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ABSTRACTS OF ORAL PRESENTATIONS

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)

PE-O-1

Treatment Seeking Behavior and Experiences of ACS Patients in Yogyakarta, Indonesia during COVID-19 Pandemic: A Qualitative Study

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Background: Even in the chaotic situation of COVID-19 pandemic, persons with ACS symptoms must seek medical attention as soon as they can in order to get immediate medical care from health staffs at hospital. Immediate medical attention on ACS patients related to better outcomes.

Objective: This study aimed to investigate patient with ACS about their behavior and experiences in seeking medical helps during COVID-19 pandemic.

Methodology: Thirty ACS patients from three different hospitals in Yogyakarta, Indonesia participated in this prospective qualitative research. An in-depth interview that was audio-recorded was used to collect the data. All transcripts were processed to a thematic analysis.

Results: In this study, three themes (treatment seeking behavior, impediments to obtaining medical care, and treatment experience) were developed to describe the situation among ACS patients during the COVID-19 viral outbreak. The process of obtaining medical assistance includes self-awareness, family, and neighbors. The

recommendation of Indonesia's insurance system and the distance to the hospital were factors of patient's consideration when choosing a hospital. Surprisingly, ACS patients in Yogyakarta – Indonesia during COVID-19 pandemic, conveyed their concerns to all health workers at hospital for their effective actions and good communication. To cope with their dread and COVID-19 condition, ACS sufferers found comfort in their faith in God's strength and in complying towards government regulations.

Conclusion: According to this study, patients weren't always motivated to seek early medical attention in response to ACS symptoms. However, the individuals' experiences of having ACS symptoms were deemed as incomparable to the COVID-19 condition in Indonesia.

Keywords: acute coronary syndrome, COVID-19 pandemic, experiences, perception, barriers

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-2

The Peak and Trough Concentrations of Dabigatran in Adult Patients

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Background: Dabigatran is an oral thrombin inhibitor that is used to treat and prevent thromboembolism in patients with atrial fibrillation and several other conditions. Routine dabigatran concentration monitoring is not recommended in clinical practice; however, measurement of dabigatran concentration may be useful in several conditions. The expected peak and trough concentrations of dabigatran are not well defined in the literature.

Objective: This study aims to pool the peak and trough dabigatran concentration from real-world studies.

Methodology: PubMed and Web of Science databases were systematically searched to identify relevant studies up to March 2021 without date restrictions. Observational studies reporting dabigatran peak or trough concentrations and patients' clinical characteristics of either gender, age or weight were included. Random-effect meta-analyses and meta-regression were conducted to pool dabigatran concentrations and to identify the correlation between factors affecting dabigatran concentrations.

Results: Fifteen studies with a total of 1,226 patient data were included. The pooled peak dabigatran concentration was 133 ng/mL (95% CI: 113-154, I2 = 86%, n=655), while the pooled dabigatran trough concentration was 80 ng/mL (95% CI: 69-91, I2 = 93%, n=1,010). Meta-regression analyses suggested that age is significantly correlated to trough concentration, while body weight and creatinine clearance significantly correlated to peak concentration. Subgroup results revealed that dabigatran concentration when measured with LC-MS/MS was higher than the Hemoclot Thrombin Inhibitor assay.

Conclusion: The pooled dabigatran peak concentration was 133 ng/mL (95% CI: 113-154), while the pooled dabigatran trough concentration was 80 ng/mL (95% CI: 69-91).

Keywords: dabigatran, meta-analysis, plasma concentration, therapeutic drug monitoring

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-3

Medication Supply among Chronic Disease Patients and their Adherence towards Medication during COVID-19 Pandemic

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Background: During COVID-19 pandemic, resource reallocation may disrupt the continuum of care among chronic disease patients with lessen outpatient visits and restrictive movement orders. This may affect patients' medication supply and their adherence towards their medication.

Objective: To evaluate issues related to medications supply and adherence among chronic disease patients during COVID-19 pandemic in Malaysia.

Methodology: A cross-sectional survey was conducted among chronic disease patients diagnosed with hypertension, diabetes mellitus and/or hyperlipidaemia. Issues related to medication supply were measured based on patients' personal factor, their area of residence and transportation, the healthcare system and the technology factor. Medication Adherence Assessment Tool (MyMAAT) was used to measure patients' medication adherence.

Results: A total of 383 respondents participated in this study. It was noted that the use of hospital outpatient service was found to decrease from 79.6% to 49.3% with the increment of delivery service from 5.2% to 21.4% during the pandemic. Although 65.0% of the respondents agreed that they have difficulties obtaining their medications during the pandemic, however this did not significantly affect their adherence towards their medication (p-value >0.05). Factors attributing to medications supply issues were participants concerned on the contagious virus, cancellation of appointment and restriction to the healthcare facilities, the need of special pass/permit to travel during the pandemic and their general income that was affected.

Conclusion: Although chronic disease patients were found to face challenges related to issues in medication supply, however, this has not directly affect their adherence towards their medication during pandemic.

Keywords: COVID-19, chronic disease patients, medication supply, adherence

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-5

"Just Google": Information Needs and Information-Seeking Behaviour of Breast Cancer Patients on Adjuvant Endocrine Therapy

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Background: Adjuvant endocrine therapy (AET) is given to oestrogen receptor-positive breast cancer patients after surgery to reduce the risk of recurrence. Patients on AET present a distinct subgroup, whom information needs may differ compared to those recently diagnosed and undergoing intensive treatment.

Objective: To explore the information needs and information-seeking behaviour of breast cancer patients taking AET.

Methodology: Breast cancer patients on AET (N=25) were interviewed individually to explore their information needs and information-seeking behaviour. Interviews were transcribed verbatim and analysed using thematic analysis.

Results: Three themes were identified: the need for more information, Internet as information source and patient information needs. The extent of information needed varied based on individuals. Apart from information on the benefits and risks of treatment, the participants wanted information with more holistic approach that covers aspects of healthy lifestyle, complementary therapies, and spiritual needs. Many patients sought information online to complement their information needs, utilising Google for their information search. However, most information online was available in English, causing difficulty for those with limited English proficiency. Participants wanted information in local language that provides information appropriate for local cultures.

Conclusion: Patients felt that information given by healthcare providers during AET initiation was insufficient and many turned to the Internet to complement their information needs. There is a need to provide information that is better suited for local cultural needs, delivered in local language to improve understanding. Patients need to be empowered and educated on digital health literacy considering the rampant health misinformation online.

Funding: This research was funded by GUP grant, Universiti Kebangsaan Malaysia, under the grant number GUP-2020-004

Keywords: health literacy, information seeking behaviours, patient education, breast neoplasms, hormone therapy

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-6

Unit Cost Analysis of the Cytostatic Compounding Program in The Pharmacy Aseptic Unit Indonesian Hospital

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Background: Chemotherapy is a common therapeutic modality used in cancer treatment. However, the number of cytostatic handling facilities in several hospitals is not proportional to the yearly increase in cancer cases. Therefore, expanding chemotherapy services by establishing an aseptic pharmacy unit is necessary.

Objective: Describe the estimated costs incurred in the compounding program of cytostatic preparations before and after establishing the pharmacy aseptic unit.

Methodology: The research was conducted at the secondary teaching hospital. The study design was a quantitative descriptive research with a calculation method, namely traditional costing. This research examined primary data from interviews with related parties and secondary data from archival documents. Unit cost analysis per drug was calculated from capital investment costs, operational costs, training costs, and the cytostatic handling capacity.

Results: The results showed that the unit cost of the cytostatic handling program in the pharmacy aseptic unit was greater by 2.2% than handling in the partner hospitals. The highest component cost prior to the construction pharmacy aseptic unit was training cost (44.37%), while after owning these facilities was operational cost (73,49%).

Conclusion: There are slight differences in unit cost before and after establishing a pharmacy aseptic unit in an Indonesian hospital. Business expansion of handling cytostatic unit in the hospital may be profitable when considering the aspect of safety, benefits, and the provision of training

Keywords: cancer, cytostatic, chemotherapy, pharmacy aseptic unit, unit cost analysis

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-7

Type 2 Diabetes Mellitus-Related Medication Adherence Enhancement Using Mobile Apps: A Systematic Review

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Background: The prevalence of non-adherence to antidiabetic treatment remains high despite various efforts. Thus, the positive effects of the antidiabetic treatment cannot be optimised and the disease progresses to complications.

Objective: This present systematic review aimed to evaluate the effects of mobile applications (apps) intervention on medication adherence among patients with type 2 diabetes mellitus (T2DM).

Methodology: This research was conducted following the PRISMA guidelines. The databases that had been searched included Web of Science, PubMed, Scopus, Cochrane Library and Ovid from 2019 to 2022 for the latest articles. Study characteristics were retrieved and study outcomes such as adherence status were extracted.

Results: Six studies met the final inclusion criteria and were included in the analysis, contributing to a total of 685 subjects. The methodological quality of the included studies was variable. Two studies reported statistically significant improvement in medication adherence through mobile apps intervention.

Conclusion: Mobile apps intervention had beneficial impacts on medication adherence. Future research should explore the best practical approach for real-world settings.

Keywords: type 2 diabetes mellitus, mobile apps, medication adherence, systematic review

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-10

Complementary and Alternative Medicine (CAM) Use among Pregnant Women

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Background: The use of Complementary and Alternative Medicine (CAM) has been increasingly popular as a healthcare option. However, limited studies have been reported about CAM use among Malaysian pregnant women.

Objective: The aim of this study was to determine the prevalence of CAM use among pregnant women, to analyze the factors associated with CAM use among pregnant women.

Methodology: A cross-sectional survey was conducted among pregnant women attending for follow-up in HCTM.

Results: A total of 200 women responded the questionnaire and were included in the analysis. A total of 94.5% of the respondents used CAM during pregnancy and that majority of them used vitamin and mineral supplements (86.8%) followed by herbal and natural medicines, massage and aromatherapy. Folic acid and iron were the most common vitamin and mineral supplements, garlic and ginger were the most common used of herbs, and lavender, peppermint and lemon were the most common used of aromatherapy. Seventy six percent of pregnant women used CAM to reduce severity of back pain. A total of 42% of CAM users did not disclose their use to doctors and that majority has no specific reason for non-disclosure (48.8%). Employment status, history of CAM use in previous pregnancy, and trimester of pregnancy were the significant factors associated with CAM use among pregnant women.

Conclusion: In conclusion, CAM use by pregnant women is high. Healthcare professionals need to know and ask about the CAM use routinely so that women can be advised accordingly to ensure fetal and maternal safety.

Keywords: complementary medicine, alternative medicine, CAM, pregnancy

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-12

Knowledge, Attitude and Practice Regarding Preventive Measures of Osteoporosis among Women of Childbearing Age

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Background: Osteoporosis is a growing health problem that could result in mortality, morbidity and increase economic burden. Preventive measures should be practiced prior to the development of osteoporosis especially for young women who are more susceptible to osteoporosis in the later stages of their lives. Little is known about the knowledge, attitude and practice regarding osteoporosis preventive measures among women of childbearing age in Malaysia.

Objective: The objective of this study was to establish the general information of women of childbearing age regarding osteoporosis and its preventive measures in term of knowledge, attitude and practice.

Methodology: A cross-sectional survey was conducted by administration of questionnaire online among women of childbearing age (18-49 years old).

Results: It was found that the knowledge of the respondents on osteoporosis and its preventive measures were poor (scored≤11) with a mean score of 11.33 (±3.453) out of 20. Most of them were still unaware of the general knowledge regarding osteoporosis and its preventive measures. Women of childbearing age portray moderate attitude towards osteoporosis and its preventive measures with a mean score of 26.81 (±4.978) out of 35. Meanwhile, practice score among women of childbearing age is low with mean score of 8.30 (±1.904) out of 15. In addition, positive correlation was found between attitude and practice among women of childbearing age (P=0.019) with correlation coefficient, r=0.150.

Conclusion: Hence, this study highlights the need for more education programs related to osteoporosis and its preventive measures among this population to enhance their knowledge, attitude and adoption of preventive measures.

Keywords: osteoporosis, preventive measures, childbearing age women

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-13

Safety and Effectiveness of Dabigatran in Patients with Atrial Fibrillation

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Background: Dabigatran is a direct thrombin inhibitor used in preventing thromboembolism in patients with atrial fibrillation (AF) and several other conditions. Despite being used for over a decade, data on the safety and effectiveness of dabigatran therapy is still limited in local setting.

Objective: To evaluate the safety and effectiveness of dabigatran therapy in AF patients.

Methodology: A retrospective observational study of AF patients on dabigatran between 2015 and 2021 was conducted in Hospital Canselor Tunku Muhriz. Outcomes of interest were thromboembolic events (effectiveness) and bleeding events (safety). Logistic regressions were conducted to identify possible risk factors which predispose patients to a higher risk of bleeding.

Results: 552 patients were included in this study. Thromboembolic events were observed in 38 patients (6.9%), and 18 of them (47.4%) were incompliant to dabigatran from 2 days to a few years time. Bleeding events were observed in 93 patients (16.8%). Bleeding event was significantly associated with patient's age ($p=0.014$), serum creatinine level ($p<0.001$), baseline hemoglobin level ($p=0.027$), event hemoglobin level ($p<0.001$), peptic ulcer disease ($p=0.012$), cancer ($p<0.001$), concomitant antiplatelets use ($p=0.05$) and HASBLED score ($p=0.05$). Significant predictors of bleeding were age (OR: 1.05, 95% CI: 1.01-1.08, $p=0.009$), serum creatinine level during time-of-event (OR: 1.03, 95% CI: 1.02-1.04, $p<0.001$), concomitant antiplatelets use (OR: 2.00, 95% CI: 1.04-3.88, $p=0.038$) and cancer (OR: 6.24, 95% CI: 1.88-20.72, $p=0.003$).

Conclusion: The low incidence of both thromboembolic and bleeding events suggest that dabigatran is a safe and effective anticoagulant. Potential predictors of bleeding identified may improve and minimize bleeding risk.

Keywords: bleeding, dabigatran, direct oral anticoagulant, stroke

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-15

Role of Community Pharmacist in Cardiovascular Diseases-related Health Promotion and Dyslipidemia Management in Malaysia: A Cross-Sectional Study

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Background: Community pharmacists (CPs) are the first point of contact in the healthcare system due to their ease of access and perceived affordability.

Objective: The purpose of this study is to investigate the current involvement of CPs in Malaysia specifically in cardiovascular diseases (CVD)-related health promotion activities together with dyslipidemia management including their perceived barriers.

Methodology: This cross-sectional survey was conducted among CP in all states of Malaysia between November 2021 and July 2022. The self-administered survey was shared in relevant groups in Facebook, Whatsapp, and Telegram platform. The statistical analysis in this study was done using IBM® Statistical Package for Social Science (SPSS) version 28.

Results: A total of 312 CPs were involved in this study. For CVD-related health promotion activities, satisfactory practice was seen in providing counselling but with no educational materials being used and given to patients. Majority of respondents never or rarely assessing individual's risk by using any risk assessment tools. Apart from that, lack of collaborative care was found by majority of the respondents where most CPs did not invite other healthcare professionals to screen for patients' risk factors. Similarly in dyslipidemia care services, majority of respondents never or rarely refer their patients to dietitian. They also never or rarely provide drug therapy recommendations to doctors. In addition to that, least involvement of CPs was seen in reviewing drug refill history to evaluate adherence to drug therapy. Lack of access to medical record, lack of CVD-related educational materials, low patient expectation regarding pharmacist's role in CVD prevention and lack of communication with other healthcare professionals are among the perceived barriers encountered by CPs.

Conclusion: Appropriate strategies may be implemented to alleviate the practice of CPs in the future. Collaborative care and efforts from all healthcare professionals should be highlighted and strengthened. Provision of educational material and advancement of CPs role may also improve the current practice of CPs in Malaysia.

Keywords: cardiovascular diseases, dyslipidemia, community pharmacy, pharmacist empowerment, patient empowerment

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-O-16

Patients' Characteristics and Antiseizure Medication (ASM) Profile in Patients with Epilepsy: A Comparison of General Medical and Neuromedical Clinic Attendees in a Tertiary Care Center in Malaysia

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Background: Referral to specialist care in epilepsy management revolves around the patients' treatment outcome and severity of the disease. Apart from these factors, other patients' characteristics observed in different clinic settings are yet to be discovered.

Objective: To evaluate the differences in patients' characteristics and treatment strategies in patients attending either general Medical or Neuromedical outpatient clinic.

Methodology: All prescriptions containing at least one ASM from 1 January 2019 to November 2022 were preliminary screened for eligibility. Samples were randomised using stratified sampling method according to the portion of ASM utilized. Each of the subject's follow up card was retrospectively review and all relevant data was recorded.

Results: A total number of 397 patients were included for analysis. 57.9% of patients (n=230) were followed up under general Medical outpatient clinic (MOPC) whereas 42.1% (n=167) were followed up under Neuromedical clinic (NMC). Using multivariate analysis, female (OR:1.61, 95%CI:1.03-2.52, p=0.035) and focal onset seizure (OR:4.11, 95%CI:2.46-6.86, p<0.001) were more likely to be followed up under NMC. Furthermore, patients with positive family history (OR:3.48, 95%CI:1.33-9.12, p=0.011) had the tendency to be monitored under NMC as well. A higher proportion of patients in MOPC attendees were prescribed with sodium valproate (VPA) (53.3%) as initial therapy compared to NMC attendees (p<0.001).

At maintenance, more patients in NMC (25.1%) were prescribed with newer ASM agents either as single or as combination therapy as compared to MOPC attendees.

Conclusion: There was a difference in patients' characteristics and ASM profile between patients in MOPC and NMC. Further study is required to determine the magnitude of clinical outcomes for these different settings.

Keywords: epilepsy, antiseizure medication, neuromedical clinic, sodium valproate

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-2

Embracing Intranasal COVID-19 Vaccine Development at FFAR: State-of-the-art and Current Status

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Background: COVID-19 is still prevalent worldwide. Currently available COVID-19 vaccines are designed for intramuscular administration. Although the vaccines are effective at reducing symptom severity, they are unable to prevent the SARS-CoV-2 virus infection at upper respiratory tract primarily due to the absence of mucosal immunity. This situation has led to the ongoing spread of the virus and the continuous emergence of SARS-CoV-2 variants. Intranasal vaccination offers a viable approach in eliciting both mucosal and systemic immune responses, which potentially overcome the shortcomings of intramuscular immunization.

Objective: To develop intranasally effective COVID-19 vaccines

Methodology: We presented our strategy in utilising our established amphiphilic chitosan-based nanoparticles platform as the mucosal adjuvant for various novel in-house designed COVID-19 immunogens, including lipidated multi-epitope subunit vaccine, modified RBD trimer-encoding mRNA vaccine and virus-like particle-based vaccine. The approaches to rational antigen selection and vaccine adjuvant design are highlighted. The constructed vaccines candidates are characterized in terms of their physicochemical properties and evaluated for their immunogenicity potency in vivo.

Results: Our current preliminary data demonstrated that the constructed vaccine candidates induced significant titers of IgG and IgA antibodies which are necessary to confer protection against the SARS-CoV-2 within mucosal compartment.

Conclusion: We believe our works would provide a strong foundation in developing homegrown intranasal COVID-19 vaccines as the next-generation immunization strategy.

Keywords: vaccine, intranasal, nanoparticles, chitosan

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-4

A Novel Cellulose Nanocrystals-based Co-processed Tablet Excipient

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Background: Traditionally, excipients have been considered as an inert ingredient that help in manufacturing, storage, and administration of drug products. However, investigations in recent times have shown that excipients not only provide manufacturing and application convenience, but also improve in vivo performance of the drug product such as enhancing bioavailability, controlling drug release and many others.

Objective: The objective of the current work is to develop a novel, co-processed excipient based on cellulose nanocrystals isolated from a sustainable bioresources and evaluate its compression and compaction property.

Methodology: Spherical cellulose nanocrystals were prepared from wild Musa spp. pseudostem by TEMPO-mediated oxidation method as we reported previously. A co-processed excipient was developed by co-granulation method in a mortar by taking different proportions of cellulose-nanocrystals (2 to 10%) and potato starch, sieved and dried in an oven. The flow properties and porosity were determined. Kawakita plots, consolidation index and rate of consolidation were also determined. Heckel plots were generated by preparing tablets at different compression pressures.

Results: A novel, cellulose-nanocrystal based-co-processed excipient was developed successfully. The Carr's index value was found to be in the range of 16.6 to 25.4%, Hausner ratio between 1.2 and 1.34, and angle of repose between 14.89 and 18.98. The 'a' value obtained from Kawakita plot was close to the Carr's index value determined and the powder cohesiveness ('b' value) was also calculated. The yield pressure from Heckel plot was found to be 45.87.

Conclusion: From the study, it was found the novel co-processed excipient consisting of cellulose nanocrystals and potato starch was a potential excipient for tablet manufacturing.

Keywords: cellulose nanocrystals, co-processed excipient, tablet, Heckel plot

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-5

Quantification of Chemical Constituents of Selected *Hylocereus* Species via HPLC Analysis and their Anti-inflammatory Activities through Inhibition of Cytokine Production

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Background: Pitaya or dragon fruits are fruits bear from cactus family plants which comes in red flesh (*H. costaricensis*) and white flesh (*H. undatus*).

Objective: This research aimed to focus on quantifying potential chemical constituents present in extract and discovering the potential of the species to be developed as an anti-inflammatory agent.

Methodology: *H. costaricensis* (HC) and *H. undatus* (HU) peel (P) and flesh (F) were blended with 80% ethanol to get the crude extract, followed by successive liquid-liquid extraction starting with hexane (HEX), ethyl acetate (EA) and butanol (BUT) to yield 4 fractions for each. These fractions were then analysed in order to quantify the chemical constituents present by using HPLC and tested on THP1 cells for anti-inflammatory activity.

Results: In HPLC analysis, HCF (Hex) was found to contain 0.21% beta amyrin, 1.34% campesterol; HCP (Hex): 0.59% beta amyrin, 2.83% campesterol; HUP (Hex): 0.15% beta amyrin, 1.86% campesterol. Another HPLC analysis showed that HCF (EA) was found to contain 0.0021% gallic acid; HCP (EA): 0.0052% gallic acid, 0.024% caffeic acid, 0.34% rutin and 0.021% quercetin. HUF (EA): 0.035% gallic acid and 0.24% rutin while HUP (EA): 0.023% gallic acid, 1.67% rutin and 0.060% quercetin. HUP (Hex) contained 0.015% of quercetin. Indomethacin, HCP (HEX) and HUP (HEX) suppressed the production of IL-1β in THP1 cells significantly, achieving 91%, 81% and 84% inhibition, respectively.

Conclusion: Both selected species of Hylocereus are found to be sources of bioactive phytosterols, phenolic acids and flavonoids that have the potential to be anti-inflammatory.

Keywords: dragonfruit, inflammation, immune system, Hylocereus, cytokines

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-6

Dual Action Dressing Containing PLGA-LL37 Loaded on Activated Carbon with Chitosan Hydrogel on Chronic Wound Infection: An in-Vitro Study

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Background: There is growing need to develop novel and more effective antimicrobial drugs to treat wound infection due to emergence of resistance. Antimicrobial peptides (AMPs), such as LL37 have gained more attention due to their strong antimicrobial activity and low propensity for resistance. However, AMP is susceptible to bacterial proteases, and endogenous proteases in wound fluids. Bacterial toxins impair wound healing. Activated carbon (AC) is highly porous with tunable porosity and excellent adsorption feature that can adsorb excess exudates and bacterial toxins. Therefore, encapsulating LL37 with PLGA and loaded with AC on chitosan (CS) hydrogel would help in wound exudate adsorption and improve the efficacy in wound healing.

Objective: To investigate the potential of LL37-PLGA microspheres (MS) loaded on AC with CS hydrogel in eliminating bacteria toxins and accelerate chronic wound healing.

Methodology: The PLGA-LL37 MS was prepared and characterised. Then, the efficiency of in vitro antibacterial, bacterial toxin elimination, in vitro cell migration and cell cytotoxicity on normal human dermal fibroblast (NHDF) were investigated.

Results: Both antimicrobial and antibiofilm assays showed promising results and demonstrated that the formulated hydrogel was effective against both Gram-positive (*S. aureus*) and Gram-negative bacteria (*E. coli* and *P. aeruginosa*). The formulated hydrogel could bind more endotoxin (73.13%) compared to AC with CS hydrogel only (62.54%). In vitro, formulated hydrogel induced enhanced cell migration and showed no cytotoxicity towards the NHDF after 24 h of treatment.

Conclusion: The endotoxins and the bacteria could be prevented by an AC with chitosan hydrogel with LL37 encapsulated with PLGA microspheres.

Keywords: LL37, activated carbon, bacterial toxins, infected wound, wound healing

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-8

Parkia speciosa Hassk. Empty Pod Extract Exerts Protective Effects in Angiotensin II-Induced Cardiomyocyte Hypertrophy

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Background: The use of natural products to treat cardiovascular disease has been an appealing area of interest since the last decades. *Parkia speciosa* Hassk. (bitter bean) has been used for various ethnomedicinal purposes by traditional healers for reducing hypertension and maintaining cardiovascular health. The empty pods extract have been extensively investigated for its diverse pharmacological aspects and found eminent for antioxidant, anti-inflammatory, anti-hypertensive and anti-diabetic properties. Previously, our findings have shown that empty pod extract of P. speciosa conferred protection against cardiomyocyte hypertrophy in simultaneous model when concurrently incubated with Angiotensin II.

Objective: This research aims to investigate the effects of *P. speciosa* extract in a post-treatment model after being exposed to angiotensin II.

Methodology: Cardiac hypertrophic parameters (cell surface area and protein content) and reactive oxygen species were analyzed using crystal violet staining, biorad kit and 2′7′-dichlorodihydrofluorescein diacetate (DCFH-DA) cellular ROS detection assay kit.

Results: Following the analysis of the assays, *P. speciosa* extract (25, 12.5 and 6.25 µg/mL) and valsartan (20 µM, a positive control) effectively suppressed the increases in cell surface area, reactive oxygen species level and protein content in the cells induced by Ang II. The effects of *P. speciosa* extract were comparable to that of valsartan.

Conclusion: *P. speciosa* empty pods extract has potential therapeutic properties in preventing cardiac deterioration, which could be attributed to its antioxidant property.

Keywords: *Parkia speciosa*, cardiac hypertrophy, angiotensin II, cardiac remodeling

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-14

Anti-Acne Properties of Essential Oil from some *Lauraceae* Plants

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Background: Acne vulgaris is a very common inflammatory skin condition, which involves the interaction of several factors, including increased sebum production by the sebaceous glands and follicular keratinization of the pilosebaceous ducts, and an imbalance of microbes compared to the normal distribution of microbes in healthy tissues or increased microbial proliferation.

Objective: To compare the major compounds, the MIC, and MBC values of the *Lauraceae* plant essential oil against *S.aureus, S.epidermidis,* and *C. acnes.*

Methodology: The essential oil was isolated by steam distillation, the antimicrobial were assayed by broth microdilution, and the oil components were analyzed by GC-MS.

Results: The yield in the bark was the same for three species *C. burmanni, C. verum,* and *C. champora*, while the yield in the leaves was *C. champhora*. The major component present in each oil were *N. cassia* leaves cinnamyl acetate (12.33%), *N. cassia* bark beta-citronellol (15.39%), *C. verum* bark eugenol (89.64%), *C. burmanni* leaves linalool (14.9206%). The leaves of *C. camphora* contains camphor (91.92%). The highest antimicrobial activity against *C. acnes* was given by oil from the leaves and bark of *N. cassia*, against *S. aureus*, and by oil from the bark of *C. verum* and *N. cassia* and *C. burmannii* leaves. The oil of *C. champora* leaves gave better activity than the barks against these microbes.

Conclusion: The highest antimicrobial activity against *C. acnes* was given by oil from the leaves and bark of *N. cassia*, against *S. aureus*, and by oil from the bark of *C. verum* and *N. cassia* and *C. burmannii* leaves.

Keywords: a chemical compound, antibacterial, *Lauraceae*, plant essential oil.

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-15

The Effect of Electrodeposition Parameter to Antioxidant Activity of Gold Nanofilms

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Background: Gold nanoparticles (AuNPS) are known to have considerable therapeutic benefits in the field of medicine including its antioxidant activity.

Objective: To synthesize AuNPs in the form of nanofilms (AuNFs) and characterize their antioxidant activity by controlling preparation parameters including the scan rate and deposition cycle.

Methodology: The AuNFs were synthesized by cyclic voltammetry technique prior to determination of their antioxidant activity by using in vitro 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay. The particle size and distribution of AuNFs were obtained by varying deposition scan rate (80, 125, 250, 300, and 350 mV/s) and cycles (10, 25, 50, 75, 100). The antioxidant capacity of AuNFs was calculated as inhibition percentage.

Results: Antioxidant activity of AuNPs gradually increased from 15.18 – 46.17% with the increase in the scan rate. Meanwhile, the inhibition percentage varied from 26.31 – 35.58% with different deposition cycles by which the highest inhibition percentage was achieved with the lowest deposition cycle. The incubation time prior to assayed using DPPH also influenced the antioxidant activity significantly as a longer incubation time gradually increased the antioxidant activity of AuNFs.

Conclusion: The increase in inhibition percentage of AuNFs could be influenced by the particle size and number of particles. Both factors could be controlled by adjusting the deposition parameters by which a smaller particle size and higher

number of particles provide high surface area for interaction with free radical and a longer incubation time would promote scavenging reaction between AuNFs and DPPH, resulting in higher antioxidant activity.

Keywords: gold nanofilm, electrodeposition, antioxidant

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-17

Classification of Gelatin Raw Material by FTIR and Partial Least Square Discriminant Analysis (PLS-DA)

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Background: Halal authentication analysis is crucial to ensure pharmaceutical products are devoid of non-halal ingredients. Gelatine, the product of animal collagen extraction, is widely used in the pharmaceutical and food industries. The physical attributes of gelatine derived from bovine, and porcine sources are incomparable. Thus, validating the gelatine source is a laborious task. The classifications of gelatine based on its origins can be done using spectroscopic technique due to its rapid, non-destructive, user-friendly, and minimal or no sample preparation requirements. Unfortunately, the peak spectrum is often overlapping and extremely complex. Fortunately, the discovery of chemometrics techniques has resolved this issue.

Objective: This study aimed to explore a rapid and accurate method using Fourier transform infrared (FTIR) spectroscopy in combination with multivariate analysis to discriminate three different sources of gelatine.

Methodology: Principal component analysis (PCA) and Partial least square discriminant analysis (PLS-DA) was used to categorise and characterise gelatin components utilising FTIR spectral between 650 and 4000 cm^{-1}. Prior PCA and PLS-DA, a dataset pre-processing step comprising outlier removal, a dataset adequacy test comprising Kaiser meyer olkin (KMO), a dataset transformation consisting of variable important for projection (VIP), and a correlation test were executed.

Results: 517 out of 3351 FTIR fingerprint variables with VIP value of 1 or more and satisfied the pre-determined condition were selected for analysis. The KMO test yielded an excellent value (0.962), indicated enough variables were present for the next test. The PCA score plot revealed a clear separation between bovine and

porcine gelatin samples. PLS-DA model indicated an accuracy of up to 93.75% with only 3 samples miscalculate into different group sources while having high specificity and high sensitivity with value of 94.44% and 91.67% respectively.

Conclusion: These models imply that PLS-DA can be applied to the FTIR-ATR spectra of gelatine for more accurate and rapid source prediction.

Keywords: halal, FTIR, chemometrics, PCA, PLS-DA

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-19

Evaluation of Antioxidant Activities and Tyrosinase Inhibitory Effects of Avocado Seed Extract

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Background: Tyrosinase is an enzyme involved in the initial stages of melanin formation. Tyrosine catalyses L-tyrosine into L-DOPA and subsequently into dopaquinone. Oxidative polymerization of dopacuinone derivatives produces melanin. Over-production of melanin in the skin may cause hyperpigmentation. The hyperpigmentation that is frequently complained of is melasma, freckles and post-inflammatory hyperpigmentation. Avocado seeds contain compounds such as phenolic and flavonoids. Flavonoids have an antioxidant effect and are able to directly inhibit the activity of tyrosinase in the melanogenesis process.

Objective: The objective of this research is to determine the antioxidant activity of avocado seed extract and its effect as an inhibitor of tyrosinase enzyme.

Methodology: The avocado seeds were extracted by maceration using three solvents: ethanol, ethyl acetate and n-hexane. The antioxidant activity of avocado seed extracts was analysed using 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay. The activity of tyrosinase enzyme inhibitors was tested in vitro using L-DOPA as a substrate.

Results: The results of antioxidant activity testing that the avocado seed ethanol extract has a very strong antioxidant activity with IC_{50} of 17,50±3,09 µg ml^{-1}, while ethyl acetate extract and n-hexane extract of avocado seed have moderate antioxidant activity (IC_{50} of 148,37±23,39 µg ml^{-1}) and very weak antioxidant activity (IC_{50} of 561,45±17,27 µg ml^{-1}). Moreover, only avocado seed ethanol extract has tyrosinase enzyme inhibition activity of 46,04±0,32% at concentration of 1000 µg ml^{-1}.

Conclusion: The avocado seed ethanol extract has a very strong antioxidant activity and also has effect as an inhibitor of tyrosinase enzyme.

Keywords: avocado seed, antioxidant, DPPH, tyrosinase, L-DOPA

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-O-20

Comparison of Polyphenolic Compounds in Three Different Types of *Hibiscus sabdariffa* Linn (Roselle) Extract

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Background: *Hibiscus sabdariffa* Linn or known as roselle is a perennial herb that is native to Malaysia which contains abundance of polyphenolic compounds mainly in calyx. The polyphenolic compounds constituted to exert its effects as potent antioxidant in alleviating various diseases. However, the polyphenolic compounds extracted from roselle calyx is highly influenced by the type of extraction and the solvent used.

Objective: The aim of this study was to compare the content of polyphenolic compounds in three different types of roselle extract.

Methodology: Three different types of extract were used in this study including polypenol rich roselle extract (HPE), aqueous roselle extract, and aqueous ethanolic roselle extract. The polyphenolic compounds were analyzed using high-pressure liquid chromatography (HPLC). The polyphenolic compounds that were identified and quantified including chlorogenic acid, caffeic acid, rutin, quercetin, delphinidin-3-sambubioside and cyanidin-3-sambubioside.

Results: In this study, HPE was found to contain a higher content of chlorogenic acid than the aqueous and aqueous ethanolic extracts. However, aqueous ethanolic extract has higher content of caffeic acid, rutin, delphinidin-3-sambubioside and cyanidin-3-sambubioside when compared with aqueous extract and HPE. Delphinidin-3-sambubioside and cyanidin-3-sambubioside were not detected in HPE while quercetin was undetected in aqueous extract and aqueous ethanolic extract.

Conclusion: The composition of polyphenolic compounds is highly dependent on the types of extraction method. Aqueous ethanolic extract was found to have higher content of polyphenolic compounds compared to aqueous extract and HPE.

Keywords: polyphenol, roselle, extraction, phytochemicals

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
MyCRS Oral 1.1

Enhanced Wound Regenerative Effects of Chitosan-Alginate Scaffolds Containing Tocotrienol-Rich Fraction (TRF)

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Background: Wounds are ubiquitous in human lives and can have effects ranging from minor inconveniences to devastating clinical presentations. Despite advances in pharmaceutical and biomedical technology, wounds continue to persist as a major healthcare issue significantly diminishing patients' quality of life.

Objective: This study aims to investigate the potential for a chitosan-alginate scaffold containing tocotrienol-rich fraction (TRF) to improve wound regeneration.

Methodology: Biocompatibility of formulated scaffolds were determined using a MTT cell viability assay in human skin keratinocyte (HaCaT) and human skin fibroblast (Hs27) cell lines. In vitro efficacy was also measured within the same cell lines using a wound healing scratch assay. Effects of the formulated scaffold on wound closure rate, growth factor expression, and histological changes were also evaluated in an animal model.

Results: Developed TRF-loaded scaffolds were found to be biocompatible with HaCaT and Hs27 cells, exhibiting greater than 80% cell viability in vitro. Treatment of Hs27 cells with TRF-loaded scaffolds also produced enhanced cell migration rates, significantly higher than the control group. An in vivo full-thickness excisional wound model using male Sprague-Dawley rats revealed accelerated wound closure rates following treatment with TRF-loaded scaffolds, comparable to the positive control. Histological analysis showed improved extracellular matrix formation in the TRF-loaded scaffold groups relative to the control group. Transforming growth factor (TGF)-β1 and vascular endothelial growth factor (VEGF) expression was also elevated in skin tissue lysates analyzed using ELISA.

Conclusion: Findings from this study support the use of TRF-loaded chitosan-alginate scaffolds in improving wound regeneration outcomes.

Keywords: alginate, chitosan, tocotrienol, wound dressing, wound healing

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
MyCRS Oral 1.2

3D-Printed Microfluidic Chips for Preparation of Cationic Nanoemulsions in Dermal Drug Delivery

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Background: Microfluidics refers to fluid manipulation in microchannels.[1] When liquid flows through the microchannels, high shear and cavitation forces generated can break coarse emulsion droplets up that leads to the formation of nanoemulsions.[2] Nanoemulsions produced via microfluidisation can be smaller, more homogenous and stable than using conventional homogenisation.[3, 4] 3D printing is an attractive technique in fabricating the microfluidic chips (MC) because it can customise microchannel designs in a single-step manufacturing process.[5]

Objective: This study aims to explore the potential of 3D-printed MC in developing cationic oil-in-water nanoemulsions loaded with ibuprofen for dermal delivery.

Methodology: Nanoemulsions were prepared via microfluidisation (M) and homogenisation (H) methods using different concentrations of ethyl oleate (EO), nonionic surfactant – Tween 80® (T80) and cationic surfactant – cetrimonium bromide (CTAB). Microfluidisation was performed by processing coarse emulsions through the 3D-printed MC with 20 pairs of upright staggered fins. All nanoemulsions were characterised for droplet size, polydispersity index (PDI), zeta potential (ZP), morphology and stability. In vitro drug release and skin permeation studies were conducted.

Results: The optimised M-nanoemulsions and H-nanoemulsions comprising of 6/9/1%w/w of EO/T80/CTAB have similar droplet size (~60 nm), PDI (~0.25) and ZP (~21 mV) values. The droplet size of H-nanoemulsions (~160 nm) increased more than M-nanoemulsions (~91 nm) after 6-month storage at 25°C. M-nanoemulsions exhibited a higher drug release percentage than H-nanoemulsions in 1st h. M-nanoemulsions achieved a higher cumulative amount of ibuprofen permeated (~10 ug/cm^2) than H-nanoemulsions (~7 ug/cm^2) over 24 h.

Conclusion: The in-house designed MC are promising devices to produce stable nanoemulsions for dermal drug delivery.

Keywords: cationic nanoemulsions, microfluidisation, microfluidic chips, 3D printing, dermal drug delivery

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-1

The Role of α7nAchR in Mediating the Cardioprotective Effects of Transcutaneous Vagus Nerve Stimulation in Isoprenaline-induced MI Rats

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Background: Mismatches in myocardial oxygen demand and supply that leads to tissue necrosis is known as type II myocardial infarction (MI).

Objective: The purpose of this study is to look into the cardioprotective effects of transcutaneous vagus nerve stimulation (tVNS) in type II MI, with a focus on the role of α7nachR.

Methodology: MI was induced over 2 days with subcutaneous injections of isoprenaline hydrochloride (85 mg/kg). tVNS was applied via electrical stimulation at the tragus of the external auricle with stimulation intensities of 20 Hz, 0.2 ms, 2 mA, 1 h daily for 14 days.

Results: Rats with MI showed reduction in left ventricular developed pressure (LVDP), maximum rate of left ventricular pressure increase (+dp/dtmax), maximum rate of left ventricular pressure decrease during relaxation (-dp/dtmax), and cardiomyocyte hypertrophy and fibrosis. The tVNS group improved cardiac functions, such as increased LVDP ($p<0.01$), increased +dp/dtmax ($p<0.05$), and –dp/dtmax ($p<0.05$), when compared to the control group. In addition, tVNS limited cellular hypertrophy ($p<0.01$) and reduced collagen deposition ($p<0.05$). Further investigation of the circulating inflammatory marker tumor necrosis factor α (TNFα) revealed a non-significant trend of anti-inflammatory action in tVNS-stimulated animals, which could be reversed by inhibiting the systemic α7 nicotinic receptor.

Conclusion: The findings of this study suggest that tVNS has the potential to improve left ventricular function, cellular hypertrophy, and fibrosis in isoprenaline-induced MI, but the role of α7nachR requires further investigation.

Keywords: myocardial infarction, transcutaneous vagus nerve stimulation, α7nachR, isoprenaline

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-2

Gynura procumbens (Lour.) Merr. Extract Inhibits Activation of Nuclear Factor Kappa B Signaling Pathway in Endothelial Cells

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Background: Inflammation in endothelial cells can lead to the development of various diseases, such as atherosclerosis, hypertension, and diabetes. *Gynura procumbens* (Lour.) Merr. (GP) have been reported to possess several biological activities, including an anti-inflammatory effect. However, the effect of GP extract on the pro-inflammatory signaling pathway is limited.

Objective: This study aimed to evaluate the effects of the GP extract on the activation of the nuclear factor kappa B (NF-κB) downstream signaling molecules.

Methodology: Endothelial cells were pretreated with 60 µg/ml of GP extract for two hours and then activated with TNF-alpha. The cell lysate was then prepared for western blotting.

Results: The result shows that GP extract significantly inhibited the phosphorylation of the IKK family of kinases (IKKα/β). In addition, GP extract inhibited the phosphorylation of the inhibitor of kappa B alpha (IκBα), which is a protein that binds to the NF-κB transcription factor and inhibits its activity by preventing its translocation to the nucleus. GP extract also inhibited the phosphorylation of NF-κB and nuclear translocation of NF-κB into the nucleus.

Conclusion: In conclusion, this study demonstrated that GP extract may suppress the pro-inflammatory NF-κB signaling pathway in activated endothelial cells. These findings suggest that GP extract may have potential therapeutic benefits for conditions associated with endothelial dysfunction.

Keywords: *Gynura procumbens*, anti-inflammatory, IKKα/β, IκBα, NF-κB

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-3

Gallic Acid and Myricetin-rich *Labisia Pumila* Extract Mitigated Multiple Diabetic Eye Disorders in Rats

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Diabetes affected about a quarter of a billion people globally, and one out of four diabetics has eye or vision problems. This study investigated whether gallic acid and myricetin-rich *Labisia pumila* extract (LP) consumption would help prevent diabetic eye disorders and some probable biochemistry involved relating to inflammation, vascular leakage, and oxidative tension. Male rats were divided into four groups (n = 6), namely healthy control, diabetic non-treated control, and hyperglycemic rats treated with 150 or 300 mg/kg LP. Intraperitoneal injection of 60 mg/kg streptozotocin was used to induce diabetes. Rats were fed in the morning and evening. Diabetic retinopathy was graded in rats using a dilated retinal digital ophthalmoscopy. Rats were sacrificed at 12 weeks and the retina, optic nerve, cornea, lens, sclera, ciliary bodies, iris, and conjunctiva were examined histologically. The diabetic rats consuming LP for 10 weeks showed dose-dependent, histopathologically-reduced eye abnormalities (keratopathy, cataract, sclera, conjunctiva, ciliary bodies, iris, limbus, corneal edema, epithelial barrier inefficiency, shallow punctate keratitis, lower basal layer cell density, retinopathy, glaucoma, and corneal changes). The LP significantly suppressed inflammation [increased serum tumor necrosis factor-α (TNF-α), prostaglandin-E2 (PGE2)], vascular leakage [claudin-1], abnormal vascularization [vascular endothelial growth factor (VEGF)], oxidative tension [malondialdehyde/reduced glutathione ratio], and hyperglycemia [fasting blood glucose] of the diabetic rats. The LP consumption was significantly protective against diabetic eye disorders and optic nerve dysfunction which were related to inflammation, vascular leakage, abnormal vascularization, and oxidative tension, which most likely influenced eye hemorrhage and collagen cross-linkage.

Keywords: claudin-1, inflammation, prostaglandin-E2, reduced glutathione

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-4

Leaves Ethanolic Extract of *Polygonum Minus* Protects Differentiated Human Neuroblastoma Cells (SH-SY5Y) against H_2O_2-Induced Oxidative Stress

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Background: *Polygonum minus* Huds (*P. minus*) known as 'kesum' is widely used in traditional medicine. *P. minus* has been reported to possess several medicinal and pharmacological properties. Neuronal models are an important tool in neuroscientific research, assisting in the elucidation of the molecular and cellular processes involved in nervous system disorders.

Objective: The current study aimed to investigate the neuroprotective effects of P. minus on H_2O_2-induced neurotoxicity in SH-SY5Y cells.

Methodology: *P. minus* leaves ethanolic extract (PMEE) was investigated for its neuroprotective effects and mechanisms of action against H_2O_2-induced neurotoxicity in the differentiated SH-SY5Y cells through cell cytotoxicity assay. With respect to the nuclear factor erythroid 2-related factor 2/antioxidant response element (Nrf2/ARE), nuclear factor kappa B-cell (NFκB/IκB), and mitogen-activated protein kinase (MAPK) signalling pathways, the influence of PMEE pre-treatment on gene expression levels in differentiated neuronal cells was assessed using quantitative polymerase chain reaction (qPCR). The acetylcholine (ACH) concentration in the culture medium was measured using an enzyme-linked immunosorbent assay (ELISA). LCMS/MS analysis was also done to confirm the presence of bioactive compounds in PMEE.

Results: Our study showed that the PMEE provided neuroprotection against H_2O_2 -induced oxidative stress by activating Nrf2/ARE, NFκB/IκB and MAPK signaling

pathways in PMEE pre-treated differentiated SH-SY5Y cells. Meanwhile, the ACH level was decreased in oxidative stress-induced treatment group after 4 hours exposure with H_2O_2.

Conclusion: PMEE may aid in reducing oxidative stress as a preventative therapy for neurodegenerative diseases. The in-vitro results indicate that PMEE has neuroprotective effects on SH-SY5Y neuroblastoma cells.

Keywords: *P. minus*, neuroprotective, oxidative stress, SH-SY5Y, neurodegenerative disease

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-5

Novel Inhaled Andrographolide for Treatment of Lung Cancer

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Background: Lung carcinoma is the leading cause of mortality in cancer patients globally. Current treatment options are confined to severe side effects and drug resistance. Therefore, there is a need for novel therapeutic candidates and drug delivery technologies with promising anti-cancer properties with fewer adverse effects. Andrographolide is a plant-based compound with good anti-cancer efficacy, but its poor aqueous solubility limits oral and intravenous delivery. Alternatively, inhaled drug delivery is highly favourable for treating lung cancer as it delivers drugs directly into the affected lungs.

Objective: We produced TWO (2) inhalable andrographolide dry powder formulations: (i) crystalline and (ii) amorphous.

Methodology: The crystalline and amorphous formulations were prepared using precipitation and co-solvent spray drying techniques, respectively. The aerosol property of the powders was determined using a next-generation impactor (NGI) operated at 4kpa pressure drop with 4L inhaled air. While dissolution was measured using a conventional Franz diffusion cell.

Results: The crystalline and amorphous powders have an average hydrodynamic diameter of 1.65 µm $\pm$ 0.34 and 1.43 µm $\pm$ 0.19, respectively. The aerosol dispersion showed FPF (Emitted) of 47.76 $\pm$ 2.35 for crystalline and 47.79 $\pm$ 1.03 for amorphous. The dissolution analysis showed a slow release pattern in both formulations with 8-10 % drug release over nine hours.

Conclusion: We have successfully produced inhalable andrographolide crystalline and amorphous powder with good aerosol performance with prolonged drug release properties. Further in vivo evaluations are crucial to confirm the therapeutic potential of these formulations.

Keywords: andrographolide, dry powder, pulmonary delivery, lung cancer

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-7

Functional Role of MicroRNA-21 in Mitigating Myocardial Ischemia Inflammatory Responses via Nicotinic Acetylcholine Receptor Activation in Macrophages

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Background: Myocardial infarction (MI) poses a serious threat to human life and health. Following an ischemic insult, the effective treatment would be to restore blow flow to heart tissues. However, the paradox is that restoration of blow flow is subjected to ischemia-reperfusion injury (I/R injury) and leads to increased inflammation resulting in adverse cardiac remodeling and accentuate heart failure. Increasing evidence suggests activation of nicotinic acetylcholine receptor (nAchR) is associated with immunomodulatory and cardio-protection in MI. The mechanism on how nAchR activation leads to anti-inflammatory leading to amelioration of this injury is yet to be explored.

Objective: Our study aims to elucidate the functional role of microRNA-21 in mediating anti-inflammatory responses following nAchR activation in ischemic macrophages.

Methodology: I/R injury mimicked in murine macrophage cells (RAW264.7) via oxygen-glucose deprivation and reoxygenation (OGDR) treatment. Successful establishment of inflammation accessed by qPCR by measuring the mRNA levels of TNFa. nAchR agonist (PNU282987) used to activate the receptor. The protein level for pro-inflammatory cytokines (TNFa) measured by ELISA and the activation of transcriptional factors (STAT3 and NFKB) and its gene expression measured by ELISA and qPCR respectively. Transfection of antagomir against microRNA-21 probe the functional role of microRNA-21 in mediating the anti-inflammatory responses. Nanostring multiplex analysis used to profile downstream pathways regulated by microRNA-21 in nAchR activated macrophages.

Results: Cell viability was measured by MTT assay to optimize the OGD durations (1, 2, 4, 6. 8, or 12 hours). The viability dropped with increased time and at 4-hrs (80.4%) successful inflammation was established and selected as optimal. Upon

OGDR, TNFα levels are significantly upregulated in RAW264.7 cells. Treatment with nAchR agonist only been able to ameliorate the inflammation a little, but not significantly.

Conclusion: Modulating inflammation via nAchR after OGDR insult able to ameliorate the inflammation slightly, but not significantly when compared with control.

Keywords: mirRNA-21, nicotinic acetylcholine receptor, oxygen-glucose deprivation and reoxygenation, ischemic-reperfusion injury, inflammation

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-8

Elucidation on the Functional Role of MicroRNA-21 as an Anti-Inflammatory Key Switch in α7nAchr Activation in Preventing Cerebral Ischemic Reperfusion Injury

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Background: Ischemic stroke is characterized by a sudden loss of blood flow in an artery leading to the brain. The activation of the α7-Nicotinic Acetylcholine Receptor (α7nAChR), which is found in immune cells such as microglia, has shown promising results in improving inflammatory profiles in stroke-induced rats.

Objective: To investigate the role of microRNA-21 in mediating inflammation via α7nAChR activation in preventing cerebral ischemia-reperfusion injury.

Methodology: The mouse BV2 microglia cells were preconditioned with PNU-120596 (α7nAchR agonist) and then kept in hypoxia chamber (Oxygen-glucose-deprived) to mimic ischemic injury. Later the protein and gene expression of M1 and M2 markers as well as other downstream signalling pathways (NF-kB and STAT3) was measured by qPCR and ELISA. Antagomir of microRNA-21 was transfected to investigate the protective role of microRNA-21.

Results: The optimum time point of OGD was finalized after measuring cell viability at different time points (1, 2, 4, 6, 8 hour) using MTT assay. 4 hours was finalized as the optimum time as it showed more than 80% cell viability as well as successful inflammation.The activation of α7nAChR by an agonist inhibited the OGD/R-induced elevation of pro-inflammatory markers (TNF-α, IL-6) while increasing the expression of the anti-inflammatory marker IL-10. It was also discovered that after OGD/R, NFkB-p65 levels increased significantly, whereas α7nAChR activation significantly reduced its expression. We also anticipate reporting that microRNA-21 regulates α7nAChR activation by switching proinflammatory M1 cytokines to anti-

inflammatory M2 cytokines.

Conclusion: The results will demonstrate that activation of α7nAChRs inhibits the transformation of M1 microglia and promotes the M2 phenotype regulated by NFkB and STAT3 pathways and microRNA-21 provides a key role in this process.

Keywords: ischemic stroke, microRNA-21, α7nAChR, microglia, oxygen-glucose deprivation and reoxygenation

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-9

The Development of Universal Lipopeptide-Based Dengue Vaccine using Bio-Inspired Polymersome Nanoparticles as Vaccine Delivery Platform

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Background: Dengue remains a severe threat to public health. The safety and efficacy of the licensed dengue vaccine is not clinically satisfactory, which necessitate the need of new approach in designing an effective dengue vaccine without electing adverse reaction.

Objective: Herein, we have designed a lipidated multi-epitope peptide vaccine (LipoDV) that can elicit highly targeted humoral and cell-mediated immune responses.

Methodology: To improve its immunogenicity, LipoDV was presented on the surface of MPLA-functionalized polymersome nanoparticles (PNs-LipoDV-MPLA). The as-constructed vaccine delivery platform resembles the structural morphology of DENV owing to its spherical nanoscale particle size and surface immunostimulatory properties given by LipoDV and MPLA that emulating the functional role of DENV E and prM/M proteins respectively.

Results: A proof-of-concept study demonstrated that BALB/c mice immunized with PNs-LipoDV-MPLA induced a stronger antigen-specific antibody response with an enhanced cell-mediated immunity as characterized by the elevated IFN-γ secretion in comparison to other tested vaccine candidates which possess a lesser structural trait of DENV. The DENV-mimicking nanoparticles vaccine exhibited negligible toxicity as analyzed by haemolytic test, MTT assay, histopathological examination, and abnormal toxicity test on immunized mice.

Conclusion: Collectively, our study provides a strong foundation in designing an effective peptide-based vaccine delivery platform against DENV infection.

Keywords: multi-epitope, peptide vaccine, nanoparticles, dengue virus, polymersome

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-10

The Analgesic Effects of 5-HT_3 Receptor Antagonist in Chemotherapy- Induced Peripheral Neuropathy (CIPN) in a Rat Model

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Background: Chemotherapy-Induced Peripheral Neuropathy (CIPN) is the second most common dose-limiting adverse effect that significantly impacts the quality of life of cancer patients and survivors. Notably, there is no recommended treatment associated with CIPN Previous studies have shown that various neuropathic pain could be blocked by the 5-HT_3 receptor antagonist. Considering that 5-HT3R antagonists are already clinically used to treat chemotherapy-induced nausea and vomiting in cancer patients, it is worthwhile to explore 5-HT_3 receptor and its antagonist in CIPN.

Objective: To examine the effects of 5-HT_3 receptor antagonists on CIPN in rats as animal model.

Methodology: The effects of 5-HT_3 receptor antagonists (Palonosetron and Ondansetron) on CIPN were examined via mechanical allodynia test using the Von Frey filament Method and cold allodynia test using acetone drop. The rats were induced with cisplatin (4 mg/kg) weekly up to 3 cycles and palonosetron and ondansetron (3.1 mg/kg and 148.48 mg/kg) treated orally for 1 week. The nociceptive behaviors were evaluated on the 7th day of the 1-week treatment.

Results: In mechanical allodynia test, our results indicate that both palonosetron and ondansetron are highly significant vs. cisplatin ($p<0.0001$). For cold allodynia both palonosetron and ondansetron are not significant vs. cisplatin ($p=0.2174$; $p>0.9999$).

Conclusion: Blockade of 5-HT_3 receptor by its antagonist induces an antinociceptive effects on CIPN and suggests that this compound may have potential clinical utility for the management of CIPN.

Keywords: chemotherapy-induced peripheral neuropathy (CIPN), 5-HT_3 receptor, palonosetron, ondansetron

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-11

Effect of 5-HT_3 Receptor Antagonists (Ondansetron and Palonosetron) and *Zingiber Officinale* Constituents (6-Gingerol and 6-Shogaol) on Nicotine Addiction and Withdrawal in Mice

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Background: The 5-HT_3 serotonin receptor is a potential target of several abused drugs. Recent study shows that the neurotransmitter serotonin (5-HT) is associated with the addictive behaviors, appetite regulation, behavioral inhibition, mood and cognitive functions. Therefore, the present study was aimed to investigate the potential role of 5-HT_3 antagonists in the modulation of nicotine addiction and withdrawal in view of seeking for an alternative target for smoking cessation treatment.

Objective: To study the effect of selected 5-HT_3 antagonists (ondansetron, palonosetron and *Zingiber officinale* constituents) on nicotine addictive and withdrawal behavior in mice.

Methodology: The effects of 5-HT_3 antagonists on the rewarding effect of nicotine was assessed by using the conditioned place preference (CPP) in mice. Nicotine addiction was conditioned using 1.0 mg/kg nicotine and consecutively treated with different doses of 5-HT_3 antagonists; ondansetron (0.5, 1.0, 2.0 mg/kg), palonosetron (10, 30, 60 mg/kg) and *Zingiber Officinale* constituents (6-gingerol and 6-shogaol) (70, 100, 130 mg/kg). Bupropion 1.0 mg/kg was used as a positive control group. Furthermore, the effect of 5-HT_3 antagonists on the nicotine depressive-like withdrawal effect was determined using the forced swim test (FST). Following CPP-confirmed addiction phase, nicotine were withdrawn and the mice were treated with palonosetron or ondansetron or 6-gingerol. Anxiety-like behaviours were also measured by recording of duration and frequency of all social interactions (e.g., sniffing, climbing on each other, climbing cage, defence, and biting) which were observed 30 minutes before and after treatment.

Results: The CPP results showed a significant reduction in the percentage preference of nicotine paired compartment in all treatment groups. In FST, treatment with the 5-HT_3 receptor antagonist has significantly reduced the nicotine withdrawal depressive-like effect. Scoring on the anxiety-like behaviour has also showed significant reduction after receiving the 5-HT_3 antagonists' treatments.

Conclusion: These findings point to a notion that the selected 5-HT_3 antagonists may be good candidates for smoking cessation treatments given that they may reduce both the nicotine dependence and withdrawal behaviours.

Keywords: nicotine addiction, 5-HT_3 antagonist, conditioned place preference test, force swim test

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-O-12

The Effects of Methiopropamine on Cognitive Function in Mice

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Background: Methiopropamine (MPA) is one of the novel psychoactive substances and has been associated with cognitive decline in some of its users. However, the effects of MPA on cognitive function are poorly reported in animal studies.

Objective: This study was carried out to determine the subacute effects of MPA on cognitive function using the novel object recognition (NOR) test in mice

Methodology: A total of 40 male Swiss Albino mice were randomly divided into four groups (n=10). Each treatment group received intraperitoneal injections of either normal saline, methamphetamine (METH) at 1 mg/kg or MPA at 1 or 3 mg/kg once daily for seven days. NOR test was carried out in four phases; habituation; acquisition trial, immediate choice trial (day 7) and choice trial after 24 hours phase. Exploration in all trials was defined as any sniffing or touching while orienting the nose towards the objects at less than 1 cm. The non-spatial memory was determined using the values of discrimination index (DI).

Results: MPA at 3 mg/kg showed a significant difference in the DI during the choice trial after 24 hours as compared to the vehicle, but not at the lower dose. Similarly, METH demonstrated cognitive deficits at 1 mg/kg. No significant differences in the DI were seen among groups during the immediate choice trial.

Conclusion: These results suggested that repeated MPA treatment induced non-spatial memory impairment and further studies are needed to identify the mechanisms of action involved for a better understanding of their effects on the brain.

Keywords: methiopropamine, NPS, cognitive impairment, methamphetamine, neurotoxicity

ABSTRACTS OF POSTER PRESENTATIONS
Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-1

Patient Related Factors Contributing to Subsidized Medication Wastage

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Background: In Malaysia, medications are heavily subsidized in the government healthcare setting. Since it is heavily subsidized, it is important to evaluate patients' perspective to ensure that the medications received were used accordingly and was not wasted.

Objective: To identify patient related factors that may contribute to subsidized medication wastage.

Methodology: A cross-sectional survey was conducted in six government healthcare settings in Malaysia. The questionnaire consists patient's demographic characteristic, Belief about Medicines questionnaire (BMQ) and Return and Disposal of Unused Medicine (ReDiUM) which was distributed at the outpatient pharmacy.

Results: From 1000 questionnaire distributed, only 750 respondents returned the survey (response rate 75%). It was found that strong belief in the necessity of their medication correlates negatively with reasons for medication wastage ($p<0.01$) in which the higher belief in the necessity of medication the lesser the reasons for medication wastage. Concern regarding medication and negative perception on medication correlates positively to the reasons for medication wastage ($p<0.01$). Patient related factors contributing to medication wastage were non-adherence, experiencing side effects of medications, keeping medication for future use and free medication subsidized by the government.

Conclusion: Patients with high concern and negative perceptions towards medication were more likely to waste their medication. Non adherence is the main patient related factor contributing to subsidized medication wastage.

Keywords: patient related factors, wastage, subsidized medication

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-2

Exploratory Study on Hormonal Contraceptives Dispensing Issues in Community Pharmacy Settings

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Background: Unintended pregnancy imposes an important global health, social and economic burden. It was estimated about one-third of unintended pregnancies in Southeast Asia were due to low use of contraception, contraceptive method failure, and high unmet need for contraceptives. Apart from unintended pregnancy, it is important to address the suitable hormonal contraceptive for women with health-related risk. Therefore, involvement of the healthcare professionals especially pharmacist is important to understand the current issues in dispensing hormonal contraceptive at the community setting.

Objective: This study explore the current practices and issues in dispensing hormonal contraceptive in community pharmacy setting in Malaysia.

Method: A qualitative study using semi structured interviews were conducted among community pharmacists, general practitioners, Obstetrics and Gynaecology (O&G) specialists, medical officers and hospital pharmacists. The data was analysed using an inductive approach to identify themes, whereby emerging themes were coded and grouped into categories.

Results: Eighteen participants were recruited and completed the interviews when saturation was achieved. Three themes were identified; healthcare professional factor, consumer factor and system factor. Healthcare professional factor highlighted the lack of training in selecting the most suitable contraceptives by the pharmacists due to unfamiliarity and lack of experience in dispensing contraceptives. Challenges that arise from consumer factors were stigma or wrong self-management and cultural belief. System factor were due to lack of guide standardisation and the issues related to information sharing of the consumer database.

Conclusion: Community pharmacists anticipate challenges in dispensing contraceptives mainly due to lack of training and guide standardisation for dispensing contraceptives.

Keywords: community pharmacist, contraceptives, issues and challenges

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-3

The Association of Health Literacy with Health Information-Seeking Behaviour Through Social Media Among the General Public in Malaysia

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Background: Social media has become an important platform for users to share and search for health information. Adequate health literacy of social media users may be essential to ensure that health information is used correctly. However, few studies have examined how health literacy influences health information-seeking behaviour through social media, especially among the Malaysian population.

Objective: To identify the levels of health literacy and health information-seeking behaviour among the general public in Malaysia, and to determine the influence of health literacy on health-related social media use.

Methodology: A cross-sectional online survey was conducted among Malaysian adults. The Health Literacy Survey Malaysian Questionnaire (HLS-M-Q18) was used to assess respondents' health literacy. Chi-square tests were used to determine the influence of health literacy on social media use for health information-seeking.

Results: A total of 341 respondents participated. Among the respondents, 34.9% possessed limited health literacy, 40.8% had sufficient health literacy, and 24.3% had excellent health literacy. The most utilised sources of health information were social media (84.8%) and healthcare providers (84.5%). The social media platforms most frequently used for health information-seeking were YouTube (61.6%) and Facebook (41.8%). In addition, respondents with limited health literacy reported less experience in using social media for health information-seeking ($p<0.05$) and greater difficulties in understanding health information on social media ($p<0.05$).

Conclusion: A considerable proportion of the general public has experience using social media for health information-seeking. The public's health literacy should be considered when developing health educational messages on social media to ensure effective information delivery.

Keywords: health literacy, health information-seeking behaviour, social media

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-4

Social Media Content by Healthcare Professionals on Modifiable Risk Factors for Non-Communicable Diseases: A Systematic Review of Elements Influencing User Engagement

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Background: Identification of social media elements influencing user engagement would ensure effective delivery of health information by healthcare professionals (HCP) on social media.

Objective: To systematically assess the elements of social media content on modifiable risk factors for non-communicable diseases (NCD) created by HCPs which influence user engagement metrics.

Methodology: Relevant articles on modifiable NCD risk factors, published between January 2006 and October 2022 in English language were identified from MEDLINE, Scopus, Web of Science, and CINAHL databases. Social media elements influencing user engagement metrics were defined as elements descriptively showing the highest user engagement or elements with significantly more or less user engagement. The titles, abstracts and full articles were reviewed.

Results: Twenty-one studies were included. User engagement metrics were reported significantly in more than half of the studies (13/21 (61.9%). A total of 43 elements were found to influence user engagement metrics. Elements positively influencing user engagement metrics included post types such as photos and videos, and general prompters such as polls, questions and suggestions. Behavioural elements which positively influenced user engagement metrics were elements driven by self-beliefs, motivation and sense of consciousness. Negative dramatic relief and self-liberation were some of the behavioural elements associated with significantly less user engagement.

Conclusion: Findings demonstrated that identification of social media elements which influence user engagement metrics allows specific tailoring of the health topic of interest, maximizing users' post-level interactions. Nevertheless, as social media continues to evolve, these elements need to be constantly evaluated through further research, providing adjustments when required.

Keywords: social media, modifiable risk factors, non-communicable diseases, healthcare professionals, user engagement

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-5

Prevalence and Factors Associated with Medication Administration Errors Amongst Neonates in the Neonatal Intensive Care Unit

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Background: Medication administration errors (MAEs) are the most commonly occurring type of medication error and is more common among neonates as compared to paediatrics, adults, and the elderly. They may cause serious patient harm and significant economic burden.

Objective: This study aims to determine the prevalence of MAEs and identify factors associated with MAEs.

Methodology: A direct observational study was conducted in Neonatal Intensive Care Units (NICUs) of three public hospitals. Medication preparations and administrations were observed using a standardized data collection form followed by a chart review. Multivariable logistic regression was used to identify factors associated with MAEs.

Results: Overall, 343 out of 524 medications observed had at least one MAE. The rate of MAE was 65.5% (95% CI 61.4%-69.6%). The most common type of MAE was wrong rate of administration (19.8%), wrong time (19.1%) and wrong drug preparation (18.3%). Factors that increased the risk for MAE were medications administered intravenously (odds ratio, OR=36.62; 95% CI=15.05-89.15; p<0.001), number of prescribed medications (OR=1.24; 95% CI=1.05-1.46; p=0.010), number of hours the nurse has been on duty (OR=1.15; 95% CI=1.03-1.29; p=0.018), younger gestational age (OR=0.95; 95% CI=0.90-0.99; p=0.013), unavailability of protocol (OR=4.40; 95% CI=1.77-11.11; p=0.001) and certain days of the week such as Monday (OR=2.53; 95% CI=1.12-5.71; p=0.025), Tuesday (OR=2.28; 95% CI=1.02-5.12; p=0.045) and Friday (OR=3.60; 95% CI=1.48-8.78; p=0.005).

Conclusion: MAEs amongst neonates in the NICU were highly prevalent in this multicenter study. Factors associated with MAEs identified can be considered in

planning remedial measures to improve medication safety in the NICU.

Funding: This research was funded by the Ministry of Higher Education (MOHE) through Fundamental Research Grant Scheme (FRGS), under the grant number FRGS/1/2022/SKK16/UKM/02/7

Keywords: medication administration errors, neonates, neonatal intensive care unit

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-6

Vulnerability Toward Health Misinformation and Factors Promoting Engagement in Health Misinformation in Social Media: A Systematic Review

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Background: Huge amount of health misconceptions are spreading in social media. Potential hazards are non-compliance to government measures and withdrawal of published literature. It is crucial to investigate who is susceptible and the factors affecting engagement in health misinformation.

Objective: Investigate factors affecting the susceptibility and engagement in health misinformation in social media.

Methodology: This systematic review included studies that investigated susceptibility towards health misinformation and factors promoting engagement in health misinformation in social media. Only studies in English and published between 2000-2021 were included. Studies were identified from Pubmed, Scopus, Cochrane Library and Web of Science. This review was done following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement.

Results: Thirty-three studies included in this review. Socio-demographic factors found to be important for vulnerability and engagement in health misinformation are age, education, income, time spent on social media, occupation, economic status of a country, and geographic factor. Presentation of the misinformation message affected the vulnerability and engagement in misinformation. Those who believe in social media are at a higher risk for misinformation. Public's tendency for information sharing as an act of pass time, religiousness and belief in conspiracy theories increases belief and sharing of misinformation. Posts that create fear and anger spread faster as compared to happy posts.

Conclusion: Factors contributing to susceptibility and engagement in health misinformation are socio-demographic factors, message characteristics, individual

beliefs, and emotions. This study allows public health measures to be targeted to this population.

Keywords: vulnerability, engagement, health misinformation

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-7

Digital Technology in Improving Antiretroviral Therapy Adherence: A Systematic Review and Meta-Analysis

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Background: Adherence to antiretroviral therapy ART) remains the cornerstone of long-term viral suppression and successful treatment outcomes among people living with HIV (PLHIV). The use of digital technology is believed one of the most important strategies to improve adherence.

Objective: The aim of this study was to systematically determine the impact of digital technology in improving adherence among PLHIV.

Methodology: The preferred reporting item for systematic review and meta-analysis guideline was followed. The systematic search was conducted on Web of Science (WoS), PubMed, Scopus, Ovid, EBSCOHost and Google Scholar databases from inception to 31 June 2022. Studies that used digital technology as an intervention for ART adherence with ART adherence status as the study outcome were included. Quality assessment and data analysis were carried out using Review Manager (RevMan) version 5.4. The pooled odds ratio between two groups were computed using a random effects model. Subgroup analyses were performed to identify sources of heterogeneity between newly initiated ART and ART treatment experiences.

Results: Of 1864 articles screened, seven eligible for analysis. Four studies showed a statistically significant impact of digital technology on improving ART adherence, while the remaining seven studies found no significant difference between the intervention and control group. The pooled odds ratio was found to be 1.98 (95% CI: 0.92 to 4.26) with a statistical heterogeneity I^2 = 82%.

Conclusion: The meta-analysis of the digital technology intervention showed no statistically significant difference in the improvement of ART adherence PLHIV.

Keywords: HIV, antiretroviral therapy, adherence, digital technology

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-8

A Retrospective Study on Chemotherapy-Induced Nausea and Vomiting in Highly/Moderately Emetogenic Chemotherapy: Incidence and Prescribing Practice

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Background: Chemotherapy-induced nausea vomiting (CINV) is a common and significant problem in oncology patients and rated as one of cancer chemotherapy's most distressing side effects.

Objective: The objectives of this study are to describe the incidence of CINV in highly and moderately emetogenic chemotherapy-treated patients and the prescribing pattern of CINV prophylaxis.

Methodology: This retrospective, cross-sectional single-center study randomly collected data on demographics, CINV episodes, and prescribing patterns for adult oncology patients receiving intravenous highly or moderately-emetogenic chemotherapy (HEC/MEC) for between January to December 2019.

Results: A total of 419 randomly selected records of HEC/MEC recipients with 2388 total chemotherapy cycles were included. The mean age was 53.6 $\pm$ 12.6 years old. The majority was female (66%), Malay (54.4%), diagnosed with cancer stage IV (47.7%), and with no comorbidities (47%). All patients were prescribed with IV granisetron and dexamethasone before chemotherapy for acute prevention, whereas dexamethasone and metoclopramide were prescribed for delayed prevention. Aprepitant was not routinely prescribed for the prevention of CINV. CINV incidence was 57% in the studied population and 20% in the total cycle. This study found a significant association between CINV incidence with performance status and cisplatin-based chemotherapy (OR=3.071, CI=1.515-6.223, p=0.002;

OR=4.587, CI=1.739-12.099, p=0.02, respectively).

Conclusion: CINV incidence was rather high per patient but relatively low per cycle. Most patients were prescribed with dual regimen antiemetic prophylaxis.

Impact: This study provides evidence that there was suboptimal use of recommended agents for CINV, and there is a clear need for further improvements in CINV management.

Keywords: chemotherapy-induced nausea vomiting, CINV, CINV incidence, antiemetic, CINV prophylaxis

Clinical Pharmacy, Pharmacy Education & Pharmacy Practice (PE)
PE-P-10

The Impact of Adherence on the Cost-Utility of Iron Chelation Therapy (ICT) in Thalassemia Patients

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Background: Regular blood transfusions and iron chelation therapy (ICT) are the mainstay treatments for thalassemia. Non-adherence to iron chelation therapy is a significant barrier to achieving better health outcomes for thalassemia patients.

Objective: This study aims to evaluate the impact of adherence on the cost-utility of iron chelation therapy (ICT) in thalassemia patients.

Methodology: A cross-sectional study was conducted involving transfusion-dependent thalassemia (TDT) patients at Hospital Ampang, Selangor between March 2021 to April 2022. Medical records were reviewed retrospectively and questionnaires were distributed to collect the data. The total costs of management include direct medical and non-medical costs. The incremental cost-effectiveness ratio (ICER) was calculated between adherent and non-adherent patients.

Results: A total of 162 patients were included in the study. The majority of patients were Malays (N=115, 70.99%), and female (N=107, 66%), with a mean age of 32.88 (SD 10.45) years. The rate of ICT adherence was 46.91%. In total, the average Short-Form 36 (SF-36) score was 74.58 with the adherent groups having a significantly higher score in each domain than the non-adherent groups. The average cost of annual thalassemia management per individual for the adherent group was slightly higher than the non-adherent group which was US$ 8,184.60 (MYR 33,884.24) versus US$ 8,045.09 (MYR 33,306.69). The ICER was estimated to be US$ 2,405.26 (MYR 9,957.76) per unit of SF-6D utility value for the adherent group compared to the non-adherent group.

Conclusion: Improving patient adherence possibly will positively impact the cost-effective value of ICTs therapy.

Keywords: cost-effectiveness analysis, iron chelation therapy, adherence, quality of life, thalassemia

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-1

Synthesis and Evaluation of Chromone Derivatives as Kinase Inhibitors in Triple-negative Breast Cancer

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Background: According to the World Health Organization (WHO), 2.3 million women were diagnosed, and 685,000 women died from breast cancer in 2020 worldwide. Among the breast cancer subtypes, triple-negative breast cancer (TNBC) appears to be the most aggressive type of breast cancer. It is frequently reported among younger women, constituting 15-20% of all breast cancer cases.

Objective: This study described the synthesis and biological activity of a series of chromone derivatives against kinase activity in triple-negative breast cancer (TNBC) MDA-MB-231 cells.

Methodology: All compounds were synthesised and tested on triple-negative breast cancer (TNBC) MDA-MB-231 cells. The most active compound C8 was then selected for further evaluation, including its effects on cancer cell growth inhibition, apoptosis induction, kinase profiling, and combination effect with chemotherapy doxorubicin agent. Finally, molecular docking was conducted to determine the binding interactions of the active compound C8 with the PIM1 and PIM2 binding sites.

Results: The active compound C8 exerted a growth inhibitory effect on the TNBC-derived MDA-MB-231 cells with an IC_{50} value of 11.71 $\pm$ 0.79 µM. It promoted apoptosis, sensitised TNBC MDA-MB-231 cells to Dox and inhibited multiple kinase activities. Molecular docking results revealed that the compound engaged in critical interactions with PIM1 and PIM2 kinases.

Conclusion: The results presented here suggest that the lead compound C8 possessed anticancer activity on TNBC cells potentially mediated by inhibition on multiple tyrosine kinases and kinases involved in cell-cycle regulation.

Keywords: chromone, anticancer, PIM kinase, multi-kinase inhibitor

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-2

Pittosporum Molucannum: A New Source of Natural Biopesticides

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Background: Pesticidal poisoning in humans has been relatively uncontrolled since the 1960s. The rate of intentional and unintentional pesticide poisoning (UPP) cases reflects how extensively the community and local agriculture uses these agents. Pesticides are mostly synthetic substances used to kill or repel plants and animals considered pests. Its benefits outweigh the health risk it poses; thus, it is crucial to look for a natural alternative that is less harmful to humans and the environment. *Pittosporum moluccanum* was traditionally used as an herbal pesticide; however, no further scientific findings support this claim.

Objective: This study aims to provide initial results on the plant's potential as a source of natural biopesticides.

Methodology: The plant's leaves, fruits, and barks were macerated in ethanol, filtered, and concentrated using a rotary evaporator to get the extracts. The extracts were chemically profiled through TLC principles, and toxicity was screened using brine shrimp lethality assay and MTT cytotoxicity assay. The herbicidal activity was determined using phototoxicity assay comparing the activities to glyphosate (positive control) and water (growth control). Moreover, molluscicidal activity was determined using immersion method comparing with metaldehyde (positive control) and DMSO (negative control).

Results: TLC experiment results suggest that the leaves, fruits, and barks contain semipolar compounds that are UV active at 365 nm and 254 nm wavelengths. In addition, alkaloids and flavonoids were found on the plant extracts, phenolics were found in leaves and fruits, and tannins was found only on leaves. Furthermore, toxicity profiling suggests an LC50 of 0.098 mg/mL for leaves extract and 3.125 mg/mL for bark and fruit extracts. In addition, the fruit extract was found to be cytotoxic (CC50) at 0.39 µg/mL, while both the leaves and barks at 0.2 µg/mL. Herbicidal assay suggests that the extracts inhibit seed germination (100% + SD 0.00) at 2 µg/mL while the positive control (13.5 µg/mL glyophosate) only exhibited 92.34%

+ 0.47 inhibition. Moreover, the plant extracts exhibit a concentration-dependent molluscicidal activity against the snails similar to metaldehyde (6 µg/mL).

Conclusion: The findings of this study suggest that *P. molucannum* plant contains UV-active compounds that exhibit pesticidal activities against snails and weeds, which are the most common pests in agricultural lands.

Keywords: *Pittosporum molucannum,* biopesticides, molluscicide, herbicide, natural product

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-3

Nanostructured Lipid Carriers for the Enhancement of Topical Curcumin Delivery in Pressure Ulcers

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Background: Pressure ulcers (PU) are chronic sores with a high prevalence in populations at risk, particularly the elderly and the immobile. Curcumin's anti-inflammatory and healing effects on chronic wounds have been extensively studied. However, the limited solubility and stability of curcumin inhibit its distribution by cutaneous application. Therefore, the development of nanostructured lipid carriers (NLCs) was proposed to enable the use of curcumin in the treatment of PU.

Objective: This primary study aims to focus on the optimization and characterization of curcumin NLC formulation.

Methodology: The solubility of curcumin in lipids was determined prior to the fabrication of NLC. The NLC formulations were optimized using a central composite design (CCD) of response surface methodology. High shear homogenization followed by high-pressure homogenization was employed for the preparation of the NLC using selected solid lipid, olive oil as liquid lipid, tween 80 as surfactant and lecithin as co-surfactant. The optimal formulation of NLC was characterized for particle size, polydispersity index (PDI), zeta potential (ZP), percentages of encapsulation efficiency (EE%) and drug loading (DL%).

Results: Curcumin showed the highest solubility in glyceryl monooleate (1 mg/ml). The optimized NLC as determined using CCD, comprising of 3.5% solid lipids, 1% surfactant and 2% co-surfactant with an average particle size of 125.43±11.58 nm, PDI of 0.248±0.05, ZP of -45.8±3.63 mV. Cur-NLCs showed no significant difference between the optimized NLC with a particle size of 134.68±6.0 nm, PDI of 0.248±0.00, ZP of -44.94±5.44, EE% of 99.46±0.03% and DL% of 1.61±0.00%.

Conclusion: The optimal NLC formulation had the potential to improve the efficacy of curcumin in topical delivery and subsequently improve its healing properties against PU.

Keywords: pressure ulcers, curcumin, nanostructured lipid carrier, central composite design, characterize

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-7

Characterizations and Sub Chronic Toxicity of Multifaceted Dressing Embedded with DsiRNA-loaded Gold Nanoparticles for Diabetic Wound Care

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Background: Hyperglycemia in diabetic patients can lead to complications like diabetic foot ulcers by hindering wound healing through the upregulation of the PGT gene and subsequent reduction of PGE2 expression. To address this, a multi-action therapy using DsiRNA against PGT gene and gold nanoparticles (AuNPs) in a thermoresponsive gel of PF127 has been developed to overcome the problem.

Objective: To upscale biosynthesized AuNP using aqueous extract of TMM extract and capped by chitosan via Response Surface Methodology (RSM) prior to incorporation into thermoresponsive gels. The toxicity of the resulting gel will be evaluated through in vivo sub chronic dermal toxicity studies.

Methodology: AuNP are fabricated using chitosan and TMM extract, then optimized and characterized before being mixed with DsiRNA and incorporated into PF127 thermosensitive gel. The gels will be applied on the rat's skin every 2 days for 28 days to evaluate the clinical signs, organ and systemic toxicity.

Results: AuNPs were upscaled and lab-scaled with particle sizes of 152.93±1.562 and 186.53±0.517 nm, respectively, and surface charges of +30 mV or more. Both formulations inhibited the growth of gram-positive and negative bacteria at 250 µg/mL. Topical application of the gel for 28 days in rats showed no significant differences in behavior, body weight, food and water intake, histological findings, or blood parameters compared to the control group, although some minor differences were observed, potentially due to other factors such as the administration of a sedative drug before treatment.

Conclusion: The study found that it is feasible to fabricate a large amount of AuNPs. The toxicity tests showed that the gels had no harmful effects on liver, kidney, or systemic blood flow, indicating they are safe for further study.

Keywords: diabetes, wound, gold nanoparticles, DsiRNA, antibacterial

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-8

Evaluation of Antioxidant and Anticancer Activity of *Tinospora cordifolia* against Ehrlich Ascites Carcinoma: *In Vitro* and *In Vivo* Approach

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Background: Globally, the burden of cancer is increasing consistently. Modern cancer therapies include lots of toxicity in the non-targeted organs reducing the life expectancy of the patients. Hence, the scientists are trying to seek for noble compounds from natural sources to treat cancer.

Objective: The objectives of present study are to evaluate the phytochemicals, *in vitro* antioxidant and *in vivo* anticancer study of various solvent fractions of *Tinospora cordifolia* (Willd.).

Methodology: In this experiment, standard quantitative and qualitative assay methods were used to analyze the phytochemicals. The antioxidant activity was measured using the DPPH and ABTS scavenging method. The *in vivo* antitcancer activity is evaluated against Ehrlich ascites carcinoma (EAC) cell bearing in Swiss albino mice.

Results: Phytochemical screening confirmed the presence of flavonoids, alkaloids, tanins, saponin, glycosides, and carbohydrates. Significant amount of phenolic (20.19±0.3 mg/g GAE) and flavonoids (9.46±0.18 mg/g GAE) were found in methanolic extract in quantitative screening. *Tinospora cordifolia* methanolic extract showed the promising DPPH and ABTS scavenging activity with the IC_{50} value of 1222.99 µg/mL and 1534.34 µg/mL respectively which was concentration dependent. *In vivo* anticancer activity in EAC cell bearing mice showed significant ($P < 0.05$) percent inhibition of cell growth (60.12±1.22) was found at highest dose compared with standard drug 5-Flurouracil (81.18±1.28).

Conclusion: The results were found to be significant and confirmed that the methanolic extract of *Tinospora cordifolia* has remarkable antitumor activity with antioxidant potential. The *Tinospora cordifolia* methanolic extract may be considered as a potent anticancer agent for advanced researches.

Keywords: natural products, gulancha, phytochemicals, anticancer

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-11

An Insight into GC-MS Phytochemicals Analysis and Antibacterial Activity of Green Synthesized Metallic Nanoparticles of *Lablab purpureus* Flowers Extract

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Background: There are several uses for silver nanoparticles in the field of biomedicine because of their exceptional features. One of the main uses of silver nanoparticles is the creation of antibiotics that are clinically effective against bacteria and microorganisms that are medication resistant.

Objective: The objective of this research is focused on to analysis of phytochemicals and preparation and evaluation of efficient green synthesis of silver nanoparticles with proven antibacterial properties of *Lablab purpureus* flowers.

Methodology: The methanolic extract was analyzed for bioactive secondary metabolites by gas chromatography-mass spectroscopic (GC-MS) methods. The silver nanoparticles were synthesized and characterized by, uv–vis, FT-IR spectroscopy and SEM analysis. Additionally, the disk diffusion method was used to assess the antibacterial activity of the silver nanoparticles against one gram positive and five gram negative bacteria.

Results: The methanolic extract of *L. purpureus* flowers was rich in bioactive phytochemicals. Silver nanoparticles used in this study were synthesized using of *Lablab purpureus* flowers extract with particle size of less than 1 µm. In bacterial susceptibility study, flower extract of *L. purpureus* showed moderate antibacterial activity but nanoparticles showed promising antibacterial potential against gram positive *S. aureus* and gram negative *E. coli*, moderate antibacterial activity against *S. typhi* bacteria, and mild activity against *Proteus*, *Klebsiella* and *P. aeruginosa*

Conclusion: This study indicates that *L. purpureus* flower is a promising source of bioactive phytocompounds and silver nanoparticles exhibit potent antibacterial activity, suggesting they might be developed into a novel class of anti-bacterial medicines for the treatment of bacterial infections.

Keywords: *Lablab purpureus*, nanoparticles, green synthesis, antibacterial, disk diffusion

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-14

The Effects of Emulsified and Non-Emulsified Palm Tocotrienol in Managing Osteoarthritis in Ovariectomised Rats

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Background: Previous studies have demonstrated that palm tocotrienol could prevent osteoarthritis (OA) in male rats but its efficacy in female rats with oestrogen deficiency has not been established. Tocotrienol also have low bioavailability, which can be improved with self-emulsifying system.

Objective: This study aims to compare the effects between self-emulsified palm tocotrienol (EPT; 25% purity) and non-emulsified palm tocotrienol (NEPT; 50% purity) in ovariectomized rats with OA.

Methodology: Three-month-old female were ovariectomised and supplemented with refined olive oil, calcium carbonate (1% w/v in drinking water) plus glucosamine sulphate (250 mg/kg/day), EPT or NEPT (100 mg/kg/day). One month after supplementation, the rats received an intra-articular injection of monosodium iodoacetate (MIA) (3 mg in 50 µl normal saline) and resumed supplementation for another month. Joint width and grip strength of the rats were measured before the MIA injection and weekly after that. Joint structural changes and circulating tocotrienol level were measured at the end of the study.

Results: Circulating total tocotrienol level was similar between EPT and NEPT groups. EPT prevented the increase in joint width (week 2-4 $p<0.05$ vs week 1 post induction) and reduction in grip strength (week 4 post induction vs OA control) caused by MIA. EPT and NEPT reduced the Mankin's scores of joint histological changes except for matrix staining ($p<0.05$ vs OA control).

Conclusion: Palm tocotrienol attenuated MIA-induced OA changes in ovariectomised rats. The protective effects of EPT are better despites containing half the concentration of tocotrienol of NEPT.

Keywords: cartilage, joint, menopause, vitamin E

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-16

The Calcium Entry Blocking Effect of merunggai (*Moringa oleifera*)

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Background: *Moringa oleifera* is a herb that has drawn commercial interest in lowering blood pressure. The anti-hypertensive effect of *M. oleifera* has been reported. However, studies on the mechanism of action on how the blood lowering effect is achieved has not been fully explored.

Objective: This study aimed to investigate the calcium channel blocking activity of *M. oleifera* leaf extracts (*MOL*) and its marker compounds *in vitro* and investigate the possible synergistic effects of *MOL* and its marker compounds when used together with amlodipine.

Methodology: Microfluorometry was used to measure the Ca^{2+}-indicator dye quin2 in primary culture of HAoSMCs treated with *MOL* and marker compounds in 4 different situations A) in normal physiological saline solution (PSS) containing 1.0 mM Ca^{2+} and 5 mM K^{+}, B) in Ca^{2+}-free PSS with 2 mM EGTA C) caffeine-induced and D) K^{+} depolarization.

Results: The results showed that the test compounds significantly decreased the concentration of cytosolic free Ca^{2+} in the absence of extracellular Ca^{2+}. The test compounds significantly affected the intracellular Ca^{2+} metabolism, regulated by the caffeine-sensitive storage site in HAoSMCs. Finally, the test samples significantly reduced the cytosolic Ca^{2+} increased by K^{+}-depolarization. When the test samples were used in combination with amlodipine it does not show any synergistic effect in decreasing cytosolic Ca^{2+} level.

Conclusion: This finding implicates that *M. oleifera* leaf extract serve as a potential adjuvant to anti-hypertensive agents. And there is a possibility of drug-herb interaction between *MOL* extract and amlodipine when used together.

Keywords: antihypertensive drugs, calcium channel blocker activity, *Moringa oleifera*, drug-herb interactions

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-17

Dermal Penetration Efficacy of a Lipophilic Active Compound Incorporated in Lanette N Based Formulations

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Background: The anionic emulsifier Lanette N, which is composed of cetearylalcohol and sodium cetearylsulfate, is widely utilized in topically applied oil-in-water (o/w) emulsions due to its ability to increase the consistency and long-term stability of formulations [1]. Limited data are available on the influence of anionic emulsifiers on the dermal penetration efficacy of a lipophilic active ingredient (AI).

Objective: This study investigates the dermal penetration of the lipophilic Nile Red (NR) incorporated in different Lanette N-based formulations.

Methodology: The Lanette N-based formulations (10% *(w/w)*) were prepared by mixing Lanette N with water or oil (i.e., Miglyol), followed by adding NR. The dermal penetration efficacy was determined using the ex vivo porcine ear model with subsequent digital image analysis to assess the relative amount of penetrated NR (AP, %) and the relative mean penetration depth (MPD, %) [2].

Results: The water-based Lanette N formulation led to an increased penetration of NR (i.e., 3-fold higher AP values and 1.5-fold higher MPD values) **(Fig. 1)** in comparison to the oil-based Lanette N formulation. Results substantiate the micellar assisted penetration theory which indicate that emulsifiers can induce the dermal penetration of a lipophilic AI by encapsulating the AI into o/w micelles [3, 4]. Opposite effects are observed for the oil-based Lanette N formulation, where o/w micelles were not formed and the penetration was hampered.

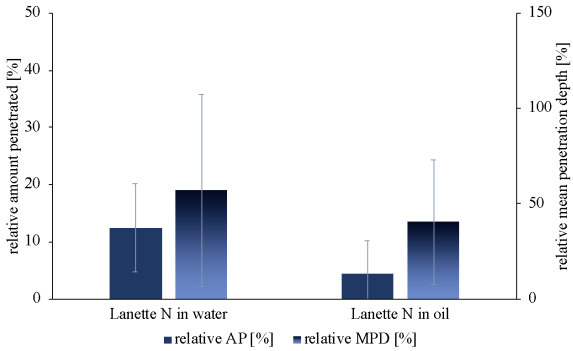

Figure 1: Dermal penetration efficacy of a lipophilic AI (i.e., NR) incorporated in water- or oil-based Lanette N formulations.

Conclusion: The micellar assisted penetration mechanism opens a new venue to improve the skin penetration of topically applied lipophilic AI and can be the base for tailor-made dermal formulations.

Keywords: dermal penetration, ex-vivo porcine ear model, Lanette N, micellar-assisted penetration

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-19

Antihypertensive Effect of *Moringa oleifera* Lam. Extract on Angiotensin Receptor Blocking Activity

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Background: The prevalence of hypertension in Malaysia has plateau since 2019 with 30% of the population developing hypertension and among that percentage, only half of them are aware of the disease and while 90% of that half are taking medication, only 45% of them have controlled blood pressure. Hence, multimodal treatment interventions with medicine, supplements as well as lifestyle changes are essential in managing hypertension. *Moringa oleifera* Lam. is a traditional herbal plant that has been known for its multiple medicinal properties, industrial applications as well as a nutritional source especially among the rural populations since immemorial times. Extensive studies have been conducted to determine the antihypertensive activity of *M. oleifera* but there is still lacking in evidence regarding its activity in relation to angiotensin receptors.

Objective: This study aims to isolate and characterize the bioactive compounds from *M. oleifera* leaves which demonstrates antihypertensive activity through blockage of angiotensin receptor 1 (AT1R) in addition to examining the underlying mechanisms.

Methodology: Angiotensin II Receptor blocking assay using Human Aortic Smooth Muscle cells is conducted to direct the fractionation of 80% ethanolic crude extract of *M. oleifera.* The pure compounds in the final fraction with highest receptor blocking activity are identified with NMR and MS.

Expected Results: Isolate and identify the pure compounds of *M. oleifera* leaves which demonstrates blocking activity of angiotensin II receptors.

Conclusion: This study prospect is to isolate bioactive compounds from *M. oleifera* leaves which lowers blood pressure through blocking of AT1R especially during pre-hypertension stage and provide an alternative choice of herbal supplements for the population.

Keywords: traditional plant, *Moringa oleifera*, blood pressure, hypertension, angiotensin II receptor

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-20

Preliminary Studies on Phytochemistry and Cytotoxic Activity of *Ficus grossularioides*

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Background: Comprising of more than 800 species, *Ficus* species is one of the largest genera of angiosperms found in the tropics and subtropics worldwide. *F. grossularioides* or commonly known as the white-leafed fig or *ara putih* is prominent among the *Ficus* species in the mulberry family, Moraceae other than *F. aurantiaca*, *F. carica*, *F. deltoidea* and many more.

Objective: The study targets to preliminarily determine the presence of phytochemical compounds in the ethanolic extract of leaves, stems and barks of *F. grossularioides var. grossularioides* using various chemical testing and chromatographic techniques. Also, it aims to evaluate the cytotoxicity of the extracts *in vitro*.

Methodology: Fresh leaves, stems and barks of *F. grossularioides* var. *grossularioides* were air-dried and ground into tea powder form. It was separately macerated with 80% ethanol for nine days and was evaporated under reduced pressure and freeze-dried to obtain its respective crude extracts. It was further fractionated, respectively using hexane, ethyl acetate and acetone prior to isolation of phytocompounds. The crude extracts were also tested for phytochemistry study as well as cell viability assay on RBL-2H3 cell line.

Results: Phytochemical screening of *F. grossularioides* var. *grossularioides* showed the presence of flavonoids, phenolics, steroid and triterpenes. This was supported when the extracts were subjected to thin layer chromatography (TLC) fingerprinting using selected mobile phase. The safe dose of the extracts was found to be 250 µg/mL as it demonstrated more than 90% cell viability.

Conclusion: From these findings, thorough investigation could be further executed such as characterization and quantification of bioactive phytocompounds of *F. grossularioides* var. *grossularioides* to distinguish its potential in combatting allergic diseases.

Keywords: *Ficus grossularioides*, *Moraceae,* phytochemistry, cytotoxicity, RBL-2H3 cell line

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-21

Comparing the Skeletal Effects between Emulsified and Non-Emulsified Palm Tocotrienol in Ovariectomized Rats with Osteoporosis and Osteoarthritis

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Background: Postmenopausal women are vulnerable to osteoporosis and osteoarthritis due to oestrogen deficiency. Palm tocotrienol has been shown to prevent both conditions but it has a low bioavailability. A self-emulsifying agent may enhance the oral bioavailability of palm tocotrienol but the effects on the skeleton are uncertain.

Objective: This study aims to compare the skeletal protecting effects of emulsified (EPT; 25% tocotrienol content) and non-emulsified palm tocotrienol (NEPT; 50% tocotrienol content) in ovariectomised rats with osteoporosis and osteoarthritis.

Methodology: Female Sprague-Dawley (n=36, 3-month-old) were ovariectomized and supplemented with refined olive oil (vehicle), EPT (100 mg/kg/day), NEPT (100 mg/kg/day), calcium (1% in drinking water) and glucosamine (250 mg/kg/day). The sham group underwent similar surgical stress and was fed with refined olive oil. Six weeks before sacrifice, osteoarthritis was induced with monosodium iodoacetate. Monthly whole-body bone mineral content (BMC) and density (BMD) were determined. Circulating tocotrienol concentration and bone histomorphometry were measured after sacrifice.

Results: Ovariectomy blunted the time-dependent increase in BMD, but EPT and NEPT sustained the increase ($p<0.05$ vs previous time points). EPT and NEPT improved bone volume in ovariectomized rats ($p<0.05$ vs negative control). Only EPT increased calcein-double labelled surface in ovariectomised rats ($p<0.05$ vs negative control). EPT and NEPT also preserved cartilage integrity in rats with

osteoarthritis.

Conclusion: EPT can achieve the same efficacy as NEPT in preventing osteoporosis of ovariectomized rats despite containing half of the concentration of tocotrienol. The emulsification system helps to promote the skeletal-enhancing of tocotrienol with a lesser amount of the substance.

Keywords: bone, castration, oestrogen, menopause, vitamin E

Pharmaceutics, Pharmaceutical Chemistry & Natural Product (PC)
PC-P-22

Phytochemical Screening and Cytotoxicity Assessment from *Anaxagorea Javanica* Blume: A Preliminary Study

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Background: *Anaxagorea Javanica* Blume is a species of the soursop family (Annonaceae) and is commonly known as "twin seed" because of the presence of two seeds in each fruitlet. Given the diverse range of phytochemicals present in *Anaxagorea Javanica* Blume, the plant has potential as a source for developing novel therapeutic agents for allergic diseases.

Objective: The objective of this study is to perform a preliminary phytochemical screening on the crude extracts of *A. Javanica* Blume using thin layer chromatography (TLC). Additionally, the study aims to evaluate the preliminary cytotoxicity of the crude extract using the MTT assay.

Methodology: *A. Javanica* Blume was extracted with 80% ethanol to obtain its leaves, barks, and stems crude extracts. These crude extracts were subjected to preliminary phytochemical screening using thin-layer chromatography (TLC). A cell viability assay using MTT was conducted on RBL-2H3 cells treated with different concentrations of the crude extracts ranging from 7.81, 15.28, 31.25, 62.5, 125 and 250 µg/mL to assess their safe dose. The negative control showed 100% cell viability.

Results: The preliminary thin layer chromatography (TLC) analysis showed the presence of various chemical compounds such as alkaloids, flavonoids, and phenolic compounds in the hexane, ethyl acetate, and acetone fractions of the leaves, barks, and stems of *A.Javanica* Blume. The preliminary cell viability assay suggests that these crude extracts may have the potential to act as anti-allergic agents.

Conclusion: Further studies are needed to isolate and identify bioactive compounds presents in *Anaxagorea Javanica* Blume and to assess their therapeutic potential for treating allergic disorders.

Keywords: *Anaxagorea Javanica* Blume, phytochemical screening, thin layer chromatography (TLC), cell viability assay (MTT), RBL-2H3

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-P-2

Effects of Annatto Tocotrienol with a Self-Emulsifying Drug Delivery System on Lumbar Microstructure and Biomechanical Strength in a Rat Model of Postmenopausal Osteoporosis

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Background: Annatto-derived tocotrienol (AnTT), a form of vitamin E has shown potential in preventing bone loss in postmenopausal osteoporosis animal models, but its low oral bioavailability may limit its use. A self-emulsifying drug delivery system (SEDDS) could improve tocotrienol oral bioavailability. This system may enhance tocotrienol's skeletal effects, however, the evidence is scarce. Region-dependent lumbar bone loss, therefore, has not been well investigated.

Objective: This study aims to evaluate the skeletal therapeutic effects of AnTT formulated with SEDDS on lumbar in a rat model of postmenopausal bone loss.

Methodology: Age-matched female Sprague-Dawley rats (10 months old; n=30) were randomly divided into five experimental groups. Four groups underwent bilateral ovariectomy to induce estrogen deficiency. The sham-operated (SO) served as a normal group that underwent similar surgery procedures, but their ovaries were retained. Two months after surgery, SO and ovariectomized (OVX) groups were given daily oral gavage of base SEDDS. The other groups of OVX received AnTT (60 mg/kg b.w.) without SEDDS, AnTT (60 mg/kg b.w.) formulated with SEDDS, and raloxifene (1 mg/kg b.w.) daily orally. The rats were euthanized after the two-month treatment. The lumbar was harvested for bone microstructure and biomechanical strength analysis.

Results: Treatment with unformulated and formulated AnTT-SEDDS improved the trabecular thickness and load parameters ($p<0.05$). Only SEDDS significantly increased the stiffness of bone strength ($p<0.05$). The improvement caused by AnTT was comparable to raloxifene.

Conclusion: Annatto tocotrienol formulated with SEDDS exerts skeletal therapeutic effects on the lumbar region in a rat model of postmenopausal bone loss.

Keywords: estrogen, osteoporosis, lumbar, vitamin E, tocotrienol

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-P-3

Effects of 5-HT3R Antagonists and 6-Gingerol-Standardised *Zingiber officinale* Extract on Chronic Nicotine Addiction in Mice

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Background: Genetic studies have shown the association of serotonin subtype-3 receptor (5-HT3R) variants with nicotine-induced effects. Our previous work demonstrated that 5-HT3R antagonists; palonosetron and 6-gingerol (a bioactive compound in ginger) reduced sub-chronic nicotine addiction in mice. It is useful to further evaluate the effects on chronic nicotine addiction which may represent the condition of heavy smokers in the existing population.

Objective: To study the effects of palonosetron, 6-gingerol and 6-gingerol-standardised ginger extracts on chronic nicotine addiction in mice.

Methodology: Quantification of 6-gingerol concentration in 95%-EtOH hydroponic ginger extract was performed by HPLC. Mice (N=64) were divided into 8 groups: saline (healthy control), nicotine (negative control), bupropion (1 mg/kg), palonosetron (10 mg/kg), 6-gingerol (70 mg/kg) and 6-gingerol-standardised ginger extracts (70 mg/kg, 100mg/kg, 130 mg/kg). Chronic nicotine addiction was induced with 1 mg/kg nicotine (s.c.) for 28 days; addicted mice were subjected to further drug/extract treatment. Nicotine preference was observed using the Conditioned Place Preference (CPP) test and scored to evaluate changes in nicotine preference.

Results: Mice developed significantly higher CPP score after the prolonged nicotine treatment. Reduced trends of nicotine preference were seen in mice groups treated with bupropion, 6-gingerol and ginger extracts; these were statistically significant with 70 mg/kg 6-gingerol and 100 mg/kg 6-gingerol-standardised ginger extract.

Conclusion: 6-gingerol may have good potential to alleviate nicotine addiction symptoms. However, in extract form, this effect may be complicated by the concurrent presence of other bioactive compounds. Further studies should be

carried out to elucidate the molecular mechanism underlying observations seen in the addiction behavioural studies.

Keywords: nicotine, *Zingiber officinale*, palonosetron, HPLC, conditioned place preference

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-P-4

Inhibition Mechanism of Silver Nanoparticles-Kaempferol against Methicillin-resistant *Staphylococcus aureus*

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Background: Methicillin-resistant *Staphylococcus aureus* (MRSA), a multidrug resistant strain, is known to cause a threat to public health due to its limited therapeutic treatment. Kaempferol (K) is a natural flavonoid that shows antibacterial activities toward MRSA, but its effectiveness is limited due to its low water solubility. However, poorly aqueous soluble drugs displayed better solubility through nano formulation. Hence, kaempferols were incorporated with silver nanoparticles (AgNPs) to enhance their solubility and antibacterial activity.

Objective: To unravel the mechanism of inhibition action of silver nanoparticles-kaempferol (AgNPs-K) on treated MRSA.

Methodology: Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) have been done to determine the lowest concentration of AgNPs-K to inhibit or kill the MRSA. Time-kill assay has been done to determine the rate of kill and effectiveness of AgNPs-K against MRSA. Scanning electron microscopy (SEM) has been done to observe and compare the morphological changes of treated and non-treated MRSA.

Results: The MIC and MBC values of AgNPs-K against MRSA ranged from 1.25 mg/mL-2.5 mg/mL. During time-kill assay, at 8 hours, AgNPs-K exhibited bacteriostatic effect, reducing the starting $\log_{10}$ colony-forming unit (CFU) growth by less than 3 logs. The SEM result showed significant difference in morphology between treated and non-treated MRSA. Non-treated MRSA has an oval shape while MRSA treated with AgNPs-K showed a disrupted cell wall with contents leakage.

Conclusion: AgNPs-K exhibit better solubility and bacterial activities against MRSA, thus can be suggested as potential alternative for MRSA infection.

Keywords: Methicillin-resistant S*taphylococcus aureus,* kaempferol, silver nanoparticles

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-P-5

Evaluation of Malaysian *Channa striatus* Water Extract Containing Arachidonic Acid as Wound Healing Potential on Human Foetal Lung Cell (IMR-90)

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Background: *Channa striatus* (*haruan*) is a traditionally used remedy in Malaysia for healing wounds and reducing pain.

Objective: The efficacy of *C. striatus* water extract (CSWE) was carried out to investigate its wound healing potentials and identify the essential compounds that facilitate the growth of fibroblast cells.

Methodology: Freshly obtained *C. striatus* samples were carefully deboned to retain the maximum amount of fish fillet. Following the aqueous extraction method to obtain the CSWE, the physicochemical properties of the CSWE were carried out, including pH level, rheological properties, moisture content, amino acid composition and essential arachidonic acid compound.

Results: The effective concentration (EC_{50}) of the sample was also performed using conventional 2-D cell culture system on ordinary human fibroblast cells (IMR-90) over a three-day incubation period. Based on the results, the pH of CSWE was 6.34 $\pm$ 0.01, which was near the neutral pH with high moisture content (97.3 $\pm$ 0.01%). The analysis also indicated that the CSWE exhibited a Newtonian fluid behaviour with a viscosity value of 1.50 $\pm$ 0.31 mPa.s. The CSWE was found to contain the essential amino acid glycine and the fatty acid arachidonic acid, which is known to aid the wound healing process despite their relatively low concentrations. As a result, the low concentration of glycine and arachidonic acid in the CSWE showed no positive growth of the normal IMR-90 cells ($p > 0.05$) as compared to the sample without treatment (control).

Conclusion: Therefore, the EC_{50} values of the 2-D cell culture system on the CSWE were imperatively invalid and undetermined due to the over diluted extract of

high fish weight-to-solvent ratio. Nevertheless, the IMR-90 cell growth rate was consistent under different CSWE concentrations with the absence of mortality throughout the three-day incubation period. However, the IMR-90 cells depicted insignificant growth profiles even though the presence of arachidonic acid and glycine was detected and used at an extremely low concentration during each cell treatment.

Keywords: aqueous extraction, *Channa striatus*, IMR-90 cell, physicochemical characteristics, wound healing

Pharmacology, Biopharmaceutical Sciences and Pharmaceutical Biotechnology (BB)
BB-P-7

Elucidation of Neuroprotective effects of *Phyllanthus amarus* in Neurodegenerative Animal Model

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Background: The efficacy of *Phyllanthus amarus* (*P. amarus*) in neuroprotection against neuroinflammation is increasingly evident. However, it is still unknown as to whether *P. amarus* also ameliorates neurodegeneration leading to protection against neurodegenerative diseases, for example Alzheimer's disease.

Objective: The aim was to evaluate the effects of standardized extract of *P. amarus* in preventing aluminium-induced memory deficits by observing the behavioural performance of Wistar rats in cognitive performance tasks.

Methodology: Rats were pre-treated orally with *P. amarus* extract (100 and 200 mg/kg b.wt) for 8 weeks. Aluminium (100 mg/kg b.wt) were given orally for 6 weeks to induce neurodegeneration. N-acetyl-cysteine (150 mg/kg b.wt) was used as a positive control and the control rats were given 5% v/v Tween 20. The memory impairment in all the groups were evaluated via behavioural tasks using Novel Object Recognition (NOR) and Y-maze task. Data obtained were analyzed with one-way ANOVA followed by post hoc Dunnett's test.

Results: *P. amarus* extract administered at 200 mg/kg b.wt significantly ($p<0.05$) protected the rats from aluminium-induced memory impairment.

Conclusion: Since *P. amarus* exhibits a protective effect towards memory deficits caused by aluminium, it is potentially can prevent neuroinflammation and progression of neurodegenerative disorders.

Keywords: *Phyllanthus amarus,* aluminium, neurodegeneration, memory impairment, neuroprotection