and engagement. With rising global mental health challenges—including depression, schizophrenia, anxiety, and dementia—there is growing interest in complementary, non-pharmacological approaches that enhance psychological care. This review evaluates the efficacy of AAT and AAA through the synthesis of peer-reviewed literature. A comprehensive search was conducted across databases such as PubMed, PsycINFO, and Scopus using search terms including “animal-assisted therapy,” “mental health,” “pet therapy,” “emotional support animals,” and “anxiety.” Studies published within the last decade with controlled designs and measurable mental health outcomes were included. A total of 27 studies, with sample sizes ranging from 20 to 300 participants, met the inclusion criteria. Findings write down consistent short-term benefits of animal-assisted interventions in improving emotional regulation, reducing anxiety, and promoting social interaction in both clinical and non-clinical populations. Dog-assisted therapy was especially effective among university students, older adults with dementia, and individuals with schizophrenia, contributing to reduced psychological distress, elevated mood, and increased social engagement. Bird-assisted activities also showed potential in managing procedural anxiety, particularly in pediatric dental settings. The mechanisms of benefit identified across studies include distraction from distress, emotional comfort, tactile stimulation, and opportunities for non-threatening social interaction. However, considerable heterogeneity in intervention protocols, animal species used, session durations, and outcome measures limits the generalizability of findings. Animal-assisted interventions demonstrate potential as safe and accessible complementary approaches for supporting mental health. However, confirming their long-term effectiveness will require robust evidence from well-designed randomized controlled trials, diverse and adequately powered samples, standardized intervention protocols, and extended follow-up assessments.

Keywords - animal-assisted activities, animal-assisted therapy, complementary therapy, mental health, psychological well-being

HSPO 07

Effectiveness of Mindfulness-Based Meditation on Perinatal Depression and Stress: A Literature Review

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Perinatal stress and depression are significant public health concerns that affect both the mother and the infant. Given the limitations of pharmacological interventions such as potential risks to fetal development, breastfeeding complications, and side effects, there is growing interest in non-pharmacological approaches. Mindfulness-based interventions (MBIs), including Mindfulness-Based Cognitive Therapy (MBCT), Mindfulness-Based Stress Reduction (MBSR), and Mindfulness-Based Childbirth and Parenting (MBCP), have emerged as promising strategies to support maternal mental health. This review aims to evaluate the effectiveness of mindfulness-based meditation in reducing perinatal depression and stress among pregnant and postpartum women. This review was conducted by identifying and analyzing 13 peer-reviewed articles published between 2018 and 2024 available in Google Scholar, PubMed, and PsycINFO with keywords “mindfulness”, “perinatal depression”, and “maternal mental health”. Studies were included if they targeted pregnant or postpartum women and utilized validated measures in evaluating the effectiveness of mindfulness-based meditation in reducing perinatal depression and stress; non-English articles were excluded. Findings from the reviewed literature consistently indicate that MBIs significantly reduce depressive symptoms and perceived stress. Specifically, MBCT and MBCP demonstrated the most robust effects, contributing to improved emotional regulation, increased self-compassion, and greater childbirth self-efficacy. Although adherence to formal mindfulness practices varied, participants still experienced psychological benefits, suggesting that program engagement and psychoeducation may play a crucial role in therapeutic outcomes. In conclusion, mindfulness interventions provide effective, non-invasive therapies for enhancing perinatal mental health. Their integration into routine prenatal and postnatal care has the potential to lower maternal distress and strengthen coping mechanisms during the transition to motherhood.

Keywords - maternal care, maternal mental health, mindfulness-based interventions, perinatal depression, stress reduction

LSPO 01

Serological Diagnosis of Intestinal Infectious Diseases in Sri Lanka

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Intestinal Infectious Diseases (IIDs) represent a critical public health challenge in Sri Lanka, particularly in resource-limited settings where diagnostic obstacles severely undermine effective management. Though prevalent, traditional diagnostic methods, such as stool culture and microscopy are often slow, labor-intensive, and frequently lack the sensitivity required for accurate detection. In contrast, serological diagnosis is capable of detecting pathogen-specific antibodies or antigens and emerges as a promising alternative, offering rapid results, cost-effectiveness, and the potential for widespread application in public health surveillance. This review meticulously examines the role of serological testing in addressing IIDs in Sri Lanka, underscoring its benefits in identifying asymptomatic carriers, monitoring outbreaks, and enhancing conventional diagnostic strategies. We delve into key pathogens, including *Entamoeba*, *Shigella*, *Salmonella*, and enteric viruses, emphasizing evidence from local studies that demonstrate improved diagnostic sensitivity over traditional methods. Nevertheless, it is essential to acknowledge limitations associated with serological approaches such as cross-reactivity, the challenge of distinguishing between past and active infections, and the necessity of confirmatory molecular testing. By integrating advanced serological techniques Sri Lanka can significantly bolster its diagnostic capabilities, particularly in rural and underserved areas. To catalyze this transformation, we advocate for strategic investments in healthcare infrastructure, training, and multiplex serological platforms, which are critical for optimizing public health responses. Ultimately, the adoption of serological diagnosis is not only advantageous but imperative for effective epidemiological surveillance, enabling targeted interventions to curb the transmission of IIDs and significantly improve health outcomes across Sri Lanka.

Keywords - diagnosis, disease transmission, intestinal infectious diseases, public health surveillance, serology

LSPO 02

***Martynia annua* L. Mediated Chitosan Nanoparticles: An Insight on Green Synthesis and Antimicrobial Efficacy**

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Chitosan, a cationic polymer extracted from chitin, possesses intrinsic broad-spectrum antibacterial characteristics that are amplified when synthesized as nanoparticles. Conventional synthesis processes of chitosan nanoparticles involve hazardous chemicals and harsh conditions. Green synthesis involving natural reducing and stabilizing agents and ambient conditions, avoids the harmful impact of traditional synthesis processes. Numerous plant extracts have lately been investigated to produce chitosan nanoparticles. Ethanol leaf extract of *Martynia annua*, abundant in bioactive compounds, function as reducing and capping agents, facilitate the synthesis of stable, spherical chitosan nanoparticles. The physicochemical characterisation of *M. annua*-mediated chitosan nanoparticles is conducted using UV-Vis, FTIR, DLS, SEM, and TEM analyses, confirming a range of particle sizes with spherical morphology. The yield, size and stability of the chitosan nanoparticles are critically influenced by the process variables such as chitosan and plant extract concentrations, pH, temperature and incubation time. Experiment results in the literature indicate the significantly enhanced antibacterial activity of *M. annua*-mediated chitosan nanoparticles than *M. annua* leaf ethanol extract alone, against both Gram-negative and Gram-positive bacteria. Due to the additional properties attributed to *M. annua* extract, the green synthesized chitosan nanoparticles gain a broader applicability in several fields, than ordinary chitosan nanoparticles. Among the future prospects, the use of *M. annua*-mediated chitosan nanoparticles in the management of diabetic complications is prominent. While *M. annua*-mediated green synthesis offers a sustainable alternative to conventional methods, to ensure safe and scalable biomedical application, further in vivo investigations and standardization of synthesis protocols are required.

Keywords - antimicrobial efficacy, chitosan nanoparticles, green synthesis, Martynia annua L., plant extracts

LSPO 03

Enhancing Ceylon Cinnamon (*Cinnamomum verum*) Quality: Biocontrol-Based Disease Management of Pink Disease Caused by *Corticium salmonicolor*

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Ceylon cinnamon (*Cinnamomum verum*), Sri Lanka's prized spice, enjoys global demand for its unique flavor, aroma, and medicinal properties. Despite being the world's leading exporter of true cinnamon, the industry faces significant challenges in maintaining export quality standards. Factors such as microbial contamination, physical damage, and chemical contamination often lead to failure in meeting international quality standards, resulting in a considerable amount of cinnamon being discarded as waste during the export process. These requirements place a strong emphasis on qualities like oil content, aroma, and the lack of fungal infections or plant diseases. One of the major issues affecting cinnamon quality is the frequent occurrence of plant diseases, particularly pink disease, triggered by the fungal pathogen *Corticium salmonicolor* B, significantly compromise the quality of cinnamon. This pathogen infects the branches and stems of cinnamon trees, resulting in dieback, reduced bark quality, and ultimately significant financial losses. Effective management practices are essential in reducing the effects of this disease. It is recommended to prune regularly, apply fungicide, and to use biological control agents. Recent studies suggest that fungal antagonists, especially *Trichoderma* species, can suppress *Corticium salmonicolor* through competition and mycoparasitism. To control pink disease and promote sustainable cinnamon cultivation, this research focused on the current state of Ceylon cinnamon production and export, analyze the factors leading to quality reduction and waste and discuss integrated disease management strategies, especially the use of fungal antagonists to control pink disease and support sustainable cinnamon farming.

Keywords - *Cinnamomum verum*, *Corticium salmonicolor* B, *Erythricium salmonicolor*, pink disease, *Trichoderma* spp.

LSPO 04

Polygenic Risk Scores on Adverse Drug Reactions for Schizophrenia

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Schizophrenia (SZ) is a chronic neuropsychiatric illness with a strong genetic basis, characterized by a spectrum of positive, negative, and cognitive symptoms. Recent trends indicate that incidence of SZ has increased by 37% and prevalence by 65% globally over the last two decades, with an estimated worldwide prevalence of approximately 1%, predominantly affecting males. Multifactorial etiologies, including both hereditary and environmental factors, underlie the complex pathogenesis of SZ, where the focus of this review is on genetic markers and modern drug interaction mechanisms such as the Sonic Hedgehog (Shh) and Hippo signaling (HPS) pathways. DRD2, HTR2C, and CYP2D6 genes play main roles in moderating antipsychotic drug effects and adverse reactions. DRD2 encodes dopamine D2 receptors, HTR2C encodes serotonin receptor subtypes implicated in metabolic dysregulation and weight gain, and CYP2D6 genetic variations alter drug metabolism rates, affecting plasma antipsychotic levels and risk of Extrapyramidal symptoms (EPS). Antipsychotics are categorized into first-generation (E.g. Haloperidol), Second-generation (E.g. Risperidone), and Next generation (E.g., Xanomeline/Trospium combination), based on their mechanisms of action, targeting dopamine D2 receptors, dopaminergic and serotonergic systems, and cholinergic pathways, respectively. Integrating these pharmacogenomic insights into polygenic risk scores (PRS) creates mechanistic links between gene polymorphisms and antipsychotic pharmacodynamics/pharmacokinetics, facilitating the understanding of pathogenesis behind complex health conditions and identification of individuals at elevated risk. Advancing technology in psychiatry and tailoring clinical management in SZ gives endless treatment options through dose optimization, and personalized treatment/prevention strategies that can impact clinical management effectively, paving the way for precision medicine in SZ management.

Keywords - antipsychotic, CYP2D6, DRD2, HTR2C, Schizophrenia

LSPO 05

Next Generation Dehydrolysis: Microbial Solutions for Molecular Challenges

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Microbial enzymes have provided innovative solutions for addressing environmental pollution, energy wastage, and rising costs in various industries. Despite these advances, a significant research gap remains in the application of enzymes in industrial-scale dehydration processes using microbes. Considering the studied route of carbon dioxide sequestration, which involves the hydration reaction of CO₂ into bicarbonate, the reverse reaction of dehydration can be harnessed for industrial purposes. Due to the extreme conditions required, halophilic and thermotolerant bacteria are ideal candidates for dehydration processes. Among the carbonic anhydrase superfamilies, the alpha family's Carbonic Anhydrase II (CA II) exhibits high catalytic efficiency and can be expressed in *E. coli*. For instance, *E. coli* is used in biofuel production to express clostridial genes, enabling efficient fuel synthesis. Similarly, in bioremediation, *E. coli* produces laccase to degrade environmental pollutants effectively. Enolase and 5-aminolevulinic acid dehydratase, key dehydration enzymes, hold promise, as they are involved in the dehydration process and can be studied for future innovations in enhancing industrial dehydration processes. Moreover, synthetic microbial consortia provide significant potential for dehydrating inorganic compounds, such as bicarbonate. By leveraging compartmentalization, the efficacy of catalytic activity can be improved. Each microbe can target different substrate components, enhancing catalytic efficiency while distributing the workload to reduce individual strain. By using gene circuits, the cellular function of the microbe's enzymatic activity for the dehydration process can be optimized.

Keywords - 5-aminolevulinic acid, carbonic anhydrase, dehydration, enolase, synthetic microbial consortia

Biological Spectrum of Lactone-Containing Compounds

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Lactone-containing compounds are a structurally diverse group of organic molecules characterized by a cyclic ester functional group. They are classified as alpha (α), beta (β), gamma (γ), delta (δ), and epsilon (ϵ) lactones based on the number of ring members. Lactones exhibit a broad range of biological activities. This review focuses on the antimicrobial and antitumor effects of gamma and delta lactones. Studying these compounds is important as their applications span infectious diseases, cancer therapy, and inflammation control. Antimicrobial agents are natural or synthetic substances that inhibit the growth or kill microorganisms. Gamma-lactones are a prominent group exhibiting notable antimicrobial activities, including bacterial, fungal, and yeast inhibition. Delta-lactones also possess considerable antimicrobial effects. Recent studies have shown that δ -lactones impact bacterial lipopolysaccharides (LPS), and some derivatives display strong toxicity against bacterial model strains. Lactone-containing compounds also have remarkable antitumor activities. Their diverse mechanisms of action against cancer cells make them attractive for anticancer drug discovery. They exert cytotoxic effects through various molecular mechanisms, primarily by inducing programmed cell death, i.e. apoptosis in cancer cell lines. This involves pathways such as the generation of reactive oxygen species (ROS), which may lead to oxidative damage and trigger the mitochondria-dependent apoptotic pathway. The ongoing discovery of novel lactone structures from natural sources, combined with advances in synthetic chemistry, promises further exploration of their therapeutic potential.

Keywords - antimicrobial, antitumor, apoptosis, delta-lactones, gamma-lactones, lactone-containing compounds

LSPO 07

Application of Microbial Biosensors for Food Safety and Quality Control

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Ensuring food safety has become increasingly critical due to rising concerns over foodborne illnesses and chemical contaminants. While traditional detection methods are accurate, they are often time-consuming, expensive, and unsuitable for rapid or on-site testing. In response, microbial biosensors have emerged as promising tools that offer faster, cost-effective, and more efficient monitoring of food safety and quality. Microbial biosensors utilize living microorganisms to detect specific contaminants such as pathogens, toxins, and pesticide residues. Upon interaction with target substances, these microbes produce measurable signals such as light, heat, or electrical changes depending on the biosensor design. These sensors can be classified as electrochemical, optical, thermal, or piezoelectric. Their applications range from detecting foodborne pathogens like *Escherichia coli* and *Salmonella*, to identifying spoilage markers and monitoring fermentation processes. Recent advancements in genetic engineering, nanotechnology, and smart packaging have significantly enhanced the sensitivity, portability, and usability of microbial biosensors. However, challenges such as long-term stability, consistent performance, and regulatory approval remain to be addressed. Overall, microbial biosensors are revolutionizing food safety by enabling real-time, on-site detection. With continued innovation, they are expected to play a vital role in modernizing food quality control and minimizing the risk of contamination across the food supply chain.

Keywords - food safety, microbial biosensors, pathogen detection, smart packaging, spoilage monitoring

LSPO 08

Microbial Secondary Metabolites as Natural Food Preservatives: Mechanisms, Applications, and Future Prospects

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Microbial secondary metabolites play a crucial role in enhancing food safety and extending shelf life. Although these compounds are not essential for microbial growth, they are produced by organisms such as *Lactobacillus*, *Streptomyces*, and *Penicillium*, and have significant potential in food preservation. This review explores how these metabolites function, their diverse applications, and the challenges involved in fully harnessing their potential. Key compounds including bacteriocins, organic acids, phenolic compounds, quorum sensing inhibitors, and antibiotics act through various mechanisms. These include disrupting microbial cell membranes, inhibiting protein synthesis, interfering with DNA replication, and mitigating oxidative stress. As a result, they effectively inhibit both spoilage organisms and foodborne pathogens. Their application is not limited to a single food type. These metabolites have demonstrated efficacy across a wide range of food systems, including yogurts, cheeses, cured meats, seafood, pickles, and sauerkraut. However, several challenges remain as maintaining the stability of these compounds within complex food matrices, navigating regulatory barriers, and achieving broad consumer acceptance of natural preservatives are ongoing concerns. To address these issues, advancements in biotechnology such as co-cultivation techniques and genetic engineering are being explored to increase yield and production efficiency. In conclusion, microbial secondary metabolites offer a promising alternative to traditional chemical preservatives, with the potential to transform food safety practices and support the development of safer, more natural food products.

Keywords - food preservation, food safety, preservatives, secondary metabolites, shelf life

Patterns and Determinants of Irrational Use of Respiratory Tract Medications in Sri Lanka

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The irrational use of respiratory tract medications signifies a considerable challenge in the global healthcare system, including Sri Lanka. It contributes to escalating antibiotic resistance and relapses, which negatively impact patients' pharmacological outcomes. This study aims to investigate the patterns and underlying factors that contribute to the irrational use of respiratory tract medications in Sri Lanka. A systematic review was conducted following the PRISMA guidelines. Literature was gathered from SLJOL, NCBI, Google Scholar, and PubMed databases from 2000 to 2024. A total of 48 studies that met the predefined inclusion criteria were assessed for quality to ensure the validity and reliability of the evidence presented. Results were analyzed to examine the patterns and contributing determinants. Key patterns included inappropriate prescribing (47.37%), self-medication with over-the-counter (OTC) antibiotics (42.11%), incorrect use of inhaler techniques (10.53%) and misconceptions (42.11%) such as the cultural beliefs and misunderstanding on antibiotics for viral treatment were significantly associated with irrational use of respiratory tract medications in Sri Lanka. Poor health literacy, extreme poverty, lack of diagnostic facilities, restricted access to healthcare, and the unregulated availability of OTC medicines were the major contributing determinants. Irrational patterns were further exacerbated by systemic difficulties such as prescriber pressure, diagnostic uncertainties, and insufficient regulation. Implementing stricter regulations, ensuring rigorous policy enforcement, and promoting health education are pivotal steps toward enhancing therapeutic outcome and patient safety while minimizing the overall burden on healthcare system in Sri Lanka.

Keywords - antibiotics, irrational use, respiratory tract medications, self-medications, Sri Lanka

Mechanism of Antibiotic Resistance in Methicillin Resistant *Staphylococcus aureus* and Emerging Therapeutic Strategies: A Review

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Methicillin- resistant *Staphylococcus aureus* (MRSA) has emerged as a major health concern due to its persistent resistance to β - lactam antibiotics, and its association with both hospital and community acquired infections. MRSA mainly affects the upper respiratory tract and skin. This review focuses on multifaceted aspects of MRSA, including resistance mechanisms, diagnostic methods, therapeutic aspects and preventive strategies. A focus is placed on the underlying mechanisms of antibiotic resistance, particularly the role of altered penicillin binding proteins (PBPs) and efflux pump systems that contribute to β – lactam resistance. PBPs are the enzymes located in the bacterial cell membrane that are crucial for the synthesis and maintenance of the bacterial cell wall. The altered PBPs inhibit the attachment of antibiotics to cell wall synthesis enzymes and efflux pumps actively eliminate the antibiotics. Further, limitations in current treatment modalities and emerging novel therapeutics are evaluated. Analyzing resistance mechanisms will provide an insight on how patients acquire MRSA and aid in developing effective prevention and management strategies. The MRSA strains have developed resistance to existing antibiotics including vancomycin and linezolid, leading to difficulties treating severe infections. Cephalosporins (Ceftaroline and Ceftobiprole), bacteriophage therapy and Tedizolid are gaining popularity due to increased potency in treating MRSA. Ceftaroline has shown 71% success in treating MRSA pneumonia. The goal is to discover enhanced therapeutics to combat MRSA through research and development.

Keywords - antibiotic resistance mechanism, diagnostic assessment, efflux pump system, penicillin binding protein, therapeutic interventions

LSPO 11

Transcriptomic Profiling of Temporomandibular Joint Osteoarthritis: Investigating the Role of Inflammatory Pathways and Cartilage Degeneration

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Temporomandibular joint osteoarthritis (TMJ-OA) is a degenerative disorder characterized by cartilage degradation, inflammation, and pain, yet its molecular basis remains incompletely understood. This study aims to investigate the transcriptomic alterations associated with TMJ-OA using RNA sequencing (RNA-Seq) and functional pathway analysis. Publicly available TMJ-OA RNA-Seq data were analyzed using the OmicsBox (3.3.2) platform to identify differentially expressed genes (DEGs) and related biological pathways. Following quality control and transcript quantification and differential expression analysis were conducted using the edgeR package. Functional enrichment analyses were performed through Gene Ontology (GO), KEGG, and Reactome databases to identify biological processes, molecular functions, and pathways associated with the DEGs. The results revealed key upregulated and downregulated genes involved in immune response, mitochondrial function, cytoskeletal remodeling, and metabolism. Pathways such as rheumatoid arthritis, ribosome biogenesis, oxidative phosphorylation, and pyruvate metabolism were significantly altered in TMJ-OA samples. Additionally, the modulation of cytokines and chemokines, including IL23A and CCL20, highlights their potential as therapeutic targets. The dysregulation of ATP-related genes suggests mitochondrial dysfunction as a key contributor to disease progression. This transcriptomic profiling of TMJ-OA provides new insights into the molecular mechanisms driving joint degeneration and inflammation. The identified DEGs and enriched pathways may serve as valuable resources for future studies aiming to develop targeted therapies and diagnostic biomarkers for TMJ-OA.

Keywords - differentially expressed genes, enriched pathways, RNA-seq, TMJOA, Transcriptomics

Targeting Epidermal Growth Factor Receptor in Colorectal Cancer using Plant-Derived Phytochemicals: A Review

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Colorectal cancer is a major global health concern. Genetic and epigenetic alterations, along with the dysregulation of downstream signaling pathways, are mainly responsible for its pathophysiology. Receptors play a vital role in oncology, and the Epidermal Growth Factor Receptor (EGFR) plays a key role in colorectal cancer development. This review summarizes current evidence on the modulation of EGFR by plant-derived phytochemicals and their potential application in targeted therapy, given the growing interest in these compounds due to their safety and cost-effectiveness. *In vivo* and *in vitro* studies report that compounds such as 6-gingerol, punicalagin, curcumin, cinnamaldehyde, epigallocatechin-3-gallate, and ellagic acid derived from ginger, pomegranate, turmeric, cinnamon, and green tea can modulate EGFR and downstream signaling pathways involved in colorectal cancer. Computational studies frequently utilized EGFR crystal structures (e.g.- PDB ID: 1M17) from the Protein Data Bank with molecular docking performed using tools such as AutoDock Vina and Schrödinger Glide, and visualization with PyMOL or Discovery Studio Visualizer. *In silico* studies further demonstrate high binding affinities between EGFR and phytochemicals, enhancing their relevance in drug design. Additionally, these compounds exhibit inhibition of receptor activation, induction of cell apoptosis, cell cycle arrest, and suppression of tumor growth. This specific modulation of EGFR by natural products presents a promising avenue for receptor-targeted cancer therapies and supports the advancement of personalized medicine in colorectal cancer therapy.

Keywords - colorectal cancer, EGFR, molecular docking, natural products, phytochemicals

LSPO 13

Relationship Between Food and Perceived Stress among Students at NSBM Green University, Sri Lanka

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University students often face elevated stress due to various factors, including dietary behaviors. This study explored the relationship between food consumption patterns and perceived stress among undergraduate students enrolled between 2021 and 2023 in the Faculty of Science at NSBM Green University. A total of 205 students were recruited between March and May 2025. Data were collected using a pretested, self-administered questionnaire comprising socio-demographic characteristics, dietary patterns, and perceived stress (PS), assessed using the 10-item Cohen's Perceived Stress Scale. Food frequency was analyzed across seven main food groups and their 27 subgroups, as recommended by the Food-Based Dietary Guidelines. Most participants were female (85.37%) with a mean age of 23.1 (SD $\pm$ 1.7) years. The majority reported moderate stress levels (88.78%) with a mean PS score of 20.41 (SD $\pm$ 4.06). Cereals were consumed by nearly half of the students at least once a day (49.27%). Eggs (42.93%) and vegetables (47.81%) were also consumed at least once daily by a significant proportion. Fresh fruit intake was moderate, with 30.24% consuming them at least once a day. Dairy product consumption was low, with fewer than 20% consuming them at least once daily, except for powdered milk (34.14%). Regression analysis found no statistically significant link between individual food groups and PS. However, weak negative associations were observed for fresh fruit (β = -0.903, p = 0.075), yogurt (β = -0.823, p = 0.065), and ultra-processed meat (β = -0.875, p = 0.077), while meat showed a weak positive association (β = 0.533, p = 0.073). Although not statistically significant, these trends suggest that certain dietary habits may influence stress. Promoting healthier eating could support student well-being. Further longitudinal and intervention-based research is recommended.

Keywords - dietary behavior, food consumption, mental health, perceived stress, PSS-10, university students



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