



16th INTERNATIONAL RESEARCH CONFERENCE

**ACHIEVING RESILIENCE THROUGH DIGITALIZATION, SUSTAINABILITY AND
SECTORAL TRANSFORMATION**

ALLIED HEALTH SCIENCES

ABSTRACTS



**General Sir John Kotelawala Defence University
Ratmalana, Sri Lanka.**

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ORAL PRESENTATIONS

***In-vitro* Antibacterial Activity of *Punica granatum* Bark used as Ayurvedic Medicine in Sri Lanka**

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Abstract

The *Punica granatum* (Delum), which is utilized in Ayurvedic medicine, is one such widely used medicinal plant. Several parts of this plant have been used to treat several illnesses and Delum bark has been shown to contain several bioactive compounds like flavonoids and tannins. Also, its therapeutic potential for antibacterial effect has not been extensively investigated in Sri Lanka. The objective of this study was to determine the antibacterial activity of the aqueous extract of the bark of *Punica granatum* which was safe and non-toxic for skin against *Staphylococcus aureus* and *Pseudomonas aeruginosa* in vitro which were common causes of skin infections. The decoction method was used which can effectively extract water-soluble active compounds. The antibacterial activity of the aqueous extract against *Staphylococcus aureus* (ATCC 25923) and *Pseudomonas aeruginosa* (ATCC 27853) was tested using the agar well diffusion and broth macrodilution methods according to the CLSI guidelines which facilitate comparative analysis. Both assays were triplicated. Results revealed that the mean highest zone of inhibition for 200mg/ml was observed in *Staphylococcus aureus* (22.33 ± 0.58 mm) and *Pseudomonas aeruginosa* (17.62 ± 0.58 mm). Minimum inhibitory concentrations were obtained in *Staphylococcus aureus* (133.33 ± 57.74 mg/ml) and *Pseudomonas aeruginosa* (166.67 ± 57.74 mg/ml) after overnight incubation. Gentamicin (10 µg/ml) was used as the positive control for both bacteria. This study concludes that aqueous extracts of *Punica granatum* bark possess antibacterial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa* and suggests that Delum bark could be utilized to treat and develop novel antibacterial formulations against *Staphylococcus aureus* and *Pseudomonas aeruginosa* associated skin infections.

Keywords: *Aqueous extract, Punica granatum, Bark, Antibacterial activity, Skin infections*

***In-vitro* Antimicrobial Properties of Plant Mixture against Common Microbial Strains Causing Urinary Tract Infections and Cytotoxicity Determination using Brine Shrimp Lethality Assay**

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Abstract

In recent years antibiotic resistance has emerged as a global health concern. Ayurvedic and traditional medicine use plant based medications to treat Urinary Tract Infections (UTIs). Aim of the study to detect the antibacterial activity of a medicinal plant mixture against uropathogenic *Escherichia coli* (*E. coli*), *Pseudomonas aeruginosa* and determine the cytotoxicity using Brine Shrimp Lethality Assay (BSLA). Plant mixture was tested using agar well diffusion and MIC to determine the antibacterial activity of the methanolic extract of the plant mixture against *E. coli* (ATCC 25922), *P. aeruginosa* (ATCC 27853) and their UTI-positive strains extracted from positive culture plates. Results were compared with Gentamycin and 50% DMSO. Plants used for the mixture were *Phyllanthus emblica* fruit, *Ocimum tenuiflorum* whole plant, *Terminalia chebula* fruit, *Zingiber officinale* rhizome, *Tribulus terrestris* root, *Asparagus falcatus* root, *Boerhavia diffusa* root, *Tragia involucrata* root and *Aerva lanata* whole plant according to a ratio of 1:1:4:1:4:4:2:2:3 respectively. Selected nine plants were tested for their antimicrobial activity separately before making the plant mixture. Plant mixture prepared based on the antimicrobial activity against selected bacterial pathogens. The plant mixture showed the mean ZOI *P. aeruginosa* (ATCC 27853) > *P. aeruginosa* UTI positive strain > *E. coli* (ATCC 25922) > *E. coli* UTI positive strain. According to BSLA LC50 was calculated using GraphPad software and compared with or toxicity scale (LC50 < 1,000 µg/ml=toxic). The resulting LC50 was 8.69 µg/ml. In conclusion, the plant mixture had the highest antimicrobial activity against *P. aeruginosa* (ATCC 27853) with 35 mm inhibition zone and 0.0015 mg/ml MIC value. According to the results of BSLA, plant mixture is toxic so needs future toxicity studies. The present study needs future validation, and this study would pave the way for new plant-based treatment options and drug development.

Keywords: *Antimicrobial, Brine shrimp lethality assay, Urinary tract infections*

Antimicrobial Activity of *Flueggea leucopyrus* Willd (Katupila) Leaf Extracts against Some Common Milk Pathogens

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Abstract

Flueggea leucopyrus Willd is a natural herbal plant native to Sri Lanka with great ayurvedic therapeutic potential, and this study assessed the antimicrobial activity of methanolic extracts of *F. leucopyrus* Willd against some common milk pathogens including *S. aureus* (ATCC 25923), *P. aeruginosa* (ATCC 27853), *Salmonella* spp., and *E. coli* (ATCC 25922). Agar well diffusion assay was implemented for the assessment of in-vitro antibacterial potency. The Minimal Inhibitory Concentration (MIC) was determined using the agar broth macro dilution technique as well as Minimal Bactericidal Concentration (MBC) was also performed. The 400 mg/ml extract showed the highest antibacterial activity against *S. aureus* with a zone of inhibition (ZOI) of 28.0 ± 1.0 mm ($p > 0.05$) without significantly altering from the positive control, gentamicin (28.3 ± 0.6 mm). A ZOI of 27.0 ± 1.0 mm, which was higher than that of the positive control (26.7 ± 0.6 mm) was exhibited against *E. coli* at a concentration of 400 mg/ml, did not differ significantly ($p > 0.05$) from the control. Inhibition zones were also observed for concentration of 200, 100, 50, and 25 mg/ml against *S. aureus* and *E. coli*, but significantly lower ($p < 0.0001$) compared to controls. Only the 400 mg/ml extract inhibited the growth of *Salmonella* spp. ZOIs were also observed against *P. aeruginosa* with the concentration of 400, 200, and 100 mg/ml but comparatively low. The mean MBC values ranged from 16.7 mg/ml to 400 mg/ml, with values against *S. aureus*, *P. aeruginosa*, *Salmonella* spp., and *E. coli* were 16.7 ± 7.2 mg/ml, 66.7 ± 28.9 mg/ml, 400 ± 0.0 mg/ml, and 20.8 ± 7.2 mg/ml, respectively. These preliminary observations demonstrate the effective antimicrobial activity of Katupila as a natural antibacterial agent for milk and milk products and suggest the prospect of using them in drugs to treat infectious illnesses caused by the tested microorganisms.

Keywords: *Antimicrobial activity, Flueggea leucopyrus willd, Common milk pathogens*

A Preliminary Study to Detect the Presence of Bacteria in Lumbar Disc Herniation

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Abstract

Bacterial biofilm in lumbar discs worsens pain by attracting inflammatory cells. Study aims to detect bacteria in herniated discs of patients undergoing lumbar microdiscectomy. Discs (n=23) were collected, into cooked meat media, and brain heart infusion broth for anaerobic and aerobic bacterial isolation respectively. Other portion of the disc was sonicated using a stomacher machineto dislodge the existing biofilm structure and incubated under anaerobic conditions. To rule out contamination skin scrapings and muscle biopsies of the respective patient were processed. Aerotolerance test was performed for positive anaerobic culture. Aerobic subculture was performed in primary culture plates. Gram stain was used to screen, and biochemical identification tests were used for presumptive identification. Mean age was 44.17 ± 16.63 years where 65.22% were males. All were immunocompetent and had not undergone epidural steroid injections or corticosteroids. Among the positive microbial cultures (n=14), 11 were anaerobic (01 strict anaerobe and 10 facultative anaerobes) with few showing polymicrobial growth(two different species). Two discs produced growth in both aerobic and anaerobic cultures whereas one disc was positive for aerobic culture only. The aerobic cultures were identified as *Acinetobacter spp*, Coagulase negative *Staphylococcus spp.* and *Corynebacterium spp.* Among the anaerobic positive cultures five contamination markers showed positive growth , but similar colony morphology generated in disc was not observed. Nine discs had no growth. Culture methods confirm the presence of bacteria in the excised disc. Higher resolution methods will enhance identification of specific bacterial species.

Keywords: *Disc herniation, Bacterial culture*

Determination of Glycemic Index, Antidiabetic and Antioxidant Activities of Palmyra/*Borassus flabellifer* Treacle

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Abstract

B. flabellifer treacle is a well-known local traditional sweetener. This study was performed to determine the glycaemic-index (GI), antidiabetic, and antioxidant activities of methanolic(ME) and aqueous extract(AE) of *B. flabellifer* treacle. Healthy undergraduates of KAATSU University were selected as subjects(n=30). The food containing 50g of carbohydrates was consumed by fasted volunteers. Capillary blood was taken at fasting, 15,30,45,60, and 120 min after the meal. The GI was calculated by dividing the incremental area under the curve for the treacle by the glucose and multiplying by 100. To determine the antidiabetic properties, glucose absorption by yeast cells (GAYC), and glucose adsorption capacity (GAC) assays were performed, and Metformin served as the standard. Ferric- Reducing Antioxidant Power (FRAP) assay and H₂O₂ scavenging were performed to determine the antioxidant activity, and ascorbic acid served as the standard. Absorbance was measured, and IC₅₀ values were calculated. GI of the treacle was 61.72 ± 17.44, and the glycemic load was 42.03. In GAYC, it showed IC₅₀=0.4609 g mL⁻¹ and IC₅₀=0.2119 g mL⁻¹ for AE and ME respectively, compared to metformin IC₅₀=0.0819 g mL⁻¹. AE and ME adsorbed 74.44%, and 71.60% of, 100M glucose. In H₂O₂ scavenging, AE and ME showed IC₅₀=0.1204 g mL⁻¹ and IC₅₀=0.3559 g mL⁻¹ respectively, compared to ascorbic acid IC₅₀=4.421 g mL⁻¹. In the FRAP assay, AE and ME showed IC₅₀=0.02783 g mL⁻¹, and IC₅₀=0.02716 g mL⁻¹ respectively, compared to ascorbic acid IC₅₀=0.02971 g mL⁻¹. The study revealed that *B. flabellifer* treacle should be classified as medium GI food, with high antidiabetic and antioxidant activities. Further studies are recommended to study the adaptability of treacle for the diet of diabetic subjects, and subjects at risk.

Keywords: Antidiabetic, *Borassus flabellifer* treacle, Glycemic index

Variation of Biochemical Parameters in Covid-19 Patients Admitted to Colombo South Teaching Hospital, Sri Lanka

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Abstract

Little information is available on the effect of COVID-19 infection on biochemistry of Sri Lankan patients. Owing to this lack of information, prognosis on development of complications were difficult to predict. Hence, this study aimed to investigate the variations of biochemical parameters of infected patients admitted at Colombo South Teaching Hospital from January 2020 to December 2021. This retrospective cross-sectional descriptive study used records of 203 COVID-19 patients, who had been treated for an average of 9 days. Information on age, length of stay, gender, symptoms, previous medical history, results of selected biochemical parameters and pharmacological interventions were collected from medical records. Laboratory tests records were collected which had been done with standard methods and quality controlled by EQA by MRI. The data was analyzed using the SPSS software (student t-test and Pearson correlations). Decreased serum sodium was reported in 150 patients on admission and average urea levels were significantly elevated ($p < 0.05$) from admission to discharge. Decline in eGFR levels ($69.5-93.9 \text{ mL/min/1.73 m}^2$) were observed in 34 out of 51 patients 5 to 7 days after admission. Elevated serum ferritin was observed in 31 out of 35 on admission and elevated ALT values were observed in 51 out of 90 patients on discharge. High AST levels were reported on admission in 71 out of 164 patients. Comparing results with other countries it has been reported decreased sodium levels elevated serum urea, AST, ALT and GGT and serum creatinine levels in patients. Owing to the results, it was concluded that COVID-19 could induce liver and kidney involvements.

Keywords: *COVID-19, SARS-CoV-2, Serum sodium, Ferritin*

Green Synthesis of Silver Nanoparticles using Silk-banana-peel Extract and their Antimicrobial Activity

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Abstract

The peels of bananas act as an ideal reducing and stabilizing agent due to the presence of secondary metabolites and biopolymers. The green synthesis of silver nanoparticles (AgNPs) using common agriculture waste biomass is a cost-effective, non-toxic and environmentally friendly approach. The aim of this study was to investigate the in-vitro antimicrobial activity of the biosynthesized AgNPs from Silk-banana (Kolikuttu) peel. Aqueous extract of banana peel was obtained by wet maceration. AgNPs were synthesized by adding 1mM AgNO₃ into fresh banana peel extract (BPE) while stirring at 60°C and characterized by Scanning Electron Microscopy (SEM) and UV-Visible Spectroscopy. BPE mediated conversion of silver ions into AgNPs was observed within 30 minutes as indicated by the appearance of reddish-brown colour in the solution. The UV-Visible spectrum of AgNPs revealed a characteristic Surface Plasmon Resonance (SPR) peak at 480 nm and SEM showed spherical-shaped nanoparticles. The antimicrobial activity of AgNPs was investigated using the well-diffusion method on *Pseudomonas aeruginosa* (ATCC 27853) and *Staphylococcus aureus* (ATCC 25923) at 37°C in duplicates. Results were observed after incubating for 24 hours. Vancomycin (0.1 mg/ml) and gentamicin (0.1 mg/ml) were used as positive controls. Green synthesized AgNPs displayed in-vitro antimicrobial activity against *P. aeruginosa*, (12.0 mm ± 2) and *S. aureus* (8.5 mm ± 0.5). BPE itself did not show any antimicrobial activity. AgNPs having antimicrobial properties against *Pseudomonas aeruginosa* and *Staphylococcus aureus* can be synthesized successfully using agricultural waste such as silk banana peel. Further studies are required to utilize these novel AgNPs as a potential antimicrobial agent.

Keywords: *Banana peel extract, Silver nanoparticles, Antimicrobial activity*

Comparison of Estimated – Glomerular Filtration Rates Given by Different Serum Creatinine Based Equations among Patients with Chronic Kidney Disease Attending the Teaching Hospital, Kurunegala, Sri Lanka

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Abstract

Chronic Kidney Disease (CKD) is a health issue affecting nearly 13.4% of the global population and also a major burden on the health sector of Sri Lanka. The investigation of the estimated Glomerular Filtration Rates (eGFR) plays a vital role in disease diagnosis, CKD stage determination and patient management. Various equations have been developed for GFR estimation, but the CKD stage of a patient may vary based on the equation used. Therefore, this study was focused on comparing and identifying variations among eGFR values calculated using six serum creatinine based equations. A cross sectional and analytical study was conducted using 205 CKD patients attending the Nephrology clinic, Teaching Hospital, Kurunegala. An additional blood volume was collected for serum creatinine testing, during routine blood collection and analysis were performed at a registered laboratory in Colombo. The eGFR was calculated for every patient using five equations: 4 - variable - MDRD, Cockcroft Gault (CG), CKD - EPI, Full Age Spectrum (FAS) and Mayo Clinic Quadratic (MCQ). Berlin Initiative Study-1 (BIS-1) equation was additionally used for patients of age ≥ 70 years. Accordingly, the equations; CKD - EPI, FAS and MCQ showed statistically significant mean differences with the routinely used MDRD equation while it was not so between MDRD and CG equations. In patients of age ≥ 70 , BIS - 1, CKD - EPI and CG equations showed significant mean differences with the MDRD equation, but it was not so in FAS and MCQ equations. Repeated measures ANOVA revealed that the GFR values of the same patient varied significantly ($p < 0.001$) among the five equations considered. This study provides evidence for deviations among equations in eGFR estimation and CKD stage determination. Therefore, it can be concluded that there is a necessity of modifying and adapting eGFR equations to suit our population.

Keywords: *Chronic Kidney Disease, eGFR, CG*

The Barriers to Continuing Higher Education among Nurses: Observations of a Preliminary Study among Registered Nurses Working in a Tertiary Care Hospital

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Abstract

It is critical for nurses to advance their basic education to higher levels to foster professional growth, yet the trend of continuing advanced nursing education is stagnant in Sri Lanka. The current factors influencing nurses not to continue higher education remain unclear, therefore as a preliminary approach, a descriptive cross-sectional study was conducted aiming to identify the barriers for Sri Lankan nurses for abandoning higher education. Randomly selected 327 registered nurses attached to the National Hospital Kandy were selected and with informed consent, personal, socio-cultural, and managerial factors affecting continuing higher education were gathered using a pre-tested self-administered questionnaire. Data analysis was done using SPSS software version 26 and the frequencies with percentages of such affecting factors were calculated. According to the results, 310 were female nurses (94.8%) and 17 (5.2%) were male nurses with the majority (n=223,68.8%) belonged to 31-40 years of age. Only 107 (32.7%) had bachelor's in nursing degree while the rest (n=211,64.5%) had Diploma in Nursing. Though 313 (95.7%) were aware that continuing higher education is essential to become competent, 229 (70%) expressed of job dissatisfaction and heavy workload (n=307,93.9%) as barriers for continuing higher education. About 197 (60.2%) were afraid of expenditures for higher education and 196 (60%) expressed that during academic work, they would not receive any peer support to manage patient care. Moreover, only 39 (12%) stated that they would be supported by the administrative staff to continue higher education. In general, nurses view that the load of responsibilities, lack of peer support and motivation by administrative staff as impediments to continue their further education, therefore addressing such barriers will be beneficial for stakeholders to take necessary actions to motivate nurses to engage in higher education thus improving the quality of nursing care.

Keywords: *Nurses, Higher education, Barriers, Impediments, Workload, Peer support*

Prospective Surveillance of Peripheral Intravenous Cannula Site Phlebitis among Patients Admitted to Medical and Surgical Wards at University Hospital Kotelawala Defence University, Sri Lanka

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Abstract

Phlebitis is a common complication associated with Peripheral Intravenous Catheters (PIVC) usage and may cause adverse outcomes to the patient. The current study was aimed to determine the PIVC site phlebitis incidence and associated factors contributing to the development of phlebitis. A hospital-based prospective observational study was conducted among patients admitted to medical and surgical wards of the University Hospital of Kotelawala Defence University in Sri Lanka for three months duration, by observing patients throughout the hospital stay using interviewer administered questionnaire. The presence and severity of phlebitis were identified by Jackson's Visual Infusion Phlebitis (VIP) standard Scoring System. Descriptive statistics were performed, and significant value <0.05 was considered as statistically significant. A total of 313 patients with 459 PIVCs were observed for 1890 cannulation days. The average patient age was 56.97 ± 19.907 and the population consisted of 54.3% ($n=170$) males. The incidence of phlebitis was n/N (45.97%) while the incident rate was 112 phlebitis incidences per 1000 PIVC days. Grade 1 and 2 phlebitis were noticed in 99/459 (21.56%) and 67/459 (14.59%), respectively. Developing phlebitis was significantly associated ($p < 0.05$) with female gender, unemployed workers, duration of hospital stays > 3 days, frequency of drug or fluid administration > 3 times/ day, size of the 1st cannula and cannula days $> 72-96$ hours. The incidence of phlebitis was significantly higher ($p < 0.05$) than the acceptable level set by the Infusion Nurses Society which is 5% or less. Appropriate interventions, infection control measures and avoiding modifiable risk factors such as inappropriate cannula size selection and longer cannula duration may lower the incidence of phlebitis.

Keywords: *Phlebitis, Peripheral intravenous catheters, Incidence*

Nurses' Perceptions and Practices Regarding Cancer Pain Management in Apeksha Hospital, Maharagama

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Abstract

Cancer pain management has significant impact on cancer patients' journey through illness. Nurses at National Cancer Institute play an important role in managing cancer pain. Effective cancer pain management requires good perceptions and correct practices. Since it is important to examine nurses' perceptions, practices regarding pain management. A descriptive cross-sectional survey was conducted. Study population was nurses who are working with cancer patients in Apeksha Hospital Maharagama. Convenient sampling method was used to achieve the sample size of 200 participants. An interviewer-administered questionnaire embedded with a qualitative section with open-ended questions was used for data collection. Inferential statistical methods, thematic analysis was used to analyze quantitative and qualitative data respectively. Among the 200 respondents, 81% were between the age ranges of 25-35 years. Majority of the participants had overall nursing experience of 1-5 years (71.5%). Many participants rated the effectiveness of current pain management practices in their wards as 80-90. Majority (70.5%) appeared to attend pain management by experience without formal training. Most commonly used pain assessment tool was the Wong-Baker FACES Pain rating scale (86.5%). Combination of pharmacological, and non-pharmacological methods give the best outcomes. Patient Controlled Anesthesia machine was reported as the best pharmacological method. Lack of; knowledge, resources and up-to-date training as well as heavy workload, shortage of staff causes challenges in effective pain management. Delegating pain management tasks among trained nurses, developing 24-hour service, education and training opportunities, and recruiting at least one trained nurse for each ward is essential.

Keywords: *Cancer, Nurses, Pain Management*

Parental Knowledge, Attitudes, and Adherence to Preventive Practices of Bronchial Asthma in Children

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Abstract

Pediatric bronchial asthma burdens both families and the healthcare system due to frequent acute attacks requiring medication and hospital admissions. This study aimed to determine parental knowledge, attitudes, and adherence to preventive practices for bronchial asthma in children attending Lady Ridgeway Hospital (LRH) for Children, Colombo. A descriptive cross-sectional study with a qualitative component was conducted amongst parents of children under 12 years of age (n=172) who had been diagnosed with bronchial asthma. Data was collected through a validated interviewer-administered questionnaire, a validated observation checklist, and focus group discussions. The quantitative data was analyzed using SPSS version 25.0 and attitude component was analyzed using thematic analysis. Ethical approval was obtained. Parental knowledge of bronchial asthma (knowledge Scores; poor 0-4, moderate > 4-8, good > 8-12) was moderate (55.2%). Knowledge of emergency management at home was poor (41.3%) (poor 0-2, moderate > 8-16, good 16-23), knowledge of preventive practices for asthma was good (52.3%) (poor 0-2, moderate > 2-4, good > 4-5). Parental adherence to prescribed medication was poor (82%) (Poor <6, moderate 6-<8, highest 8). According to the observation checklist, parental competency in administering inhalers was inadequate (n=145), only (40.7%, n=59) were performed in all 12 steps. In qualitative component, parents showed positive attitudes toward using inhalers for managing bronchial asthma after identifying four themes; parental attitudes regarding the susceptibility of children to experience side effects, children's potential inhaler addiction, the effectiveness and efficacy of inhaler medication and the social stigma associated with using an inhaler. In conclusion, parents demonstrated good knowledge and positive attitudes toward asthma management. Their skills in the proper use of inhalers should be improved, and misconceptions regarding inhaler usage should be addressed.

Keywords: *Bronchial asthma, Parents, Knowledge, Attitudes, Practices*

Work-related Physical and Psychological Health Concerns of Nurses at University Hospital-Kotelawala Defence University, Werahera, Sri Lanka: A Descriptive, Mixed-method Study

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Abstract

Working environment of nurses may affect their Quality of Life (QoL), quality of patient care and job satisfaction. University Hospital-Kotelawala Defence University (UH-KDU) is a newly established hospital where most of the nursing staff are young and novice. This study aimed to find work-related contributors effecting the physical and psychological health, well-being and QoL of nurses at UH-KDU and to explore their suggestions to improve current working environment, general health and well-being. This was a descriptive, mixed-method study which consisted both quantitative and qualitative approaches. Questionnaire-based data was collected from a random sample of 162 nurses. Nine in-depth semi-structured interviews were conducted with a purposively selected group of nurses from the selected setting. Data gathered from the interviews were analyzed using thematic analysis. Majority of the nurses (76.6%) were in between age of 25 - 30 years (31.5% males; 68.5% females). Participants reported work-related physical and psychological conditions, including work-related stress (48.1%), gastritis (35.2%), back pain or muscle pain (20.4%) and frequently feeling fatigue at day time (25.9%). Forty-two percent reported that their work has negatively affected on their QoL while 44.4% reported poor work-life balance. The themes, 'Stress', 'Exhaustion' and 'Poor satisfaction' were emerged. The current work environment has negatively affected with their meal patterns, nutrition, rest and sleep times and overall psychological health. Participants suggested flexible work hours, adequate staff in a shift, adequate resting and treating with dignity at work to improve current work-related stress. Findings of the current study revealed need of work environment changes in terms of to reduce nurses' work-related stress and improve happiness at workplace. In order to feel good at the work place it is important to have adequate staff and enable more autonomy and job freedom among young nurses.

Keywords: *Physical and psychological health, QoL, Working environment, Nurses, UHKDU*

An Exploration of Coping Strategies used During the Examination Period by Final Year Allied Health Undergraduates of General Sir John Kotelawala Defence University; A Qualitative Study

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Abstract

Academic and clinical coursework often leads to high levels of stress among undergraduates specially during exam period, which may induce anxiety, depression and decreased academic outcomes. Recognizing the need for improved stress management, this study explored stress coping strategies used by final year undergraduates of Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University (FAHS, KDU) which could support them to effectively manage stress especially during exam period. A qualitative study using in-depth, semi-structured interviews conducted face-face among 35 final-year undergraduates using a purposive sampling method representing all degree programs at FAHS, KDU. Ethical approval was obtained. Interviewer-administered questionnaire was given to assess socio-demographic data and analysed using SPSS Version 23 software. Interview transcripts analysed using Thematic Analysis method. The study participants were aged 22 to 27 years and the majority were females. Our findings revealed the following four themes, maladaptive, adaptive, social support, and active coping strategies. Cigarette smoking, self-blame, venting as a temporary relief and giving up falls under maladaptive coping strategies. Adaptive coping strategies gave rise to four sub themes, such as engaging in religious activities, maintaining a positive and refreshing mindset as positive reframing, avoiding distractions as self-control, accepting real situations as acceptance. Social support includes Psychological, emotional and peer support. Active coping strategies include ignoring reality, Self-distraction, having a study plan and incorporating enjoyable activities into their study routine. The findings revealed that undergraduates faced various stressors and employed coping strategies. Therefore, this study is focused to enhance positive coping skills and to reduce their stress to achieve better academic outcomes.

Keywords: *Final year undergraduates, Coping strategies, Stress, Period of examination*

Prevalence of Overweight, Obesity, and Associated Lifestyle Behaviours among Female Nurses in Colombo South Teaching Hospital, Sri Lanka

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Abstract

Overweight and obesity are defined as abnormal or excessive body fat accumulation that may impair health. Being overweight and obese among nurses is an important issue as it can affect their health and professional capability which may directly impact healthcare quality and budget. A descriptive study was conducted at the Colombo South Teaching Hospital (CSTH) to identify the prevalence of overweight and obesity and the lifestyle behaviours related to overweight and obesity among female nurses. Two hundred and two female nurses have been recruited randomly respecting the inclusion and exclusion criteria. A self-administered questionnaire was used to collect data and analyzed with Statistical Package for Social Sciences version 22. The response rate was 80.8%. Majority (37.13%) were obese with a Body Mass Index (BMI) $\geq 25 \text{ kg m}^{-2}$ while 22.28% (BMI=23-24.9 kg m^{-2}) were overweight, 4.95% were underweight (BMI $< 18.5 \text{ kg m}^{-2}$). Only 35.64% of nurses were in the normal range (BMI=18.5-22.9 Kg/m^2) of Asian BMI classification. Most nurses (64.9%, n=131) take snacks two times per day and 74.3% (n=150) used to take a snack during the night shift. Sixty-three (31.2%) nurses used to skip their breakfast or dinner in stressful situations. More than half of the nurses (58.4%, n=118) never engaged in any type of exercise for years. The majority of nurses (23.8%, n=48) engaged in 24 hours of extra duty per week while 38.1% (n=77) engaged in one-night shift per week. Inadequate exercise, unhealthy snacks, extra work, fast foods and skipping meals were identified as unhealthy lifestyle behaviours related to overweight and obesity.

Keywords: *Prevalence, Overweight, Obesity, Lifestyle behaviors, Nurses*

Awareness, Self-Care Measures, and Medication Adherence to Managing Diabetes Mellitus among Patients attending Colombo South Teaching Hospital, Sri Lanka

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Abstract

Diabetes Mellitus (DM) is a global health concern that is interfered with poor glycaemic control due to a disorder of carbohydrate metabolism. Therefore, this study assessed awareness, self-care measures, and medication adherence in managing DM among adult patients with DM attending Colombo South Teaching Hospital (CSTH), Sri Lanka. A descriptive cross-sectional study was conducted among the patients who have been diagnosed with DM and utilized the simple random sampling method to reach the desired sample size. After obtaining ethical approval from the Ethics Review Committee, KAATSU International University, data was collected by using a semi-structured administrative questionnaire. Data was analyzed by using SPSS version 25. The study sample included 400 patients with DM who were attending CSTH. The majority were female (239, 59.8%), Sinhalese (350, 87.5%), and married (338, 84.5%). The mean age was 58.62 ± 10.1 years. The majority was having a first-degree relationship with diabetes (311, 77.8%) and maternal relationship was common (159, 52.6%). Accordingly, 3.3% had good knowledge and 20.5% had moderate knowledge. The majority (76.3%) had poor knowledge of managing diabetics. According to the Diabetic Self-Management Questionnaire, the highest mean value (9.48 ± 2.73) was reported for glucose management. Other self-care measures included diet control (7.32 ± 2.06), physical activity (4.47 ± 2.12), healthcare use (5.39 ± 1.68), and overall diabetic management (1.39 ± 1.16), and indicated poor self-care in those aspects. The mean value of medication adherence was 4.8. The marital status and having a bachelor's degree relation with diabetics were associated with medication adherence at a 95% confidence interval. Majority (270, 67.5%) showed poor adherence to the use of anti-diabetics. Several patient empowerment programs and techniques focused on increasing diabetic health literacy are required.

Keywords: *Diabetes mellitus, Awareness, Self-care measures, Medication adherence*

Caregiving Skills of Family Caregivers Providing Daily Care to Dependent Stroke Survivors: A Study in Colombo, Sri Lanka

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Abstract

Stroke is a devastating disease that impacts the patient and the family. Often patients have long term disability and need the support of a family caregiver for activities of daily living (ADL). However, the specific care giving skills of a family caregiver are not known. This study aimed to determine the baseline skills of care related to ADL provided by family caregivers of dependent stroke survivors in the Colombo area. A descriptive cross-sectional study was conducted on 250 family caregivers of dependent stroke survivors. Among them, caregiving capabilities of family caregivers were observed among 55 hospitalised patients in selected hospitals in the Colombo area. Family caregivers were assessed through a questionnaire. The caregiving skills were observed by two independent evaluators using a validated observational checklist. The level of caregiver performance was scored out of a total score of 100. Family caregivers had almost equitable gender distribution, 54% (n=135) were males. The mean (\pm SD) age of the subjects was 44.7 (\pm 13) years. Most subjects (48.4%, n=121) were educated up to GCE ordinary level and did not have any experience as a family caregiver (46.8%, n=117). The mean (\pm SD) observational score was 48.0 (\pm 15.3) and poor performance as per observational checklist was seen 58.2% (n=32) family caregivers. Though the insight of family caregivers indicated confidence in providing skilled care (44.8%, n=112), observed skills indicated poor 58.2% (n=32) family caregivers. The findings indicate a need for skills development training for family caregivers to deliver quality care related to ADL and thereby improve the quality of life of the stroke survivors.

Keywords: *ADL, Dependent stroke survivors, Family caregivers, Caregiving skills*

Prevalence and Pattern of Tobacco, Alcohol and Other Substances Abuse among Male Manual Labourers in Colombo District, Sri Lanka

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Abstract

Tobacco and alcohol use, and substance abuse are common problems among manual labourers in many areas of the world. Increased consumption of alcohol, tobacco, and other substances in Sri Lanka has severely impacted the country's economy. Descriptive cross-sectional study was conducted using simple random sampling among 411 male manual labourers in five randomly selected peri-urban MOH divisions in the Colombo district, Sri Lanka. Out of 411 participants, a significant proportion (n=215) smoked and drank alcohol (n=215). Majority had good knowledge and awareness of health problems (94%), socioeconomic issues (95%), and the adverse effects of drug use (86%). There were 303 smokers, 322 alcohol users, and 71 other substance abusers. Most used tobacco types were cigarettes (86.8%), alcohol types were beer and local arrack (44.7%), and other substances types were ice and heroin (28.2%). Currently, a higher percentage of participants, 82.8% smoked cigarettes more than once per day, 51.9% consumed alcohol weekly and 63.4% used other substances once a day. Majority of participants were influenced by friends to start smoking (35.5%), consume alcohol (41%) and use other substances (78.9%) and had received advice to quit smoking (n=122), alcohol (n=134) and other substances (n=16) from their family members. There were significant associations between monthly income ($p = 0.036$) and level of education ($p = 0.000$) with knowledge and awareness of health problems. This study has shown that the prevalence of alcohol and tobacco use is higher among male manual labourers, and current alcohol consumption among the labourers has decreased significantly due to price increases. It is important to maintain higher alcohol and tobacco pricing, implement rehabilitation and assessment programmes to prevent the rise in prevalence among manual labourers.

Keywords: *Tobacco, Alcohol, Substances*

Detection of Gross Brain Volume Changes in Patients with Migraine Using Magnetic Resonance Imaging

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Abstract

Magnetic Resonance Imaging (MRI) based computational neuroanatomy has shown to be an effective approach in detecting grey matter, and white matter changes in the brains of individuals with migraine. However, research on detecting gross volume changes in migraine is rare. Therefore, the objective of this study is to investigate gross volume changes associated with migraine and test the potential utility of gross volume changes in developing a novel neuroimaging biomarker for objective diagnosis of migraine. 45 patients with migraine, and 46 healthy controls were scanned using a 3 Tesla scanner, and 3D, T1- weighted MR images were obtained. First, Tensor-based morphometry was performed using Computational Anatomy Toolbox (CAT 12) to generate voxel-wise Jacobian determinant images and smoothed (HWFMM = 8 mm). A group-level univariate analysis was performed, using a two-sample t- test and the results were corrected for multiple comparisons. Second, multivariate pattern analysis (MVPA) was conducted using support vector machine (SVM) to classify the patients with migraine and healthy controls. Reduced gross volume changes in patients were detected in the middle frontal, superior frontal, inferior temporal of right cerebrum, middle temporal, angular, cuneus, calcarine in the left cerebrum and cerebellum. Moreover, the results of the MVPA indicated that gross volume changes can be served as a biomarker to distinguish patients with migraine and healthy individuals (Accuracy = 73.63%). In conclusion, we propose that the gross volume changes detected in migraineurs can be considered when developing neuroimaging tools to facilitate the objective diagnosis of migraine.

Keywords: *Migraine, Gross volume changes, Tensor based morphometry, MRI, Classification*

Assessing Occupational Radiation Exposure for PET/CT Technologists: A Study of Finger Radiation Dose at a Selected Hospital

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Abstract

In nuclear medicine, radiation exposure to the fingers is a matter of concern for radiation workers since they perform the preparation, dispensing and administration of radiopharmaceuticals. Therefore, this study aims to assess the finger radiation dose received by the technologist who is dealing with dispensing and the administration of ¹⁸F-Fluorodeoxyglucose (FDG) in Positron Emission Tomography (PET)/ Computed Tomography (CT) imaging procedures in a PET/CT centre at Asiri Surgical Hospital, Colombo, Sri Lanka. The finger radiation dose received by the technologist was measured by the ED3 active real-time extremity dosimeter over a period of 2 months from November 2022 to December 2022. During this data collection period, a total of 50 PET/CT procedures were performed by the technologist. The ED3 detector was mounted with a single finger coat onto the base of the ring finger of the right hand of the technologist. The dosimetry reading for each procedure was accumulated. The estimated mean value of finger dose from preparation and administration of radiotracers were 78.54 μ Sv and 177.63 μ Sv respectively. The annual dose was estimated from the total number of PET/CT procedures performed in 2022. The annual estimated finger dose for the technologist is 180.09 mSv, which was found to be within the International Commission on Radiological Protection (ICRP) recommended value of 500 mSv. This study revealed that the finger dose during FDG Injection was significantly higher than the finger dose found during FDG preparation. Nevertheless, when they increase the number of PET/CT procedures is relatively high, there is a higher possibility to reach the dose limit.

Keywords: *Finger dose, Positron emission tomography/Computed tomography, Extremity dosimeter, Occupational radiation dose*

Establishment of Facility Reference Level for Computed Tomography in Radiotherapy Simulation Examinations at National Cancer Institute Sri Lanka

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Abstract

Computed Tomography (CT) plays a crucial role in radiotherapy treatment planning. The optimization of radiation dose to patient during CT simulation is not a matter of concern so far in most of the countries but it cannot be since even after the primary cancer is treated, patient may have a long-life expectancy. The additional imaging doses should be as low as reasonably achievable. Therefore, this study aimed to evaluate radiation dose to patients during CT simulation for radiotherapy treatment planning. A total of 350 patient data were collected from October 2022 to November 2022 with the Toshiba Aquilion large bore CT scanner at Apeksha Hospital, Maharagama, Sri Lanka. The study focused on commonly performed simulations for different protocols (abdomen, chest, head and pelvis) and used Computed Tomography Dose Index (CTDI) and Dose-Length Product (DLP) parameters to establish Diagnostic Reference Levels (DRLs). Analysing the data for descriptive statistics and the 25th, 50th, and 75th quartiles of the dose metrics were calculated using SPSS software. According to the recommendation of the International Commission on Radiological Protection (ICRP), the DRL values are defined as the median (50th percentile) of the CTDI volume and DLP values. The established typical values of CTDI volume and DLP respectively are 7.4 mGy, 394 mGy.cm for abdomen; 15.5 mGy, 455 mGy.cm for chest; 58.2 mGy, 2632 mGy.cm for head; 9.3 mGy, 339 mGy.cm for pelvis. The developed DRL values were relatively lower for most anatomical regions compared to other countries and institutions, except for the chest region where the values were higher. Further evaluation is needed to assess the appropriateness of these lower DRL values in ensuring patient safety and minimizing radiation exposure during CT simulation procedures for radiotherapy. The study emphasizes the importance of optimizing radiation dose to patients, considering their potential long-term life expectancy even after primary cancer treatment.

Keywords: *CT simulation, Diagnostic reference level, DLP, Optimization of radiation dose*

Assessment of Setup-errors in 3D-Conformal Radiotherapy for Head and Neck Cancer Patients using an Electronic Portal Imaging Device

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Abstract

The accuracy in radiotherapy is very important since it is irreversible treatment and it partially depends on patient's set up on each fraction of treatment. Developing unique margins by assessing set up errors will provide better treatment. The aim of this study was to evaluate set up errors in three-dimensional conformal radiation therapy for head and neck region using an electronic portal imaging device and to define the Clinical Target Volume (CTV) to Planning Target Volume (PTV) margin in Varian 2300CD unit at Apeksha Hospital, Maharagama, Sri Lanka. Head and neck patients (n=101) immobilized with thermoplastic masks and data were collected from July 2021 to July 2022 for this study. Transitional errors of all directions were collected using 303 pairs of orthogonal portal images to calculate systematic errors and random errors. The margins for CTV to PTV were calculated using three different margins recipes. The calculated population systematic and random errors for the Anteroposterior (AP), Superioinferior (SI) and Mediolateral (ML) directions are 0.13 cm, 0.1 cm, 0.08 cm and 0.22 cm, 0.21 cm, 0.19 cm respectively. All the margins were calculated from the three recipes are less than 0.5 cm. Therefore, this study shows that 0.5 cm margin is safe for head and neck patients who receive treatment from Varian 2300CD unit at Apeksha Hospital. This study recommends to maintain their own CTV to PTV margins by institute to minimize unnecessary radiation dose for surrounding tissues and organs at risk (OARs). In addition, the effectiveness of the immobilization devices should be analyzed during the treatment.

Keywords: *Radiotherapy, PTV, CTV, Three-dimensional conformal radiotherapy, Set-up errors, Electronic portal imaging device*

Brain Structural Covariance Networks of Patients with Migraine: A Source-based Morphometry Study

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Abstract

Migraine is associated with grey matter changes in the human brain, but the interrelationships between voxels and naturally grouped patterns of structural variations need to be identified to understand how migraine affects the brain at the network level. Three dimensional, T1 weighted images of 45 migraine patients and 46 healthy controls who underwent brain MR scanning in a 3 Tesla scanner were selected. The data were analyzed using Computational Anatomy Toolbox-CAT12. Group independent component analysis (Group ICA) was performed on grey matter volumes using GIFT toolbox. Two sample t-tests were performed using component loadings of each component to find out the significant independent components (ICs). Nine maximally independent components (ICs) were resulted using group ICA and labeled according to the Resting State Network (RSN) atlas. Among them 6 ICs were found to be significant ($p < 0.05$) based on two-sample t-tests representing the attention, sensorimotor, frontal, and visual networks. Further, mask based multivariate pattern analyses (MVPA) were performed to distinguish patients with migraine and healthy controls. MVPA revealed that component 4 (sensorimotor, classification accuracy=61.53%), component 5 (sensorimotor, classification accuracy=73.62%), component 7 (sensorimotor, classification accuracy=69.23%) and component 8 (visual, classification accuracy=68.13%) show different potentials to correctly classify patients with migraine and healthy subjects ($p < 0.05$, number of permutations, $n=1000$). Source Based Morphometry can detect the structural covariance networks of brains with migraine, which exhibit significant differences when compared with healthy controls. Further, the above structural network changes can be used to develop an effective biomarker for objective diagnosis of migraine.

Keywords: *Migraine, Source based morphometry, Grey matter, Independent component analysis, Structural covariance networks*

An Evaluation of the Relationship between Viral Load and Quantitative Chest Computed Tomography Imaging Features in Patients with COVID-19

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Abstract

COVID-19, caused by SARS-CoV-2, is a highly infectious global pandemic. Diagnosis relies on the RTPCR test, with Cycle threshold (Ct) value as an indirect measure of viral load. High-resolution computed tomography (HRCT) chest imaging aids in assessing disease severity as a secondary diagnostic tool. This retrospective study aimed to evaluate the relationship between HRCT quantitative parameters, biochemical markers, and disease severity in 50 COVID-19 confirmed subjects. HRCT images were analyzed using 3D Slicer software to extract lung volumes. Patients were categorized based on Computed Tomography Chest Severity Score (CTSS) grades. Biochemical parameters including Ct value, C-reactive protein (CRP), D-dimer, and serum ferritin levels were collected. The study found that the viral load of COVID-19 subjects ranged from 11 to 33 with a mean value of 21.74 ± 5.42 . No significant correlation was observed between lung volumes and Ct value ($p > 0.05$), but a moderate positive correlation was found between white blood cell (WBC) count and Ct value ($r_s(48) = 0.441$, $p = 0.01$). Although Ct value did not significantly differ between CTSS grades, significant variations in the Ct value among lung volumes and the ratio of affected lung volume to functional lung volume were observed ($p < 0.05$). These findings emphasize the importance of comprehensive evaluations using radiological and biochemical assessments for COVID-19 patients. Further research is needed for better understanding of the relationships between HRCT quantitative parameters, viral load, and disease severity, which can enhance treatment decisions and patient management strategies.

Keywords: *COVID-19, Cycle threshold value, High-resolution computed tomography*

Development of Institutional Reference Level of Radiation Dose for Cardiac Catheterization Procedures

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Abstract

Fluoroscopy-guided interventional procedures have gained prominence in diagnostic and therapeutic settings due to their minimally invasive nature. Among these procedures, Coronary Angiogram (CAG) stands out as one of the most commonly performed cardiac interventions. To minimize patient radiation exposure, the International Commission of Radiation Protection (ICRP) recommends to establish Diagnostic Reference Levels (DRLs) nationally or regionally. This study aims to establish an institutional DRL for CAG procedures at a selected private hospital in Colombo, Sri Lanka. The research was conducted in the cardiac catheterization laboratory, focusing on 201 CAG procedures performed using two separate C-arm machines. For machine No: 01- PHILIPS ALLURA clarity FD-10, the median cumulative DAP was 9060.50 mGy.cm² while it was 7498.00 mGy.cm² for machine No: 02- PHILIPS AZURION 7 B20/15. These median values were considered as their respective DRLs for CAG procedures in each machine according to the ICRP recommendation. In addition to establishing the DRLs, the study identified significant correlations between patient effective dose and several factors, including patient weight, fluoroscopy time, and the number of images taken. In conclusion, this study established institutional DRLs for CAG procedures and highlights the importance of optimizing radiation dose to achieve better patient outcomes. Established DRL values for DAP were quite low compared with previous studies. Therefore, this study recommends to develop national DRLs for interventional procedures to optimize the radiation exposure level.

Keywords: *Catheterization laboratory, CAG, Cumulative dose area product, Dose reference level, Radiation dose optimization*

A Gender-based Evaluation of Quantitative and Radiological Computed Tomography Imaging Features in Patient with COVID-19

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Abstract

Computed Tomography (CT) is a widely utilized and precious method that is used to determine the severity of COVID-19. High-Resolution Computed Tomography (HRCT) is the inherent protocol for covid pneumonia. The chest severity score is a diagnostic tool to measure the severity of COVID-19 by using quantitative and radiological imaging features. The aim of the study was to evaluate the quantitative and radiological features of computed tomography imaging in COVID-19 patients base on their gender. The study included 49 patients who underwent COVID-19 positive and HRCT examinations. The patient's age, gender, lymphocytes, and neutrophils were quantified. Depending on whether non-communicable diseases were present or not, the data set was divided into two groups. The 3D slicer software was used to obtain functional volume and affected volume in both the right and left lungs in inspiration and expiration. The Mann-Whitney U test was performed to assess the difference between the male Total Severity Score (TSS) and the female TSS. Kendall's tau test was performed to evaluate the correlation among the variables. According to the present study results, there was no significant difference in TSS between males and females. There was no significant difference in TSS according to the presence of non-communicable diseases. The present study was concluded that it is feasible to devise a formula for the CT severity score and that a grading scale the severity can be developed by using the TSS since there is no studies for the severity category in Sri Lanka.

Keywords: *COVID-19, CT, HRCT, Gender, TSS*

Anti-tyrosinase Activity of Green Synthesized Silver Nanoparticles from Aqueous Extract of *Nelumbo nucifera* Petals

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Abstract

Since green synthesis is simple, inexpensive, less time-consuming and eco-friendly, it is highly accepted over chemical synthesis in the pharmaceutical and cosmetic industries. This involves nontoxic secondary metabolites of plants, which could function as reducing and capping agents during nanoparticle synthesis. This study utilized a petal extract of *Nelumbo nucifera* (Lotus) to reduce silver nitrate solution into silver nanoparticles (AgNPs). Then, the anti-tyrosinase activity of AgNPs was tested. Fourier transform infrared (FTIR) spectroscopy and ultraviolet-visible (UV-Vis) spectroscopic analysis confirmed the presence of secondary metabolites in petal extract. The AgNPs were characterized using UV-Vis, FTIR and Scanning Electron Microscopic (SEM) techniques. The UV-Vis spectrum of AgNPs showed the characterized excitation of maximum surface plasmon resonance band at 435 nm. FTIR spectroscopy analysis established that the petal extract served as a reducing agent and acted as a capping agent to stabilize the NPs. SEM revealed the formation of well-dispersed and spherical shape NPs (≈ 80 nm). The tyrosinase inhibitory activity of AgNPs was evaluated spectrophotometrically using mushroom tyrosinase, L-tyrosine, potassium phosphate buffer and \pm arbutin as a positive control in the 96-well microplate. The percentage inhibition of tyrosinase was calculated. The percentage inhibition of AgNPs (0.1 mg/ml) and \pm arbutin (0.1 mg/ml) were found to be 56.38% and 65.27% respectively. When compared with \pm arbutin significant ($p < 0.05$) percentage inhibition of tyrosinase enzyme was observed from green synthesized AgNPs. The study concluded that green synthesized AgNPs could be developed into a potential candidate in the pharmaceutical and cosmetic industries. Further, more studies are needed to elaborate quality, safe and efficacious utilization of green synthesized AgNPs.

Keywords: *Green synthesis, Tyrosinase, Secondary metabolites*

***In vitro* Analysis of the Anti-inflammatory Activity of Sri Lankan Bees' Honey, *Aloe vera*, their Combination, and the Development of a Topical Anti-inflammatory Gel**

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Abstract

Clinicians and scientists are on the lookout for the development of safer, sustainable alternatives for topical corticosteroids in treating inflammatory skin diseases due to the potential complications associated with their long-term use. Although both honey and *Aloe vera* have been individually studied for their anti-inflammatory action, there is only limited research on the specific combination of Sri Lankan bee's (SLB) honey with *Aloe vera*. In this study, the anti-inflammatory activities of the individual components and combinations are evaluated. A heat-induced albumin denaturation assay was used. Data analysis was carried out using the GraphPad Prism 9 software. At 5000 µg/mL, the highest of the concentration range used in this study. The aqueous solutions of SLB honey and crude *Aloe vera* exhibited moderate anti-inflammatory activities of 8.19±0.08% and 8.14± 0.93%, respectively. Lyophilization of the crude *Aloe vera* gel effectively increased its activity up to 77.53±0.16%, at the same concentration. The combinations of SLB honey with crude *Aloe vera*, and SLB honey with lyophilized *Aloe vera* demonstrated a percentage inhibition of albumin denaturation of 12.59±2.4% and 86.51±0.2% respectively. Thus, when combined, SLB honey with *Aloe vera* show higher activity compared to their individual counterparts. The concentrations at which optimal activity was observed were selected for formulation. Accordingly, three novel topical anti-inflammatory gels were formulated with 0.125%, 0.25%, and 0.5% SLB honey and lyophilized *Aloe vera* (1:1) which exhibited relatively high activities of 71.57±0.48%, 76.56±0.24%, and 81.38±0.21% respectively. The organoleptic properties, pH, and spreadability of the gels were observed to be stable over a 60-days period at 4°C, room temperature, and 40°C. With further optimization and testing, the gels would show a promising potential to be developed into a clinically useful product.

Keywords: *Anti-inflammatory, SLB honey, Aloe vera, Topical gels, Albumin denaturation*

Evaluation of Excipient Properties of Starch Extracted from *Dioscorea alata* (Kahata Angala) grown in Sri Lanka and its Suitability in the Formulation of a Losartan Potassium Tablet

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Abstract

Starch is an essential excipient used in the manufacturing process of pharmaceuticals. This study aimed to evaluate the excipient properties of *Dioscorea alata* which is locally called Kahata Angala compared to commercially available maize starch BP. *D. alata* starch was extracted following the aqueous extraction method. Both *D. alata* and maize starches were tested for particle size, Infrared spectrum analysis, pH, hydration capacity, bulk density, tapped density, true density, angle of repose, Hausner ratio, compressibility index and proximate composition. Losartan potassium 50 mg tablets were formulated following the wet granulation using *D. alata* starch as a binder. T-test was used to analyse the proximate and physicochemical properties of starches. The results showed that all the physicochemical characteristics of *D. alata* starch were statistically different from maize starch BP ($p < 0.05$). However, *D. alata* starch exhibited better flow properties over maize starch BP in terms of angle of repose and Hausner ratio. Both starches were similar in terms of moisture content, crude fat content, and carbohydrate content ($p > 0.05$). Infrared spectrum indicated that *D. alata* starch has no interactions with Losartan potassium. Tablets which were prepared using *D. alata* starch did not meet the pharmacopeial standards in weight variation tests, hardness tests, disintegration tests, and dissolution tests. However, their friability percentage was less than 1%. The study concludes that several parameters of *D. alata* starch are favourable as excipient properties as per the pharmacopeial specification and certain parameters are similar to maize starch BP. However, the disintegration and dissolution profiles of tablets formulated using *D. alata* starch should be improved.

Keywords: *Excipient properties, Dioscorea alata starch, Losartan potassium*

Formulation of Nanosuspensions of *Psidium guajava* Fruit Extract and Evaluation of the Antioxidant Activity

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Abstract

Psidium guajava (Guava:G) is an antioxidant rich, one of common fruits growing in Sri Lanka. However due to certain properties of phytochemicals, the in-vivo activity of natural antioxidants is less than expected. Therefore, the present study was aimed to initiate the development of novel nanoformulations of unripe guava fruit extract with the purpose of enhancing the antioxidant capacity. Nanosuspensions (NS) of the fruit extract were synthesized by nanoprecipitation method using two polymers, polyvinylpyrrolidone (PVP) and sodium alginate (SA) as stabilizers to increase the water solubility of phytochemicals. Then the antioxidant capacity of the crude extract and the nanosuspensions were assessed by DPPH scavenging assay, Ferric Reducing Antioxidants Potential determination (FRAP) and Nitric Oxide (NO) scavenging assays. The morphology and particle size of nanoparticles in guava PVP nanosuspension (G-PVP-NS) and guava SA nanosuspension (G-SA-NS) were obtained by scanning electron microscope (SEM). The G-PVP-NS ($77.59 \pm 0.009\%$) and G-SA-NS ($84.30 \pm 0.038\%$) exhibited a significant ($p < 0.05$) enhancement of DPPH scavenging activity at the lowest concentration (0.0781 mg/mL) compared to the crude extract ($58.76 \pm 0.005\%$). The results of the FRAP assay, also indicated a significantly ($p < 0.05$) increased antioxidant power in both nanosuspensions (G-PVP-NS: $1598.50 \pm 0.071\text{AAE}/100\text{ g}$, G-SA-NS: $550.85 \pm 0.242\text{AAE}/100\text{ g}$) at 0.0781 mg/mL compared to the crude extract ($334.60 \pm 0.033\text{AAE}/100\text{ g}$). The results observed in NO scavenging assay revealed that the G-PVP-NS exhibited maximum activity ($6.82 \pm 0.036\%$) at the 0.0781 mg/ml, while the G-SA-NS showed the highest activity ($24.93 \pm 0.068\%$) at the 0.625 mg/ml. The SEM images confirmed the formation of nanoparticles. The results of the present study revealed that the antioxidant capacity of guava fruit extract is significantly enhanced by nano-sizing.

Keywords: *Free radical scavenging activity, Antioxidant, Nanosuspensions*

Comparative Analysis of the Anti-cholesterol Activity and Phytochemical Analysis of *Biophytum reinwardtii*, *Trachyspermum roxburghianum* and *Cyanthillium cinereum* extracts

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Abstract

Biophytum reinwardtii, *Trachyspermum roxburghianum*, and *Cyanthillium cinereum* are traditional herbs in Ayurvedic medicine known for treating hypertension, fatty liver, and obesity. Abnormal cholesterol levels are considered as a contributing factor for these conditions. However, the anti-cholesterol properties of these herbs, which are highly valued in Ayurvedic medicine are yet to be explored. This research aimed to evaluate the anti-cholesterol activity of different plant extracts and analyze qualitative and quantitative phytochemicals. Plant extraction was carried out by maceration using three different solvents: n-hexane, ethyl acetate, and methanol. The resulting extracts were subjected to an in vitro cholesterol reduction assay. Qualitative and quantitative phytochemical analysis of the above three plants were performed exclusively on the methanolic extracts, which exhibited the highest anti-cholesterol activity. All three plants exhibited significant anti-cholesterol activity compared to the standard Simvastatin, with the methanolic extracts showing the highest IC₅₀ values. Specifically, *C. cinereum* demonstrated the highest anti-cholesterol capacity, with an IC₅₀ value of 17.48 mg/mL. *B. reinwardtii* and *T. roxburghianum* exhibited anti-cholesterol activity with IC₅₀ values of 30.42 mg/mL and 27.83 mg/mL, respectively. Phytochemical analysis revealed the presence of phenols, saponins, alkaloids, tannins, flavonoids, and steroids in all methanolic extracts. Notably, the methanolic extract of *C. cinereum* displayed the highest total flavonoid content (8.23% w/w) and total saponin content (9.18% w/w), while *B. reinwardtii* had the highest total alkaloid content (6.6% w/w). These findings highlight the potential of the methanol extract of *C. cinereum* as a cholesterol-lowering drug.

Keywords: *Anti-cholesterol activity, Phytochemical*

A Comparative Study on the Toxicity and Biocompatibility of *Hemidesmus indicus* Aqueous Extract-in Various Developmental Stages of Zebrafish *Danio rerio* using the FET293 Bioassay

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Abstract

Hemidesmus indicus R. Br. (Periplocaceae) commonly known as “Iramusu” in Sinhala; found in Sri Lanka is used for a variety of ayurvedic preparations. However, the toxicity of *H. indicus* aqueous plant extract remains unknown. The purpose of this study was to investigate the biocompatibility and toxicological properties of *H. indicus* aqueous plant extract using zebrafish embryo assay (FET293 bioassay) following OECD guidelines. Wild-type male and female zebrafish were maintained at 27.0°C, pH (7 ± 0.5) and nitrates (<0.009 g L⁻¹), nitrite (8-12 g L⁻¹), and ammonia levels (<0.05 mg L⁻¹) were monitored weekly. Aerial parts of the plant were extracted into distilled water using the maceration method. The LC50 in the brine shrimp lethality assay was 48.2 mg/mL, which was used to determine the concentration range for the zebrafish embryo assay. Two- fold dilutions ranging from 8-125 mg/mL were prepared based on brine shrimp lethality assay results. The study was conducted according to the KIU Ethics Review Committee approval. Zebrafish embryos were exposed to the plant extract, and hatch rate, mortality rate, survival rate, heart rate, and developmental deformities were observed at specific time points. Statistical analysis was performed using GraphPad Prism 9 software. Hatchability increased with extract concentration, reaching the highest at 8 mg/mL at 96 hpf. Survival rate decreased with higher concentrations, reaching 0% at 63 and 125 mg/mL from 72 hpf onwards. Heart rate remained within the normal range except at 63 and 125 mg/mL, in which 100% mortality was observed. Developmental deformities were observed, including yolk sac edema and pericardial edema, mainly at higher concentrations. The *H. indicus* extract was safe at 8 mg/mL but exhibited mild- moderate toxicity effects at higher concentrations.

Keywords: *Biocompatibility, Hemidesmus indicus, Toxicity, Zebrafish embryos*

Formulation, Characterization, and Evaluation of the Antibacterial Activity of a Polyherbal Hand Sanitizer Gel

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Abstract

Hand sanitizer is a popular method to maintain hand hygiene. Alcohol-based hand sanitizers have drawbacks such as skin irritation, dryness, and harshness. Thus, this study was aimed to formulate a novel antibacterial hand sanitizer gel using aqueous flower extract of *Cassia auriculata*, fruit extract of *Phyllanthus emblica* (PE), and ethyl acetate flower extract of *Nyctanthes arbor-tristis* (NA) and assess its antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* through the well-diffusion method. Carbopol 940, distilled water, 95% ethanol, glycerin, and triethanolamine were used to formulate the gel base and its stability was examined. The gel was prepared by incorporating antibacterial plant extract combinations (1PE:1CA:1NA, 2 PE:1CA:1NA, 1PE:2CA:1NA, 1PE:1CA:2NA) into the gel base. The effectiveness of the formulated herbal sanitizer gel was evaluated against *S. aureus* and *E. coli* through well-diffusion method and Minimum Inhibitory Concentration (MIC) was determined in triplicates and the trials were analyzed as mean \pm standard error of mean (SEM) of the replicates. Among the plant extract combinations, 2PE:1CA:1NA represented the most potent antibacterial activity, and 1PE:1NA:1CA was used to formulate sanitizer gel considering stability studies. The gel was semi-solid, soft, and light brownish-colored, with an acceptable fruity odor and the gel was stable up to 60 days at both 4°C and room temperature. The formulated gel exhibited potent antibacterial activity against both microorganisms, with the highest activity against *S. aureus*, while gel base (negative control) was not shown activity. The gel's MICs were 9.375 mg/mL and 18.75 mg/mL against *E. coli* and *S. aureus*, respectively. The gel's pH was 5.82 and compatible with the skin's pH range. The formulated polyherbal hand sanitizer gel could be a promising candidate for hand sanitation in comparison to alcohol-based hand sanitizers.

Keywords: Polyherbal, Hand sanitizer, Antibacterial *C. auriculata*, *P. emblica*, *N. arbor-tristis*.

Relationship between Heart Recovery Rate, Physical Activity Level, Body Mass Index and Sedentary Behavior among Undergraduates of Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University

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Abstract

With the digitalization of many aspects of the life, the average Physical Activity Level (PAL) is in decline. Sedentary Behavior (SB) is a rising risk factor for cardiovascular diseases. There are less evidences regarding the PAL among Asian undergraduates. A delay in Heart Recovery Rate (HRR) in 1 minute (HRR1min) indicates the prevalence of cardiovascular diseases. This study aimed to determine the relationship between HRR, PAL, Body Mass Index (BMI), and SB among undergraduates of Faculty of Allied Health Sciences. A descriptive cross-sectional study was carried out. HRR1min was measured after performing Modified Harvard Step Test. A Self-administrated Global Physical Activity Questionnaire was provided to assess the PAL and SB. The Chi-Square test was performed for data analysis. The sample size consisted of 252 participants (age range of 18-26). Results showed that the normal HRR 1min was 75.4% and 24.6% showed poor HRR1min and 11.5% of high PAL, 86.5% of moderate PAL, and 2% of low PAL among participants. The mean value for SB was 11.64 hours for males and 12.18 hours for females. A strong positive correlation was observed in between PAL and Gender ($p=0.049$). No significant correlation was observed in between HRR and BMI, HRR and PAL. In conclusion, PAL of an individual depends on gender. Moderate intensity activities are most common among undergraduates and most undergraduates follows a sedentary lifestyle. Therefore, self-awareness of BMI, PAL and SB are essential in preventing non-communicable diseases and to improving quality of life.

Keywords: *HRR, PAL, BMI, SB, Undergraduates*

Association between Physical Activity and Instrumental Activities of Daily Living in Elderly People with Type 2 Diabetes Mellitus

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Abstract

Elderly people with Type 2 Diabetes Mellitus (T2DM) are rapidly growing, with significant impact on both Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL). Physical Activity (PA) plays an important role in glycemic control and maintaining independency in ADL and IADL. “Instrumental activities of daily living” is a term used to describe more complex tasks like transportation and shopping, managing finance, and shopping and meal preparing. This study aimed to assess the association between PA and IADL in elderly people with T2DM. Sixty older adults, age more than 60 years having T2DM for more than five years were recruited from diabetes clinics at National Hospital of Sri Lanka. Convenience sampling method was used to select participants. Data on demographics and diabetes-related medical indicators were obtained through an interviewer administered questionnaire. International Physical Activity Questionnaire (IPAQ) and Lawton-Brody Instrumental Activities of Daily Living Scale were used to assess level of PA and IADL respectively. Study sample was consisted of 60 participants (mean age= 71.8±4.0 years) with 50% (n=30, age=72.0±3.4 years) males and 50% (n=30, age=71.5±4.6) females. Among the study subjects, 15.0% (n=9) were inactive, 66.7%(n=40) were moderately active, and 18.3% (n=11) were highly active. Mean PA score was significantly higher in females compared to males (females=2355.8±1496.8 MET-min/week; males= 1416.9±1106.3 MET-min/week, $p=0.008$). Mean IADL score was not significantly different between males and females (males=6.7±1.6; females=6.0±1.7, $p=0.126$). Although PA and IADL was not significantly associated ($p=0.104$) in the sample, PA and IADL in active elderly people were significantly correlated ($p=0.015$). Majority of the elderly with T2DM were moderately active, but independent in their IADL. Therefore, elderly, especially males with T2DM need to engage in recommended levels of PA, in order to increase the independency in IADL.

Keywords: PA, IADL, Elderly people, T2DM

Assessment of Learner Satisfaction of BSc Physiotherapy Undergraduates of a Selected University in Colombo, Sri Lanka regarding Onsite and Online Learning Experience during the COVID-19 Pandemic

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Abstract

Physiotherapy is a health care profession that is concerned with the function and movement of the human body to maximize physical potential. Mode of delivery of the BSc physiotherapy program has shifted from onsite to online during the COVID-19 pandemic and it may have affected the learner satisfaction of the undergraduates. The purpose of this study was to assess the learner satisfaction of BSc Physiotherapy undergraduates of Faculty of Allied Health Sciences - Kotelawala Defence University (KDU), Colombo, Sri Lanka regarding onsite and online learner experience during the period of COVID-19 pandemic. An analytical cross-sectional study was conducted among undergraduates (n=141) of Faculty of Allied Health Sciences - KDU according to the sample size calculated using a standard formula, using validated structured self-administrated questionnaires. The responses to the questionnaires were captured electronically. Based on the responses, simple average scores and percentage simple average scores were computed. The online vs onsite satisfaction was compared using Paired sample T test. The results showed that there is a significant difference between the percentage simple average scores of onsite and online learner satisfactions of BSc physiotherapy undergraduates ($80.04\% \pm 9.21$ vs $68.02\% \pm 16.7$, $p < 0.05$). Accordingly, BSc physiotherapy undergraduates had a greater learner satisfaction with onsite learning. The result is the same across the gender and intakes. Overall, BSc Physiotherapy students of KDU have a significantly higher learner satisfaction with onsite learning than online learning. Therefore, online learning during the COVID-19 pandemic may have affected in their academic performance and the development as a healthcare professional.

Keywords: *Learner satisfaction, Physiotherapy education, Undergraduates, Online learning, Onsite learning*

The Relationship between the Anthropometric Indices and Hypertension in Elderly Population at Elderly Homes in the Medical Officer of Health Area of Piliyandala in Sri Lanka

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Abstract

In Sri Lanka, the prevalence of hypertension has increased with age in adults. Obesity can be explained by different anthropometric indices. The objective of the study was to investigate the relationship between anthropometric indices of obesity with hypertension in elderly population at elderly homes in the Medical Officer of Health (MOH) area of Piliyandala in Sri Lanka. In this descriptive cross-sectional study, a total of 199 adults aged 65 years and above were interviewed. Anthropometric indices such as Body Mass Index (BMI), Waist Circumference (WC), Hip Circumference (HP), Waist Hip Ratio (WHR), Waist Height Ratio (WHtR), Body Roundness Index (BRI), a Body Shape Index (ABSI) and blood pressure were monitored from each participant by using standard methods. New hypertensive cases were identified when the average of two resting seated BP readings, separated by 5 min was SBP of ≥ 150 mmHg and a DBP of ≥ 90 mmHg, 64.32% were hypertensive, 35.68% were non hypertensive. The results indicated a significant positive relationship between Systolic Blood Pressure (SBP) and various anthropometric obesity indices, including WC, WHR and BRI. The Pearson correlation value is 0.134 between SBP and WC, 0.133 between SBP and WHR, 0.808 between SBP and a BRI. This study revealed nearly two-thirds of the population was hypertensive and females being more affected than males. The results showed a substantial positive correlation between hypertension and anthropometric obesity indices, including BMI, WC, WHR, WHtR, BRI, and ABSI. Furthermore, WC, WHR, and ABSI were the ideal obesity indices to correlate with hypertension.

Keywords: *Obesity, Hypertension, Elderly homes, BMI, WC, WHtR*

Prevalence of Neck Pain among Military Clerks in the Directorate of Pay and Record and Directorate of Benevolent Fund in Army Camp, Panagoda

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Abstract

Neck pain is one of the most common musculoskeletal conditions among different occupations specially in occupations which requires the use of a computer. Military clerks are reported to experience neck pains at a higher rate and there are no studies done previously on prevalence of neck pain among this population. Therefore, this study is aimed to identify the prevalence of neck pain among military clerks in directorate of pay and record and directorate of benevolent fund in Army camp, Panagoda. An observational cross-sectional study was carried out among 103 individuals (69 males and 34 females) who currently work as military clerks. A self-administered questionnaire was used to collect data along with the pain severity assessment by Numerical Pain Rating Scale (NPRS). Among the total population, 48.5% (n=50) were reported with neck pain within the past 12 months (55.1% males and 35.3% females). Among the clerks who had neck pain during the past 12 months, 54% (n=27) had pain radiating towards their upper limbs and most of them complained of radiating pain to both sides. Majority of the clerks reported to experience neck pain lasting for few hours per day 52% (n=26). Aggravating factors for neck pain in this population were staying in the same posture for prolong periods, riding a motorcycle and lifting weights whereas a break from work, massaging neck area and neck exercises relieved neck pain. According to NPRS, majority of neck pain cases were mild (NPRS 1–3). Neck pain is common among Sri Lankan military clerks hence such vulnerable clerks should be identified early and should be directed to take preventive action from getting neck pains.

Keywords: *Neck pain, Military clerks, NPRS, Aggravating factors, Easing factors*

Relationship between Physical Activity and Falls in Older Adults with Type 2 Diabetes Mellitus

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Abstract

Physical inactivity (PA) is a modifiable risk factor for Type 2 Diabetes Mellitus (T2DM). Falls is a major concern for older adults with T2DM. This study aimed to identify the association between PA and falls in older adults with T2DM attending to selected hospitals in Colombo district. In this cross-sectional study, 180 participants with T2DM, aged 60 years and above were recruited using non probability sampling. Demographic data and retrospective falls in previous 12 months were assessed using interviewer administered questionnaire. International Physical Activity Questionnaire-Short Form (IPAQ-SF) was used to assess physical activity. Descriptive statistics, spearman correlation test and Mann Whitney U test were used for data analysis in SPSS version 20.0. Among 180 T2DM participants (mean age=66.61±5.35 years), 38.3% (n=69) were males and 61.7% (n=111) were females. Mean weekly energy expenditure for total PA was 1567.78 (±1216.99) metabolic equivalent of task (MET) minutes per week. Among 180 participants 20% (n=36) were physically inactive, while 68.9% (n=124) were moderately active and 11.1% (n=20) were highly active. Approximately, 22% of T2DM patients experienced falls during previous 12 months and 59.2% of falls resulted in injuries. Total PA of non-fallers (median=1359.0MET- minutes/week) was significantly higher than total PA of fallers (median=972.0MET-minutes/week, $p=0.022$). There was a significant negative relationship between PA and number of falls ($p=0.021$, $r=-0.172$). Majority of the T2DM older adults were physically inactive or moderately active. Physical inactivity leads to increase in fall rate in older adults with T2DM.

Keywords: *Physical activity, T2DM, Falls*

Comparison of Health related Physical Fitness Components in Young Male Rugby and Soccer Players in Kotelawala Defence University

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Abstract

Physical fitness plays a major role in determining the player's athletic performance, especially in the games of rugby and soccer. It is essential for implementing specific coaching, strength and conditioning programs for rugby and soccer players. The study aimed to compare health-related fitness components of male rugby and soccer players of Kotelawala Defence University (KDU) in order to facilitate effective coaching programs to improve player performance. The descriptive cross-sectional study was conducted with male rugby (n=15) and soccer players (n=15) aged between 20 to 25 years in KDU, Sri Lanka. Participants were assessed and tested for their body composition Body Mass Index (BMI), muscle percentage and fat percentage, muscular strength, muscular endurance and cardiorespiratory endurance. The collected data were analysed using the Mann-Whitney U test from SPSS version 21 software. The median of weight, body mass index, upper body strength, lower body strength, upper body endurance, and lower body endurance were (70.6 ± 10.5 ; 59.2 ± 5.6 kg), (23.4 ± 2.8 ; 19.9 ± 1.5 kgm⁻²), (55.0 ± 8.5 ; 40.0 ± 6.0 kg), (100.0 ± 26.6 ; 58.5 ± 19.9 kg), (40.5 ± 4.5 ; 32.5 ± 6.9 reps per min) and (51.5 ± 7.7 ; 45.5 ± 5.4 reps per min) of rugby players and soccer players respectively. Cardiorespiratory endurance was not significantly different, but there was a significant difference in body composition, muscular strength, and muscular endurance between the two groups. Sri Lankan university-level rugby players have greater BMI, fat percentage, muscle percentage, muscular strength and muscular endurance than university-level soccer players.

Keywords: *Physical fitness, Rugby, Soccer*

Sedentary Behavior and Social Loneliness in Before, During and After the Lockdown Periods in COVID-19 Pandemic among Physiotherapy Undergraduate Students in Sri Lanka

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Abstract

The COVID-19 pandemic had become a major global threat in whole over the world. To control the rapid infection, the country was lockdown. The aim of this study was to assess the level of sedentary behavior and social loneliness in before, during and after the COVID-19 lockdown among physiotherapy undergraduate students in Sri Lanka. The descriptive cross-sectional study was carried out with 300 physiotherapy students of Kotelawala Defence University, University of Peradeniya and University of Colombo between January 2020 and February 2023. The data was collected using validated structured self-administrated questionnaires. The responses were captured electronically and the data was analyzed using SPSS software, version 20. The lowest number of population showed high sedentary behavior (127-168 hrs/week) in all three phases while the highest showed in during lockdown (7.3%). Most students showed high level of social loneliness during lockdown (13.3%) than the other two phases. A significant difference was found between gender and sedentary behavior only before lockdown ($p=0.04$) while no difference for the social loneliness. Further, a significant negative correlation was found between physical activity and sedentary behavior in before lockdown ($p=0.04, r=-0.12$). Most of the Sri Lankan physiotherapy undergraduates spent less sedentary hours regardless of COVID 19 pandemic. However, compared to other two phases there was an increase of sedentary hours in during lockdown while they showed more social loneliness in during lockdown period rather than the other two phases.

Keywords: *COVID-19 lockdown, Undergraduates, Sedentary behavior, Social loneliness*

POSTER PRESENTATION

Knowledge and Attitude of Pregnant Mothers toward Cesarean Section in Rural Community in Pallepola Division, Matale, Sri Lanka

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Abstract

Cesarean Section (CS) is a common surgical procedure used in childbirth when vaginal delivery poses risks to the mother or baby. The knowledge and attitudes of pregnant mothers towards CS play a crucial role in determining their acceptance of this birthing method. This study focuses on evaluating the knowledge and attitudes of individuals engaged with social philosophies towards accepting CS among pregnant mothers in the Pallepola division, Matale District, Sri Lanka. The study selected a sample size of 133 participants from the total population of 200 pregnant mothers using a stratified sampling method to ensure representativeness across different subgroups. The data was collected through well-structured questionnaires that were validated for accuracy and reliability. The study found that the overall knowledge about CS among the participants was 57%, while their attitude towards CS was 58%. Significantly, the acceptance level of CS was 54%. The majority of respondents had heard of cesarean sections, and most of them learned about them through neighbors, doctors, clinical consultations by midwives, and field nurses in the division. Most mothers believed that cultural and religious philosophies had minimal direct influence on the child birthing procedure. The majority of respondents had some knowledge about CS, and their attitude and acceptance towards CS were relatively positive. Recommendations based on the research findings include arranging further health educational programs and social awareness initiatives led by community leaders to improve healthcare procedure knowledge in the community.

Keywords: *Cesarean Section, Knowledge, Attitudes, Acceptance*

Knowledge, Attitudes, and Practices about Responsive Care in Early Childhood among Public Health Midwives in Kandy District, Sri Lanka

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Abstract

The process of watching/picking a child's interests, curiosities, and cues, to find out what they mean and promptly responding to them sensitively is known as responsive care. The aim of this study was to investigate the knowledge, attitudes, and practices about responsive care in early childhood among Public Health Midwives (PHMs) in Kandy District, Sri Lanka. A descriptive, cross-sectional study was conducted among 213 PHMs in the Kandy District. Data were collected using a validated, pre-tested self-administered questionnaire. Data analysis was done by using SPSS Version 26. The data were interpreted by calculating the frequencies and Chi-square tests. Computed knowledge scores were graded into "Good (26-29)", "Average (25-26)", and "Poor" (20-25)". Attitudes scores were graded into "Positive (64-80)", "Neutral (61-64)", and "Negative (34-61)". Practice scores were graded into "Good (45-50)", "Average (41-45)" and "Poor (25-41)". Among the total participants (n=213), 25.8% of them had good knowledge, 33.8% of participants had positive attitudes, and 31.9% of participants had good practices toward responsive care. There was a significant association between the level of education with the knowledge score ($p < 0.01$). The chi-square test exhibited there was no association between socio-demographic data with attitudes ($p > 0.01$) and practices ($p > 0.01$) related to responsive care in early childhood. According to this study, the knowledge, attitudes, and practices about responsive care in early childhood among PHMs in Kandy District need improvement. However, repeating the self-reported assessment after an interval and evaluating actual practices by observations or by parents' reports would be essential steps in future research. Further validation of the knowledge, attitudes, and practices tool developed for this study could be done by conducting qualitative studies and triangulation of results.

Keywords: *Responsive care, Early childhood, PHM*

Quality of Life of Breast Cancer Survivors of the University Hospital, Kotelawala Defence University, Sri Lanka

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Abstract

Breast cancer is the leading malignancy among women in Sri Lanka. Breast cancer survival rates have improved due to earlier detection and treatments. However, the patient's quality of life is still questionable. A descriptive cross-sectional study was carried out to assess the quality of life of breast cancer survivors at Kotelawala Defence University, Sri Lanka. The convenience sample approach was utilized to collect data on 112 patients who had completed treatments at University Hospital KDU from the 1st of May 2019 to the 30th of May 2022. A self-administered questionnaire, validated interviewer-administered EORTC QLQ-C30 questionnaire and validated interviewer-administered EORTC QLQ-BR23 questionnaire were used to collect the data. Spearman correlation, Mann-Whitney U test and Kruskal-Wallis H tests were done by using the SPSS version 25. The mean scores for physical function, role function, emotional function, cognitive function, and social function were 76.16 (± 19.53), 81.44 (± 18.07), 82.22 (± 18.53), 79.33 (± 13.86), and 98.36 (± 6.303). The mean scores for systemic therapy side effects, hair loss, arm symptoms, breast symptoms, body image, sexual functioning, and sexual enjoyment were 17.78 (± 16.48), 23.80 (± 31.66), 22.09 (± 18.90), 7.80 (± 12.40), 89.45 (± 14.57), 98.06 (± 8.28), and 63.73 (± 37.91) respectively. Quality of life is significantly improved by reducing symptomatic problems and increasing functional scales among breast cancer survivors. The prevalence of breast cancer increased with age while younger patients had a better quality of life. Sexual pleasure was lacking. The type of breast surgery did not affect the quality of life. According to the findings, health education and a sensitive monitoring system are needed to assess women's practices while emphasizing the consequences of breast cancer.

Keywords: *Quality of life, Breast cancer survivors, EORTC QLQ-C30, EORTC QLQ-BR23*

Knowledge and Awareness of Cervical Carcinoma among Female Students Aged 18-20 in Selected Schools in Kalutara District, Sri Lanka

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Abstract

Cervical carcinoma due to Human Papilloma Virus is one of the leading causes of morbidity and mortality among gynecological cancers in developing countries such as Sri Lanka. This study was conducted to assess the knowledge and awareness of cervical carcinoma among female students aged 18-20 in selected schools in Kalutara District, Sri Lanka. A descriptive cross-sectional study was conducted using a validated pre-tested self-administrated questionnaire designed as two sections under the topics of, knowledge and awareness regarding cervical cancer with closed-ended questions. Collected data from 440 participants were analyzed using SPSS 28 and Bloom's cut-off point was used to grade the data. The association between the participants' A/L stream and their knowledge and awareness of cervical carcinoma was analyzed using the chi-square test ($p < 0.05$). The study assessed knowledge and awareness of cervical carcinoma among students. Results showed that 95% had a low level of knowledge, and 86% had low awareness. Only 0.45% knew about screening tests, while 99.55% were unaware. This showed a lower knowledge level compared to a study conducted by K. Gunasekera in 2022 in Sri Lanka. However, a significant relationship was found between participants' A/L stream and knowledge and awareness of cervical carcinoma. In conclusion, the current study found that female students aged 18-20 in selected schools in Kalutara District have low knowledge and awareness regarding cervical carcinoma. It is strongly emphasized that a high priority should be set to provide knowledge on cervical carcinoma while conducting awareness programs at the school level.

Keywords: *Cervical carcinoma, Knowledge, Awareness*

Intestinal Parasitosis : Knowledge, Attitude, and Practices among Parents of Children aged 1-5 years in Hanwella Medical Officer of Health Area, Sri Lanka

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Abstract

Intestinal Parasitosis (IP) is a group of diseases of public health concern, caused by different species of protozoa and helminths. Prevalence is highest among children in developing countries. This study aimed to investigate the Knowledge, Attitude, and Practices (KAPs) among parents of children aged 1-5 years in Hanwella Medical Officer of Health (MOH) area of Sri Lanka towards IP to aid in identifying, planning, and carrying out effective community-based interventions. A cross-sectional study was conducted in Hanwella MOH area, from April to June 2023. A total of 282 parents were recruited using simple random sampling technique from 3 sub-areas. KAPs towards IP were assessed using a pre-tested interviewer-administered structured questionnaire and data was analyzed using SPSS version 25. Bloom's cut-off point was used to categorize KAP. Among respondents, 52.1%, 73.0%, and 61.7% had good knowledge, attitude, and practice respectively. 95% and 98.2% of respondents stated that their children wash their hands before meals and after defecation respectively. There were significant association towards knowledge with mother's educational level ($p=0.026$), family income ($p<0.001$), housing conditions (no. of rooms $p<0.001$, no of bathrooms $p<0.000$), type of toilet commonly used ($p<0.001$), and with the origin of water supply ($p=0.006$). There was a significant association between practice with the availability of separate toilets ($p<0.000$) and a significant association towards attitude with deworming frequency ($p=0.036$). There was a positive linear correlation between, knowledge and attitude, ($r=0.282$, $p<0.001$), attitude and practice, ($r=0.278$, $p<0.001$). Knowledge, attitude, and practices of parents towards IP were at a good level on average.

Keywords: *Intestinal parasitosis, Knowledge, Attitude, Practice, Parents*

Effect of Health-Literacy and Self-Management Efficacy on the Health-Related Quality of Life of Hypertensive Patients Attending a Tertiary Care Hospital in Sri Lanka

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Abstract

Disease processes and subjective factors such as Health Literacy (HL) and Self-Management Efficacy (SME) affect the Health-Related Quality of Life (HRQoL) of hypertensive patients. The main objective of this study was to examine the effect of health literacy and self-management efficacy on the HRQoL of hypertensive patients who are attending a tertiary care hospital in Sri Lanka. A descriptive cross-sectional study was conducted among 404 hypertensive patients attending Teaching Hospital-Peradeniya. Data was collected using Short Form-36 (SF-36), Self-Efficacy for Managing Chronic Disease 6-Item Scale (SES6C), and Brief Health Literacy Screening (BHLS) to measure the patient's HRQoL, SME and HL, respectively. p value being ≤ 0.05 considered as the level of significance. Out of 400 participants 246 (61.5%) were female and 154 (38.5%) were male. Mean age of the participants was 63.2 ± 10.6 years. Total mean score of SF-36 was 65.71 ± 19.73 . The total mean score for the SES6C was 7.36 ± 1.48 and the total mean score for the BHLS was 18.35 ± 3.17 . A moderately significant relationship was found between Total HRQoL and SES6C Scores ($r = 0.498, p = 0.001$). A positive but weak relationship was found between the total HRQoL and the Total BHLS score ($r = 0.209, p = 0.001$). Simple linear regression analysis revealed that two predictor variables, SME and HL explain about 26.1% of the variance in HRQoL. Both HL and SME affect the HRQoL in a significant manner. Age, level of education, duration of hypertension, and the monthly income of the patients were found to be associated with the HRQoL of the hypertensive patients.

Keywords: *HRQoL, SME, HL, Hypertensive patients*

***In vitro* Evaluation of Anti-Inflammatory and Antibacterial Properties of Tuberos Roots of *Mirabilis jalapa* Linn. Found in Sri Lanka**

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Abstract

The Four-O'clock plant, also known as *Mirabilis jalapa* Linn. is a well-known ornamental plant prized for its folklore remedies in many countries around the world. The objective of the current study was to evaluate the anti-inflammatory and antibacterial properties of hexane, dichloromethane, methanol, and aqueous extracts of *M. jalapa* tuberous roots found in Sri Lanka in order to test the numerous claims made on the medicinal properties of this plant. The plant extracts were prepared by cold maceration method and concentrated using a rotary vacuum evaporator. The anti-inflammatory activity was evaluated using the human red blood cell (HRBC) membrane stabilization assay and the egg albumin denaturation inhibition assay. The antibacterial activity was tested against the most common wound pathogens (*Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus aureus*) by both disc and well diffusion methods. The methanol extract demonstrated the highest anti-inflammatory potency in the egg albumin denaturation inhibition assay ($IC_{50} = 137.8$ g/mL), whereas the aqueous extract demonstrated the highest potency in the HRBC method ($IC_{50} = 197.4$ g/mL). All four extracts showed no discernible antibacterial activity. However, in the well diffusion method, the dichloromethane extract against *S. aureus* had the highest inhibitory zone, measuring 15.33 ± 0.33 mm, at the concentration of 400 mg/ml. Hexane extract had the second-highest inhibitory zone, measuring 14.00 ± 2.08 mm at the same concentration. This study shows that *M. jalapa*'s tuberous roots have promising anti-inflammatory properties with no significant antibacterial efficacy against the selected pathogens.

Keywords: *Four O' clock plant, Mirabilis jalapa Linn., HRBC method, Antibacterial, Anti-inflammatory*

Assessment of *In vitro* Antibacterial and Anti-inflammatory Activities of Sri Lankan Medicinal Plant *Jeffreyia zeylanica* (Pupula)

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Abstract

Antibiotic resistance, global health risks, and absurd consequences of anti-inflammatory drugs are significant complications. As an alternative plant can be used. *Jeffreyia zeylanica* an endemic plant in Sri Lanka was selected to evaluate antibacterial and anti-inflammatory activities, because of its ethnomedical value and economical. *J. zeylanica* leaves were air-dried, then macerated and plant extracts were prepared using vacuum evaporation. Plant extracts were made using aqueous, methanol, dichloromethane, and hexane as solvents. To detect antibacterial activity Agar well diffusion and Disc diffusion methods were used. To assess anti-inflammatory activity egg albumin denaturation and Human Red Blood Cell (HRBC) membrane stabilization methods were used. The antibacterial activity of the plant extracts was evaluated against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Escherichia coli*. In both methods, plant extracts effectively inhibited the activity of *S. aureus*. In the agar well diffusion method, methanolic extract indicated the highest inhibition zone of 29.33 ± 0.33 mm and high effectiveness with EC_{50} of 39.05 mg/ml. In the disc diffusion method, dichloromethane extract indicated the highest zone of 14.66 ± 0.33 mm, and the most effective activity was indicated by methanolic extract with an EC_{50} of 200 mg/ml. Both methods used Gentamicin (40mg/mL, 10 μ g) as the positive control. In the protein denaturation method, hexane extract indicated the best potential activity with IC_{50} of 154.9 μ g/ml. In the HRBC method, the highest potency was indicated by dichloromethane extract with IC_{50} of 154.0 μ g/ml. Diclofenac sodium was the reference drug to evaluate the anti-inflammatory activity. The above results indicate that plant *J. zeylanica* has potential antibacterial and anti-inflammatory activity.

Keywords: *J. zeylanica*, Antibacterial activity, Anti-inflammatory activity, Endemic, Sri Lanka

Antibacterial Effect of Aqueous Leaf Extracts of Lemon Grass Plant against *Staphylococcus aureus* and *Escherichia coli*

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Abstract

Antimicrobial drug resistance has increased dramatically in the past years. Therefore, the urge to discover alternative natural antimicrobial agents has increased. Several plant extracts were found to be highly effective against the activity of these pathogens causing food borne infections. This study aims to determine the antibacterial effect of aqueous leaf extract of *Cymbopogon citratus* (Lemon grass) against *Staphylococcus aureus* (ATCC 25923) and *Escherichia coli* (ATCC 25922). Aqueous plant leaf extract was obtained by maceration technique under sterile conditions. Antibacterial testing of the plant extract was performed using the agar well-diffusion method, Minimum Inhibitory Concentration (MIC), and Minimum Bactericidal Concentrations (MBC). Concentrations of 50mg/ml, 100mg/ml, 200mg/ml, and 400mg/ml plant extracts were prepared in 10% Dimethyl sulfoxide (DMSO) solution and tested for the zone of inhibition. Vancomycin Intravenous (IV) and Cefotaxime IV drugs were used as positive controls for *S. aureus* and *E. coli* respectively. For the negative control 10% DMSO was used. According to the triplicates results, a zone of inhibition was only observed in *E. coli* with 9.67 ± 0.1 mm for 400 mg/ml, MIC of 400 mg/ml, and MBC of 800 mg/ml and zone of inhibition was not observed for 50 mg/ml, 100 mg/ml, and 200mg/ml concentrations under the tested conditions. Aqueous plant extracts at the studied concentrations failed to inhibit the growth of *Staphylococcus aureus*. In conclusion, aqueous extractions of *C. citratus* leaf possess antibacterial activity against *E. coli* and to produce new antibacterial compounds using *C. citratus* plant will be an intriguing option.

Keywords: *Antimicrobial activity, Cymbopogon citratus, Aqueous plant extract*

Incidence of Diabetes Mellitus and Chronic Kidney Disease and Assessment of Risk Factors among Tuberculosis Patients Attended to the Chest Clinic, Regional Director's Office of Health Services, Badulla

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Abstract

The incidence of Diabetes Mellitus (DM) and Chronic Kidney Disease (CKD) is significantly high in TB patients. Risk factors associated with TB are multifactorial. A prospective cross-sectional study was conducted to investigate the risk factors and incidence of DM and CKD among tuberculosis patients attending Chest clinic, Badulla, Sri Lanka from October 2022 to December 2022. The ethical clearance was obtained from the ethical review committee of General Sir John Kotelawala Defence University. Data such as sociodemographic characteristics, risk factors and laboratory investigation findings were collected from patient data base and clinical records to a questionnaire. Patient Body Mass Index (BMI) and eGFR was calculated by the investigators. Descriptive statistics, Chi-square tests and Pearson correlations were used to analyze data. Results showed a higher prevalence of tuberculosis (TB) among males (69.5%) with mean patient age of 47 (± 17). Most TB patients (52.2%) had a mean BMI of 19.04 (± 4.67) and were underweight based on BMI, and a significant number had education up to an ordinary level (85.5%). Majority of employed patients (67.4%) had low income (<Rs. 15,000 per month). Onsite visits of the Public Health Inspector indicated unsatisfactory ventilation for over half of the patients (51.3%). Common symptoms included cough (78.5%), loss of appetite (66.0%), and weight loss (66.0%). Diabetes (17.5%) and chronic kidney disease (CKD) (3%) were observed among TB patients, with some showing reduced kidney function (eGFR < 60 ml/min/1.73m²) based on calculated eGFR. Factors such as low education, low income, poor ventilation, unsafe water (71.6%), and imprisonment (8.5%) were potential TB risk factors. Surprisingly, smoking (65.5% non-smokers) and alcohol consumption (59.0% non-consumers) didn't appear significantly linked to TB in this study.

Keywords: *DM, CKD, Risk factors*

Risk Factors, Incidents of Acute Kidney Injury and Liver Involvement among Leptospirosis Patients Admitted to the Teaching Hospital, Ratnapura

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Abstract

Leptospirosis is a global zoonotic infection and severity is highly variable. Renal and hepatic complications are major concerns of the disease. Therefore, the study was aimed to identify the potential risk factors and evaluate the progression of renal injury and liver involvement among leptospirosis patients admitted to the Teaching Hospital, Ratnapura. A prospective cross-sectional study was conducted on 103 clinically suspected leptospirosis patients above 15 years of age. An interviewer-administered questionnaire was used to collect socio-demographic, geographical, behavioral, occupational, and agricultural information. Clinical information of patients was collected from medical records and biochemical and hematological investigations were extracted from the laboratory reports. The majority of patients were males (94.2%) with a mean age of 45 ± 15 years. The highest percentage of the population was engaged in mining (31.8%) and farming (30.7%). Most patients had open wounds, cuts, or bruises on the skin (66%), and had bathed or waded in flood water or contaminated fresh water (57.4%). Acute kidney Injury (AKI) was developed among 26.2% of the population (KDIGO criteria). A significant increase in creatinine ($p < 0.001$), CRP level ($p < 0.001$), differential count of neutrophils ($p < 0.001$), and a significant decrease in the differential count of lymphocytes ($p < 0.001$) and platelet count ($p < 0.01$) was observed in AKI patients when compared with non-AKI patients. Liver involvement was observed in 28.16% of the study population (National Guideline of Leptospirosis). A significant increase in AST ($p < 0.001$), ALT ($p < 0.001$), and decreased platelet count ($p < 0.05$) was observed between patients with and without liver involvement. In conclusion, involvement in mining and farming activities were identified as major occupational risk factors for the disease. Approximately one-third of the patient's population had AKI and liver involvement.

Keywords: *AKI, Leptospirosis, Liver involvement, Risk factors*

A Study on Incidence of Bacteria Fostering Blood Culture Positivity

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Abstract

Analysis of single positive blood culture is widely used in Sri Lanka in the diagnosis of sepsis. There are only a few studies conducted regarding information on bacteria that could give rise to sepsis and the probability of bacteria causing sepsis. Therefore, the aim of this study was to identify bacteria that commonly give positive results for single positive blood cultures and to study the incidence of bacteria giving positive results. A prospective cross-sectional study was conducted at the Microbiology Laboratory, National Hospital of Colombo, Sri Lanka. Patients (144) who had given positive results for blood cultures were recruited from the 30th of October to the 31st of December 2022. The epidemiological profiles (patient name, age, gender, BHT, disease conditions, and comorbidities) and the results obtained for the blood cultures of patients were analyzed. Out of 144 positive blood cultures, 58.3% and 41.7% were identified as Gram-positive bacteria and Gram-negative bacteria respectively. Amongst Gram-positive bacteria, Methicillin-sensitive *Staphylococcus aureus* (MSSA), Methicillin-resistant *Staphylococcus aureus* (MRSA) & Gram-positive bacilli showed positive results, whilst coagulase-negative Staphylococci had given the highest incidence (23.6%) of giving positive results on blood cultures. Amongst Gram-negative bacteria, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Acinetobacter baumannii* were reported as common bacteria that give positive results on blood cultures. *Klebsiella pneumoniae* had the highest incidence (11.8%) in the Gram-negative group. Therefore, this study identified the most common bacterial species apart from contaminating skin flora that cause blood culture positivity and the incidence of bacteria for blood culture positivity.

Keywords: *Gram-positive, Gram-negative, Coagulase-negative Staphylococci, MRSA, MSSA*

***In Silico* Study of the Computationally Designed Novel Vinca Alkaloid Derivatives VADRPA01 and VADRP01 Effects on Calmodulin and Calmodulin Dependent Ca²⁺ Transport ATPase**

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Abstract

Vinblastine was the first Vinca Alkaloid (VA) with antiproliferative properties discovered in plant *C. roseus*. The ability of VA drugs to bind with the Calmodulin (CaM) and Calmodulin-dependent Ca²⁺ transport ATPase (CaM-dep-Ca²⁺ TATPase) causes neurotoxic side effects due to antagonist the activity of the enzyme. The optimized derivative forms of the natural VAs are playing an important role in clinical practice to reduce the side effect of the Vinca Drugs. This in-silico study was conducted to evaluate the CaM binding characteristics of the novel VAs derivatives VADRPA01 and VADRP01 and their effect on CaM-dep-Ca²⁺ TATPase compared to the marketed Vinca drug. VADRPA01 demonstrates the highest water solubility at 7.4 pH, LogS=-0.91. Klaus Gietzen *et al* confirmed that VAs have two binding sites at the Calmodulin molecule with high and low affinity by in vitro analysis. The CHARMM36 updated force field was used to calculate binding energy and identified two binding sites (A and B) on the CaM molecule. The binding affinity of VAs varies between 1.9% to 8.1% related to Vinflunine (-6.2 kcal/mol). In silico results compared with Klaus Gietzen *et al* in-vitro analysis data show the antagonist activity of Vinca drugs on the CaM-dep-Ca²⁺ TATPase enzyme depends on the strength of the complex formed with CaM. The conducted gmxMMPBSA analysis shows that the binding energy is not the only factor influencing the antagonist activity of Vinca alkaloids. The conducted Vinca-free and Vinca-bound CaM|CaM-dep-Ca²⁺ TATPase binding behaviour analysis confirmed that the binding position geometry of the Vinca molecule with CaM plays an essential role in their antagonist activity on the CaM-dep-Ca²⁺ TATPase. The present study found that VADRPA01 lowered CaM binding affinity with CaM-dep-Ca²⁺ TATPase by 81.8% compared to Vinblastine.

Keywords: VA, Molecular docking, Molecular dynamics, Anticancer, Calmodulin

Formulation and Evaluation of a Polyherbal Hair Dye Cream of the Aqueous and Ethanolic Plant Extracts of *Hibiscus rosasinensis*, *Coffea arabica*, *Syzygium aromaticum*, and *Cinnamomum zeylanicum*

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Abstract

Polyherbal hair dye products are preferred over synthetic products due to their several benefits. Literature reported flowers of *Hibiscus rosasinensis*, seeds of *Coffea arabica*, buds of *Syzygium aromaticum*, and bark of *Cinnamomum zeylanicum* extracts seem to have high colour intensity. Hence, this study aimed to prepare a Poly Herbal Hair Dye (PHHD) cream using aqueous and alcoholic extracts of above plants. Aqueous and ethanolic extracts were obtained after maceration. PHHD creams (A,B,C) were prepared mixing each extract with the cream base. A hair color developer was prepared to improve the colour retention of the hair by adding hydrogen peroxide in 3% ,6% and 9% concentrations, separately. The formulated PHHD creams and the developer were evaluated for organoleptic and physicochemical properties. The hair colorant effect of each cream and their combinations with the hair color developers were evaluated using human gray hair. Formulated creams were characterized by microscopic analysis, stability test, analyzing the effect of sunlight, natural detergent and room temperature on coloured gray hair. Descriptive analysis was done using SPSS 23. The ethanolic extract exhibited high color intensity. All the types of hair color developers had the same colour effect on gray hairs. Nine percent of developers had the longest duration (45 days) of colour retaining ability. The six percent of developers were selected as the suitable developer considering its median peroxide level and the duration of colour retention. Hence, it could be concluded that the combination of PHHD B (Ethanolic) with 6% developer would be suitable for hair dyeing due to its high colour intensity, colour retention time (30 days) and the level of hydrogen peroxide.

Keywords: *PHHD, Physicochemical properties, Hair colorant effect*

Formulation Development and Analysis of Poly-herbal Antidiabetic Tablet Dosage Form

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Abstract

Diabetes mellitus is a leading global health problem. Prevalence of diabetes mellitus in Sri Lanka was 11.3% in year 2021. As synthetic antidiabetics are associated with several unintended adverse effects on long term use, a convenient herbal formulation based on scientific evaluation could be beneficial to control diabetes with lesser adverse effects. The objective of this study was to formulate and analyse a tablet containing scientifically evaluated antidiabetic active plant constituents. Extracts of *Garcinia quaesita*, *Bunchosia glandulifera* and *Coleus hadiensis* which have been proven non-toxic and showed in vitro antidiabetic and antioxidant activities were used in this study. Four different tablet formulations were developed by slightly changing the percentage of added excipients. The tablets were then prepared by wet granulation followed by compression and stored at room temperature ($28\pm 5^{\circ}\text{C}$). Friability, hardness, weight variation, disintegration and dissolution tests were conducted as per the United States Pharmacopeia. Tablets of all four formulations passed the friability (1%), hardness (within $5\text{--}8\text{ kg/cm}^2$ or force within $4\text{--}10\text{ kg}$) and weight variation (within 5-10%) tests. Tablets of the three formulations totally disintegrated within 30 minutes at $37\pm 2^{\circ}\text{C}$. However, the tablets of only two of the formulations passed the dissolution test, while the tablets of all four formulations were physically stable to-date without any change in colour, odour, shape, and texture. In conclusion, two tablet formulations that conform with all quality standards could be considered for further activity evaluations including preclinical and clinical trials.

Keywords: Tablets, Antidiabetic, *Garcinia quaesita*, *Bunchosia glandulifera*, *Coleus hadiensis*

Fabrication of Dermal Patch for Wound Care with Graphene Oxide Based Nanocomposites Loaded with Gallic Acid

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Abstract

Graphene-based nanocomposites have been used as a promising drug delivery mechanism due to their significant properties. Gallic Acid (GA) is a natural bioactive compound with pharmacological properties including anti-bacterial, anti-inflammatory, and antioxidant activity. The objective of the present study was to form a dermal patch loaded GA to facilitate wound healing. Initially, nano-graphene oxide was synthesized using Hummer's method followed by PEGylation. Then GA was loaded with 1:1 ratio and by which characterization studies were conducted to confirm the successfulness of the formulation procedure. Anti-inflammatory and antioxidant activities of the nanocomposite were evaluated by Egg albumin method. The dermal patch was fabricated using the solvent evaporation technique followed by characterisation studies. The SEM (scanning electron microscope) confirmed the physical existence of GA on the matrix with particle size varying from 200 to 450nm. The FTIR (Fourier-Transform Infrared spectroscopy) exhibited the structural arrangement of the nanocomposite. Thermogravimetric analysis (TGA) proved the thermal endurance with breakdown of the aromatic structure occurred in between 210 to 600°C. The Particle Size Analysis (PSA) confirmed that the average particle size distribution lies between 193.48nm and 246.98nm. The antioxidant activity of the nanocomposite was revealed with an IC₅₀ value of 3.78 mg/mL for ABTS assay, 4.15 mg/mL for FRAP assay, and 3.50 mg/mL for NO assay. The antioxidant assay was conducted using Ascorbic acid as the positive control. The nanocomposite exerted an anti-inflammatory activity with an IC₅₀ value of 11.39 mg/mL. Here Diclofenac Sodium was used as the positive control. Finally dermal patch was developed. The formulation consisted with Polyvinylpyrrolidone: Hydroxypropyl Methyl Cellulose, 2:8 was selected as the best formulation with the suitable characteristics which can lead to the formulation of successful wound healing application.

Keywords: *Gallic acid, Graphene oxide, Dermal patch*

Assessment of Antimicrobial Efficacy of Banana Peel (*Musa paradisiaca*) Extracts and Determination of Minimum Inhibitory Concentration against Selected Oral Pathogens.

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Abstract

The peels of *Musa paradisiaca* apply to a wide range of applications, including antimicrobial applications, the production of face masks, hair masks, and biofuel. This study aimed to determine the antimicrobial activity of aqueous, ethanolic, and methanolic extracts of *M. paradisiaca* peels against selected oral pathogens. Ethanolic and methanolic extracts were concentrated by evaporating evaporation at room temperature. Powder (500 mg) was dissolved in 1 ml of 1% Dimethyl Sulfoxide (DMSO) for agar well diffusion assay. Gentamycin, Vancomycin and Fluconazole were used as positive controls for Gram-negative bacteria, Gram-positive bacteria and *Candida* respectively. DMSO (1%) served as the negative control. Inhibitory zones were measured after overnight incubation at 37°C. The Minimum Inhibitory Concentration (MIC) of the extracts was determined using a broth dilution assay. *S.aureus*, *E. coli*, *K. pneumonia*, and *C. albicans* exhibited mean inhibitory zone diameters of 23 ± 1.0 mm, 17 ± 3.0 mm, 21 ± 2.0 mm, and 5.6 ± 0.0 mm, respectively for methanol extract at 500 mg/ml. The respective controls exhibited mean zone of inhibition diameters of 26 ± 0.3 mm, 20 ± 0.1 mm, 28 ± 0.0 mm, and 12 ± 0.6 mm, respectively. For the ethanolic extract, *K. pneumonia*, *S. aureus*, *E. coli*, and *C. albicans* exhibited 27 ± 0 mm, 18 ± 1.0 mm, 16 ± 3.0 mm, and 8 ± 0.0 mm diameter mean inhibitory zones respectively, at 500 mg/ml. The respective controls exhibited mean zone of inhibition diameters of 28 ± 0.2 mm, 26 ± 0.0 mm, 20 ± 0.4 mm, and 12 ± 0.6 mm. The aqueous extract did not exhibit inhibitory effects against tested microorganisms. For the ethanol extract, MIC against *S. aureus* and *E. coli* was found to be 125 mg/ml. For methanolic extract, MIC against *K. pneumoniae* was 125 mg/ml. The methanolic and ethanolic extracts from *M. paradisiaca* peel have potential antimicrobial properties against the tested microbes, comparable to that of the positive controls.

Keywords: *Antimicrobial activity, M. paradisiaca, MIC*

Microscopic Characteristics and Phytochemical Screening of *Crudia zeylanica*

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Abstract

Crudia zeylanica (Fabaceae) is a native, critically endangered plant in Sri Lanka. It was rediscovered recently after recorded in 1911. Its uses or any activity have not been reported. The objectives of this study were to observe the microscopical characteristics and to screen the secondary metabolites present in *C. zeylanica*. In the methods, transverse section (TS), upper and lower epidermal peels of the leaf and the TS of the stem were examined under light microscope (x40). Plant leaves and stem twigs were separately dried and ground to obtain a coarse powder. Powder of the stem twigs was subjected to dry powder analysis while plant leaves were extracted into methanol and subjected to selective qualitative phytochemical screening. Microscopical observations of the leaf showed the presence of a brown pigment in some of the cells in the lower epidermal peel, in parenchymal cells and cells around phloem tissue of the central vascular bundle. Small irregular shape, light brown, and colourless droplets were present in the central pith of the TS of the stem twigs. In powder microscopy, sclerenchyma, phloem and phloem sieve plate, lignified fibres, xylem with annular type tracheid and cells with brown pigment were observed. Phytochemical screening revealed the presence of coumarins, flavonoids, glycosides, phenols, resins, saponins and tannins. Special features observed in cross sections could be used to identify the plant. Presence of flavonoids and other phytochemicals suggests that the *C. zeylanica* may have medicinal importance over some diseases.

Keywords: *C. zeylanica*, Pharmacognostical study, Powder microscopy, Phytochemical screening

Assessing Occupational Radiation Exposure in Interventional Cardiology: A Study on Effective Dose Estimation

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Abstract

Safeguarding of safety and well-being of interventional cardiology healthcare workers, monitoring their occupational radiation exposure is crucial. This study evaluates the radiation dose of interventional cardiologists using the Swiss Ordinance for personal dosimetry approach. Its primary aim is to estimate the radiation dose for each operator engaged in interventional cardiology procedures to protect from dangerous levels of radiation. Notably, no previous studies in Sri Lanka have specifically assessed radiation dose in this context, making this research vital in shedding light on radiation exposure in an interventional cardiology environment. Two cardiologists conducted a total of 108 interventional cardiology procedures, including coronary angiograms and percutaneous coronary interventions for three months at the Cardiac Catheterization Laboratory of Sri Jayawardenepura General Hospital, Sri Lanka. Active dosimeters were utilized to measure dose values using a two-dosimeter approach where one dosimeter was positioned above the thyroid collar and the other beneath the lead apron on the left side of the waist. The Swiss Ordinance algorithm calculated the effective dose for each cardiologist, resulting in 3.0397 $\mu\text{Sv}/\text{year}$ and 0.9697 $\mu\text{Sv}/\text{year}$, respectively showing that the estimated annual occupational doses remained well below the annual dose limit (20 mSv/year). The accuracy of the algorithm in interventional ionizing radiation scenarios was also highlighted. In conclusion, implementing the Swiss Ordinance for personal dosimetry in interventional cardiology enhances our understanding of radiation dosimetry and underscores the importance of accurate dose estimation to protect cardiologists. This study contributes to advancing radiation safety practices in the interventional cardiology field.

Keywords: *Effective dose, Double dosimetric algorithm, Interventional cardiology, Occupational exposure, Radiation protection, Swiss ordinance for personal dosimetry*

A Comparison of Gray Matter Structural Networks of Patients with Migraine and Healthy Subjects: A Graph Theory-Based Study

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Abstract

Migraine is a common primary brain disorder which is characterized by recurrent pulsating and throbbing head pain. Magnetic Resonance Imaging (MRI) - based neuroimaging has been extensively used to detect structural brain changes in migraines. We hypothesize that the above- mentioned changes may alter structural brain network topology in the brain, resulting in poor information transfer. Therefore, we aimed to characterize the global network topology of patients with migraine and healthy subjects using gray matter structural networks. The study was performed using 3D T1-weighted MRI images of the brains of 45 migraine patients and 46 healthy controls. Then group-level structural connectivity matrices were developed using Pearson correlation and the matrices were binarized by applying a series of sparsity thresholds and global network topologies (small worldness, network efficiency, hierarchy, synchronization, and assortativity) were computed. Between-group differences of global topological metrics were tested using nonparametric statistics (permutation tests, $n=1000$). According to between-group results, patients with migraine showed increases in small-worldness, and global efficiency while local efficiency and synchronization did not differ significantly between patients and healthy subjects ($p<0.05$). Assortativity values were largely dispersed among their sparsities and were considerably higher in the healthy network than in the migraine network at sparsities of 0.4 and 0.5 ($p<0.05$). In addition, with the increasing network sparsity there was an increasing trend for hierarchy property of patients. Our findings imply that migraine could alter the topological properties of structural brain networks and graph theory-based approach provides valuable information about them.

Keywords: *Migraine, Gray matter, Structural networks, Graph theory, MRI*

Identification of the Factors Affecting on the Retention of ^{99m}Tc-DMSA in Syringes among Paediatric Population

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Abstract

^{99m}Tc-DMSA is a common paediatric renal study, where radiopharmaceutical is introduced intravenously using disposable syringes. Radiopharmaceuticals retain on disposable syringes, causing under-dosing, impacting on imaging quality. The present study aimed in specifying the factors affecting on retention of ^{99m}Tc-DMSA in disposable syringes. A sample of 212 paediatric patients under 15 years of age, underwent the ^{99m}Tc-DMSA renal scintigraphy investigation, from 17th of November 2022 to 28th of February 2023 were subjected. CAPINTEC radiation dose calibrators were used to measure the pre and post radiation doses of the used disposable syringes. Six different types of 1 ml/1 cc disposable syringes (Type-1 to 6) and 1 ml insulin syringe (Type-7) were used. All relevant data pertaining to this study were accumulated. The data were analysed using Welch's ANOVA test, Mann-Whitney U test and Spearman's Rank Order Correlation statistical tests using SPSS version 26 software with $p < 0.05$ indicating a level of significance. Results indicated a statistically significant correlation between retention dose and radiopharmaceutical dilution. No significant difference in retention with patients' gender and patient's positions during the radiopharmaceutical administration. Significant differences in retention dose among syringe types, injected sites, and radiopharmaceutical labelling and administering personals were indicated. Syringe Type-1 is less suitable with its highest retention dose. Type-7 is the best with the lowest retention dose. In conclusion, the retention of ^{99m}Tc-DMSA in disposable syringes is affected by the radiopharmaceutical dilution, types of the syringes, injected sites and radiopharmaceutical labelling and administering personel. Retention is not affected by pre-dose, patient's weight, gender, and patient's position.

Keywords: *Retention, ^{99m}Tc-DMSA, Disposable syringes, Paediatric population*

Establishment of Institutional Diagnostic Reference Levels for Whole-body Positron Emission Tomography/Computed Tomography Imaging Procedures

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Abstract

The use of Positron Emission Tomography/Computed Tomography (PET/CT) imaging has become more popular in oncology. A concern with PET/CT is the combined radiation doses from both CT and radiopharmaceuticals. A Diagnostic Reference Level (DRL) is an effective tool for optimizing patient and staff radiation exposure while maintaining adequate diagnostic image quality. The aim of this study is to optimize the patient radiation dose by establishing institutional DRLs for whole-body PET/CT imaging procedures performed at Apeksha hospital in Maharagama, Colombo, Sri Lanka. A total of 86 imaging procedures was selected for this study. All data were collected from September 2022 to November 2022. The median (50th percentile) of the administered activity, Dose Length Product (DLP) and CTDI_{vol} values were considered as the DRL values as recommended by the International Commission of Radiological Protection (ICRP). The median values of the administered activity, effective dose, total DLP and CTDI_{vol} were reported as 184.26 MBq, 3.50 mSv, 1407.5 mGy.cm and 7.51 mGy respectively. According to the ICRP recommendation, the established DRL values for administered activity, total DLP and CTDI_{vol} for PET/CT whole-body scan procedures performed in the PET/CT Unit of Apeksha Hospital are 184.26 MBq, 1407.5 mGy.cm and 7.51 mGy respectively. This study is an initiative process of developing national DRLs for PET/CT imaging procedures in Sri Lanka. Furthermore, a significant statistical correlation was found in between the effective dose and patients' body mass index. In addition, a significant relationship was found in between effective dose and patients' clinical indication.

Keywords: *PET/CT, DRL, Effective dose, Whole-body scan*

The Relationship of the Craniovertebral Angle with Pain and Activities of Daily Living in Patients with Neck Pain attending the Department of Physiotherapy at Kotelawala Defence University Hospital Sri Lanka

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Abstract

Neck pain is one of the most commonly appeared symptom when a healthy person adopts a compensatory forward head posture with a lower Craniovertebral Angle (CVA) than the normal healthy person. The purpose of this study was to determine the relationship between CVA with cervical pain, and Activities of Daily Living (ADL) in patients with neck pain. A cross sectional descriptive study was conducted by recruiting 75 neck pain patients between ages 25 and 55. Neck pain intensity was measured by the Numerical Pain Scale (NPS), ADL by the self-administrated Neck Disability Index (NDI), and CVA by the photogrammetry method. The photograph was analyzed using the Kinovea (Kinovea-0.9.5-x64) body posture analyzer software. The Pearson correlation test result was significant at the 0.05 level and a negative correlation was observed between CVA with cervical pain ($r=-0.658$) and level of disability ($r=-0.268$). Neck pain and level of disability tend to increase when a CVA decreases and vice versa.

Keywords: *Neck pain, Craniovertebral angle, Forward head posture*

Association of Chronic Obstructive Pulmonary Disease Stages with Musculoskeletal Pain Sites and Mobility in Patients at Central Chest Clinic in Colombo, Sri Lanka

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Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a respiratory disease, that results in progressive airflow limitation and restricts the normal breathing pattern which is irreversible. Musculoskeletal pain and mobility are affected by the severity of the disease. The general objective was to evaluate the association of COPD stages with musculoskeletal pain sites and mobility in COPD patients at Central Chest Clinic in Colombo, Sri Lanka. Specific Objectives were to identify the most occurring musculoskeletal pain sites in COPD patients and to determine the association between mobility and COPD stages. A descriptive cross-sectional study was conducted with the participation of 135 COPD patients with age between 30-79 years. The pain site was assessed by administering a brief pain inventory questionnaire. Timed Up and Go (TUG) test was performed to assess the mobility and the reference value confounded the age. Data were statistically analyzed using SPSS software (version 20) and $p < 0.05$ was considered as significant. The test results reflected that the association between COPD stages and musculoskeletal pain site was not statistically significant ($p = 0.354$). In accordance with descriptive statistics, most responded musculoskeletal pain sites according to the COPD stages were mild stage-chest, moderate stage-shoulder, severe and very severe stage-lower back. A sub-group analysis was done for age (41-50 yrs, 51-60 yrs-chest and 61-70 yrs, 71-79 yrs-lower back). The association between COPD stages and mobility was strongly positive ($p = 0.01$). As conclusion, there was strong association between COPD stages and the mobility whereas there was no association between COPD stages and musculoskeletal pain site.

Keywords: *COPD, Musculoskeletal pain, Mobility*

The Prevalence of Musculoskeletal Discomfort among Bank Officers in Selected Banks in Colombo District

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Abstract

Improper working postures associated with bending, twisting, overreaching and repetitive tasks can lead to musculoskeletal disorders in office workers. Musculoskeletal disorders due to work environment can be considered as one of the major complaints among sedentary workers such as bank employees. Hence, this study attempted to describe the prevalence of musculoskeletal discomforts in bank officers in selected banks in Colombo District. This descriptive cross-sectional study was conducted in selected branches of nine selected private banks in the Colombo District. Thus, 212 Bank officers of both genders aged 18 to 60 years, with working experience in office setups more than one month and whom the daily working period is above 5 hours were recruited using multi-stage random sampling method. Those who had pre-existing musculoskeletal conditions prior to starting work as a banker or, recent injuries/surgeries were excluded. Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was used to collect data on the musculoskeletal discomfort level of the participants which was experienced at that time of data collection. In the study, the participants consisted of 136 (64.2%) males and 76 (35.8%) females. The study revealed that a significant majority of bank officers in the Colombo District were aged 18-30 (n=102, 48.1%), with a considerable portion working for 8 hours or more (n=102, 73.4%). The prevalence of musculoskeletal discomfort was high, with the neck (n=80, 37.7%), lower back (n=50, 23.6%), and hip/buttocks (n=30, 14.2%) being the most commonly affected areas. Moderate levels of discomfort were reported by the majority of participants in these regions based on the CMDQ score. Majority of participants (n=71, 33.4%) reported in at least one region. In conclusion, this study revealed that the neck, lower back, and hip/buttocks are the primary areas of with moderate discomfort among bank officers. To address issues, interventions focusing on ergonomic improvements are crucial for enhancing the wellbeing of officers.

Keywords: *Musculoskeletal discomfort, Working posture, Office workers*

Relationship between Musculoskeletal Pain and Stress Level of Secondary Teachers in Selected Schools of Matara District

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Abstract

Musculoskeletal (MSK) pain is a common occupational health problem among school teachers. Stress level may contribute for MSK pain. The study aims were to determine the prevalence of MSK pain, stress level, determine the relationship between MSK pain and stress level among secondary school teachers. This descriptive cross-sectional study was conducted among 222 secondary school teachers who were recruited using two-stage random sampling method from selected schools of Matara district. Teachers of both genders aged 25-60 years who had been teaching for one year or more were recruited. Self-administered questionnaires were used to collect data. The Nordic MSK questionnaire was used to assess MSK pain and Perceived Stress Scale was used to assess stress level. Descriptive statistics and Chi-square test were used to analyze data. Results were the majority had MSK pain in one or more body regions both during the last 12-month period (n=155, 69.8%) and last 7-day period (n=147, 66.2%). Lower back pain was the most prevalent region of MSK pain in last 12 months (39.2%) and last 7-days (33.8%). The majority had a moderate level of stress (n=185, 83.35%) following 9.5% school teachers had low level of stress and 7.2% had high level of stress. Increasing stress level was significantly associated with increase in MSK pain in one or more body region during both last 12 months ($p=0.017<0.05$) and last 7 days ($p=0.004<0.05$). MSK pain among secondary school teachers were high while lower back region was commonly affected. Increased stress level may cause increase in MSK pain. Comprehensive occupational health approaches to minimize MSK pain, to manage stress were highly recommended.

Keywords: *MSK pain, Stress level, School teachers*

Association of Hamstring Flexibility on Spinal Mobility and Health Related Quality of Life among Female Obese Undergraduates of Allied Health Sciences in General Sir John Kotelawala Defence University

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Abstract

Due to the fact of spending high seated time of undergraduates, there will be an increasing obesity risk and low health related quality of life. The objective of the current study was to assess the effect of hamstring flexibility on spinal mobility and health related quality of life (HRQOL) among obese female undergraduates of Faculty of Allied Health Sciences (FAHS) in Kotelawala Defence University (KDU). A descriptive cross sectional case-controlled study was conducted with 100 female participants (50 obese and 50 normal Body Mass Index (BMI)) aged between 18-40 years at FAHS, KDU. Hamstring flexibility, lumbar spinal flexion, both lumbar spinal extension and lateral flexion, HRQOL were measured by sit and reach test, Schober's test (tape measurements), standard goniometer and SF-36 questionnaire respectively. Prevalence of obesity was 18.3%. The mean BMI (kgm^{-2}) of the case was (27.9 ± 2.9) and control groups was (21.0 ± 1.4). Mean age (years) of case and control groups were (23.5 ± 4.2) and (23.3 ± 3.5) respectively. Spinal mobility and hamstring flexibility did not show any significant difference between two groups ($p > 0.05$). Hamstring muscle flexibility did not show any significant difference between two groups ($p = 0.42$) and it was associated with right lumbar lateral flexion in the obese BMI group ($p = 0.04$, $r = 0.03$) and both left ($p < 0.05$, $r = 0.43$) and right ($p < 0.05$, $r = 0.41$) lateral flexion in normal BMI group. Obese BMI group showed a significant association only for the SF 4 ($p = 0.02$) and SF 8 ($p = 0.01$) questions. The lumbar spinal mobility did not differ in the obese group compared to the normal BMI group. In both groups, lateral flexion has shown an association with hamstring flexibility. In the obese group, hamstring flexibility showed a significant ($p < 0.05$), yet weak positive ($r < \pm 0.4$), association with left side lumbar lateral flexion.

Keywords: *Spinal mobility, Obesity, Hamstring flexibility, Health related quality of life*