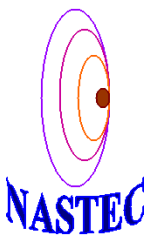
2nd National Undergraduate Research Symposium - 2019

March 29, 2019

Organized by

National Science and Technology Commission

(NASTEC)



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Published by:

National Science and Technology Commission
No. 9/31, 10/31, Dudley Senanayake Mawatha,
Colombo 08
www.nastec.lk

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Message from the Chairperson

National Science and Technology Commission

It is with great pleasure that I issue this message on the occasion of the 2nd National Undergraduate Research Symposium (NURS 2019) organized by the National Science and Technology Commission (NASTEC).

The National Research and Development Framework (NRDF) was developed and presented to the Cabinet and the Head of the State, H.E. the President of Sri Lanka in 2016.

The NASTEC has been keen to see the implementation of the NRDF and arranged several promotional activities. The National Undergraduate Research Symposium is one such activity arranged by the NASTEC to encourage budding scientists to focus on National issues.

I take this opportunity to thank the Acting Director/CEO and the staff of NASTEC for organizing this symposium successfully. I also offer my gratitude to our young researchers in universities and their supervisors for submitting their research papers to be presented at the symposium.

I wish every success in carrying out a productive symposium.

Prof. Sirimali Fernando
Chairperson,
National Science and Technology Commission

Message from the Director
National Science and Technology Commission

As the Acting Director / CEO of the National Science & Technology Commission (NASTEC), I am pleased to convey this message for the 2nd National Undergraduate Research Symposium (NURS 2019) organized by NASTEC.

In an era of competitive global economy, Science & Technology is a key factor in facilitating national development. As scientists & researchers of Sri Lanka it is imperative that we should contribute to the increase the gross domestic expenditure on research and development (GERD) and in return ensure that Research & Development related to S&T plays a major role in Sri Lanka's economy. Considering this, National Research and Development Framework (NRDF) was created with the objective of providing directions to scientists, administrators, policy makers and other relevant decision makers to make a concerted effort to take the country forward through appropriate Research and Development (R&D) activities.

The NRDF has identified 10 areas to focus on and several significant issues under them. These areas consist of; i) Water, ii) Food, Agriculture and Nutrition, iii) Health, iv) Shelter, v) Environment, vi) Energy, vii) Mineral Resources, viii) Textile & Apparel industry, ix) Software and Knowledge Services, and x) Basic Sciences, Emerging Technologies and Indigenous Knowledge. The first 5 areas of the list cater to improving quality of life while the latter 5 contribute on economic development.

The National Undergraduate Research Symposium was introduced to encourage university undergraduates to carry on research related to NRDF focus areas and relevant interventions. It will help the young scientists to focus on a broader vision relating to National Development. I hope this symposium will be a great success in achieving said goal.

Eng. D.D. Ananda Namal
Acting Director / CEO,
National Science and Technology Commission

FOCUS AREA – WATER

FRESHWATER POLLUTION: A STUDY ON KIRULAPONE CANAL

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Freshwater pollution is a major challenge that humanity faces in the twenty first century due to increased urbanization and industrialization. This threatens human health and reduce ecosystem functions, hence requires immediate actions. A study was carried out at Kirulapone canal, Colombo, located in one of the most urbanized areas of Sri Lanka to assess how the water body has changed through time, identify reasons for water pollution and to analyze physical and chemical properties of water. A questionnaire survey was carried out to collect information on past and present status of the waterway using 20 randomly selected families living along the canal. Five water samples along transect of the canal from Pamankada to Kirulapone, were collected. Temperature, pH, salinity, turbidity, dissolved oxygen and the presence of inorganic phosphates and nitrates were measured during the month of June 2018. The study site has originally been a source of freshwater used by people for their daily activities and supported local fishery and laundry industry. Average surface water temperature was 29°C. The average pH value of the water was 7.03. Water was blackish green having less visibility and with a foul egg smell, clearly showing eutrophication, according to the qualitative analysis of anions (brown ring test and phosphate test); negative results were shown for the presence of inorganic Phosphates and Nitrates. Dissolved oxygen (DO) values ranged from 0.8 – 1.7 ppm which are very low and unable to support aerobic life form. Dengue, Filariasis and Leptospirosis are common among the community. According to the study, the physico-chemical properties of the analyzed samples indicated that water was not suitable for human use or to support aquatic life. The once life supporting canal has turned to a health hazard and an eyesore through irresponsible pollution which needs strict and immediate regulations.

Keywords: freshwater pollution, salinity, turbidity, dissolved oxygen, inorganic phosphates and nitrates

FOCUS AREA – FOOD, NUTRITION AND AGRICULTURE

EFFECT OF STAR FRUIT (*Averrhoa carambola*) PEEL EXTRACT ON OXIDATIVE STABILITY OF SESAME (*Sesamum indicum*) OIL DURING DEEP FAT FRYING

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As cooking oil undergoes oxidative deterioration during frying, use of plant sources as alternatives for synthetic antioxidants has received much attention. This study aimed to evaluate the effect of star fruit (*Averrhoa carambola*) peel extract on stability of sesame (*Sesamum indicum*) oil during deep frying. Effect of acetonic extract of the peel (1000 mg/kg), as the test sample was compared with butylated hydroxytoluene (200mg/kg), as the positive control. Oil without antioxidants was used as the negative control. Uniform sized (0.5×0.5×0.8 cm) potato pieces were fried for 10 min at 170±5°C. The same oil samples were reused for two more frying cycles on consecutive days. Free fatty acid content (FFA), peroxide value (PV), *p*-anisidine value (AV), TOTOX value, conjugated diene (CD) and conjugated triene (CT) values, iodine value (IV), thiobarbituric acid-reactive substances (TBARS), polar compounds and fatty acid composition of the used oil samples were assessed. Total phenolic content, total antioxidant activity and IC 50 values of the extract were 27.10±3.03 mg gallic acid equivalent/g, 33.12±4.13 mg ascorbic acid equivalent/g and 2.85 mg/µL, respectively. FFA, PV, AV, CD and CT and TBARS values of the test samples were significantly lower than both the controls. In the control samples, polar compounds exceeded the recommended level (25%) during the 1st cycle, however, the test sample exceeded this level on 3rd frying cycle (28.50±0.9 %). Moreover, the test sample showed significantly higher IV and polyunsaturated fatty acid content than other samples, indicating lesser oxidation. Thus, it can be concluded that star fruit peel extract is a better antioxidant source than butylated hydroxytoluene for suppressing oxidation of sesame oil during deep fat frying.

Keywords: antioxidants, acetone, iodine value, peroxide value, thiobarbituric acid-reactive substances

BREAST FEEDING PRACTICES IN A MUSLIM COMMUNITY IN AKKARAIPATTU MEDICAL OFFICER OF HEALTH AREA

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Breast feeding is important for optimal growth and development of infant and young children. In spite of recommended guidelines racial and ethnic differences in breast feeding practices has been documented. Objective of this study was to assess breast feeding practices among three maternal generations (1st maternal generation: >50 years, 2nd maternal generation: 35-50 years, 3rd maternal generation: <35 years) in a Muslim community in Akkaraipattu Medical Officer of Health area. A community based descriptive cross-sectional study was conducted among 155 Muslim mothers (1st generation: 50, 2nd generation: 53 & 3rd generation: 52) selected by multi stage sampling method during the period of April to August 2018. Interviewer-administered, pretested questionnaire was used to collect data while analysis was based on WHO & UNICEF recommendations for breastfeeding. According to results, the median duration of Exclusive Breast feeding (EBF) was 6 months. The proportion of EBF up to completion of 6 months was highest (84.5%) among 3rd maternal generation while 30.1%, 28.6% in 2nd & 1st generations respectively. 80.7% of mothers breastfed their children for 2 years or more. Among our study population 14.2% mothers had the practice of continuation of breastfeeding for two years or more while rest of them followed medical advice or other. Prelacteal feeds were reported by 7.7%. Statistically significant generational differences were observed with median duration of EBF and discrimination of girl child with regard to duration of breast feeding. Mothers from all three generations in Muslim community had good EBF rates and continuation. However, prelacteal feeding of honey and discrimination against female child with regard to the duration of breast feeding were disturbing findings. Cultural sensitive interventions are needed to address issues related to breast feeding practices in the Muslim community in Sri Lanka.

Keywords: exclusive breast feeding, gender discrimination, maternal generations

BODY IMAGE IDEALS, SATISFACTION AND THEIR ASSOCIATION WITH ANTHROPOMETRIC MEASURES AMONG SRI LANKAN ADOLESCENTS IN TWO SELECTED SCHOOLS IN COLOMBO EDUCATION ZONE

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Body image is the self-attitude and perception that a person has of own physical self. Adolescence is a vulnerable period for issues with body image as they strive to achieve their ideals, which may not always be healthy. Individuals who have a negative perception of their body image may have low self-esteem and body dissatisfaction which can lead to psychological problems like eating disorders and depression. The aim of the present study was to describe the association of anthropometric measures, with the ideals and level of satisfaction of body image among adolescents aged 15-16 years in selected government schools in Colombo educational zone. A descriptive cross sectional study was conducted among 245 adolescents (53.8% girls) between 15-16 years from two selected government schools in Colombo during the period of May to June 2018. Self-administered questionnaires were used and anthropometric measurements were obtained. Body size ideals and dissatisfaction were based on Stunkard figure rating scales. Majority (74%) of the participants were not satisfied with their current body image while over 50% in each BMI category were able to identify their correct body image. Thin figure was the perceived ideal body image by the majority (62%). Statistically significant associations were found between Body Mass Index (BMI) and satisfaction with current body image; perceived body image with BMI and waist circumference. Body dissatisfaction was noted in a high percentage of adolescents (74%). BMI is significantly associated with body satisfaction. Preference of thinner ideal body image was noted in the majority of adolescents. Interventions should be implemented to promote healthy body size ideals, body esteem and a healthy lifestyle among Sri Lankan adolescents.

Acknowledgement: University of Sri Jayewardenepura for financial support.

Keywords: body mass index, body dissatisfaction, perceived body image, thin ideals

SIMULTANEOUS DETERMINATION OF VITAMIN C & CITRIC ACID IN VITAMIN PREMIXES – RP-HPLC BASED METHOD VALIDATION

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A balance diet is a well-known need as per the recommended daily allowances (RDA) for a healthy life. Vitamins play an important role in this respect like the other main nutrients. Vitamin C (*L-ascorbic acid*) is among the important vitamins, which must be supplied through a balanced diet, as it is not synthesized in the human body. Therefore, fortification of food with such nutrients is a common practice in food industry. As both ascorbic and citric acids are natural constituents of many fresh commodities and are also present in many formulated products, this research was conducted to validate a simultaneous method for determination of these acids in premixes of vitamins with reverse phase liquid chromatography (RP-HPLC). Isocratic conditions in 75:25 mobile phase A and B of 20 mM phosphate buffer (A) and a mixed mobile phase of methanol acetonitrile (B) were used for analysis. Detection was carried out at the wavelength of 230 nm. The method was validated against accuracy, precision, repeatability, reproducibility, linearity, minimum detection level, working range and recovery according to the Eurachem guidelines. The detection limits for vitamin C and citric acid were 0.5 and 20 µg mL^{-1}, respectively. The linearity indicated by the regression value (R^2) for vitamin C was 0.9999 at the working range of 0.5 to 500 mg kg^{-1} and that for citric acid was 0.9998 for the working range of 20 to 600 mg kg^{-1}. Recovery of the method was between 80% and 120% for both vitamin C and citric acid. The accuracy of the method was determined using a QC sample that falls within the accepted range. RP-HPLC was found to be a reliable method for simultaneous determination of ascorbic and citric acids in vitamin premixes.

Keywords: Eurachem guidelines, formulated product, fortification, recommended daily allowances, vitamins

DETERMINATION OF NITRATE AND NITRITE IN COMMINUTED MEAT PRODUCTS IN SRI LANKA BY RP-HPLC/UV METHOD

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Meat curing is the addition of salts of nitrite and nitrate in processing to generate desirable color and flavor, to prevent or delay lipid oxidation and to preserve the finished product. A direct relationship between these salts and some health issues such as blue baby syndrome and carcinogenicity is reported. Therefore quantification of residual nitrate and nitrite contents in meat products is considered important. Therefore, this study focused on the determination of nitrate and nitrite levels in comminuted meat products collected from super markets by high performance liquid chromatography, equipped with diode array detector. The values were compared with the maximum allowable values specified by Sri Lanka Standards (SLS) and Codex Standards. Popular four brands of each chicken sausages and chicken meatballs were purchased and residual nitrite and nitrate levels were analyzed in 9 replicates. The average nitrite contents in brands 1, 2, 3 and 4 of chicken sausages were 127±37, 130±15, 79±38, and 141±23 mg kg^{-1} respectively. Nitrite contents of three brands (1, 2 and 4) of chicken sausages exceeded the maximum allowable level of 150 mg kg^{-1} specified by the SLS. However, all four brand of chicken sausages contained nitrites below the level of 200 mg kg^{-1} specified by the Codex Standards. The average nitrite contents of all four brands of chicken meat balls were below the levels of 125 and 200 mg kg^{-1} specified by the SLS and Codex Standards respectively. Nitrate contents of all four brands of both chicken sausages and chicken meat balls exceeded the maximum allowable levels specified by the SLS and Codex Standards.

Keywords: nitrate, nitrite, curing, carcinogenicity, chromatography, Sri Lanka standards, codex standards

FOCUS AREA - HEALTH

PHYTOCHEMICAL SCREENING AND *IN-VITRO* ANTI DIABETIC PROPERTIES OF *Hemidesmus indicus* METHANOLIC ROOT EXTRACT

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Aim of this study was to evaluate the *in vitro* anti-diabetic properties of methanolic root extracts of *Hemidesmus indicus* using α- amylase and α- glucosidase inhibitory assayand to determine the phytochemical constitutes present. The experiment was carried out from February 2018 to June 2018. Initial screening for α -amylase and α-glucosidase for methanolic r extract was carried out at the concentration of 2000 ppm. Acarbose was used as a positive control. Partitioning was done using the non-polar to polar solvents such as hexane, dichloromethane and ethylacetate successively. Qualitative tests for constituents such as alkaloids, flavonoids, tannins, sapponins, steroids and terpenoids were identified and total phenolic content and total flavonoid content were quantitated. From the qualitative phytochemical analysis, constituents such as alkaloids, flavonoids, tannins, sapponins, steroids and terpenoids were identified in the methanolic crude extract of *Hemidesmus indicus* root. Total phenolic content and total flavonoid content were 675 ± 21.21 mg GAE/g and265.33 ± 2.82 mg CAT/g, respectively. Ethylacetate fraction of *Hemidesmus indicus* root exhibited very high inhibition percentage for α- amylase (78.3%) and α-glucosidase (97.15%) at 500 ppm, whereas final residue remaining after the extraction by the solvents showed around 58.07% inhibition for α- glucosidase. IC_{50} values of α-amylase and α-glucosidase inhibitory assay for ethyl acetate fraction were 36.87 ± 0.9 ppm and 8.52 ± 0.10 ppm, respectively. Final residue remaining after solvent extractions showed IC_{50} value of 18.55 ± 0.22 ppm for α- glucosidase inhibitory activity. Large amount of phenolic compounds were present in the methanolic crude extract of *Hemidesmus indicus* root. Ethylacetate fraction of methanolic extraction of *Hemidesmus indicus* effectively inhibits both α-amylase and α-glucosidase enzymes activity and the polar compounds in the root may be responsible for the anti-diabetic properties. The effect of the extract supported the traditional claim of the plant root for its anti-diabetic property.

Acknowledgement: Authors acknowledge the financial assistance given by National Institute of fundamental studies.

Keywords: α-amylase, α-glucosidase, inhibitors, diabetes, ethylacetate

EMOTIONAL INTELLIGENCE AND ITS ASSOCIATION WITH THE WORK EXPERIENCE OF WARD NURSES IN A GOVERNMENT HOSPITAL IN COLOMBO

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Emotional intelligence has gained spotlight as a panacea in modern health care service. Current studies on patient satisfaction, job performance and job satisfaction among health care workers have created an increased interest to use the concept of emotional intelligence as a recruitment criterion and promoted the use of programmes to enhance emotional intelligence in health care workers. Thus, the objective of the study was to determine the association between work related experience and the emotional intelligence of ward nurses in the National Hospital of Sri Lanka. A cross sectional analytical study was carried out in a randomly selected sample of 122 nurses belonging to nursing officer grades 1, 2 and 3 working in selected specialty wards. Information on socio-demographic characteristics and work-related experience (based on the period of service, grades, wards and/or hospital categories they have served in, average work hours per week and average night hours per week) were collected using a self-administered questionnaire and the emotional intelligence was assessed using the self-administered Genos Emotional Intelligence Inventory (Concise; Sinhala) version validated for Sri Lanka by Edussuriya et al. (2017). Associations and correlations between the work related experience and Emotional Intelligence were determined using independent sample t-test and spearman's correlation. A percentage of 67.2% of the sample were nursing officers belonging to grade 3 (junior most service grade) while the total work period of the participants ranged from 01 to 31 years (mean = 6.1 years).The mean emotional intelligence score was 100.71 (SD = 12.38).There was a statistically significant positive correlation between the work period and the emotional intelligence of the nurses ($r = 0.322$; $p < 0.001$) and a positive but statistically non-significant correlation between the number of working hours per week and the emotional intelligence.($r = 0.165$; $p = 0.069$). There was no statistically significant difference in the emotional intelligence based on the number of night hours working per week ($t = -1.757$; $p = 0.082$) or nurses who have worked only in medical wards or only in surgical wards when compared to others ($t = 0.234$; $p = 0.815$, $t = -1.353$; $p = 0.178$ respectively). Emotional Intelligence was higher in the nurses with longer

work experience suggesting that Emotional Intelligence enhances with the work experience.

Keywords: emotions, domains, health care, patient care, emotional management

HEALTH RELATED QUALITY OF LIFE OF RHEUMATOID ARTHRITIS PATIENTS ATTENDING THE NATIONAL HOSPITAL OF SRI LANKA AND ITS ASSOCIATION WITH KNOWLEDGE ABOUT THE DISEASE AND COMPLIANCE WITH MEDICATION

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Rheumatoid Arthritis (RA) is a chronic inflammatory condition with a worldwide distribution, which leads to pronounced disability and increased mortality. Poor patient compliance with medication and disease related knowledge are considered to be significant barriers to management. There is very limited research done on this area in the local setting. The objective of the study was to determine the Health Related Quality of Life (HRQoL) of RA patients attending the National Hospital of Sri Lanka (NHSL) and its association with the knowledge about the disease and compliance with anti-rheumatic medication. A clinic based cross sectional analytical study was carried out on 105 RA patients attending the Rheumatology clinic at NHSL from March – July 2018 using systematic sampling. An interviewer administered questionnaire comprising of Arthritis Impact Measurement Scale-2, Patient Knowledge Questionnaire in Rheumatoid Arthritis and Simplified Medication Adherence Questionnaire was used. Majority (61.0%) had a satisfactory disease related knowledge. A statistically significant increase in the disease related knowledge with the educational level was seen ($p = 0.022$). Only 35.2% of participants were compliant with medications. A majority (56.2%) had a good HRQoL. A statistically significant decline in the overall HRQoL with increasing severity of pain was observed ($p< 0.001$). Only 30.5% had a good social health status. No statistically significant associations were found between disease related knowledge, compliance with medication and HRQoL. The overall HRQoL and disease related knowledge of RA patients were found to be satisfactory in the majority while the compliance was strikingly low. Interventions must be targeted at raising awareness on the importance of medication adherence and techniques of pain management.

Keywords: rheumatology, adherence, arthritis impact measurement scale, patient knowledge questionnaire in rheumatoid arthritis, simplified medication adherence questionnaire

FACTORS CORRELATING WITH THE USAGE OF INDIGENOUS AND ALLOPATHIC TREATMENT OPTIONS AMONG ENDSTAGE CHRONIC KIDNEY DISEASE PATIENTS IN A DIALYSIS UNIT

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Chronic Kidney Disease (CKD) is a progressive, irreversible deterioration in renal function which develops over a period of time. It affects most of the systems in the body causing an intolerable symptom burden in affected patients. The objective of the study was to assess the factors correlating with the usage of indigenous and allopathic treatment options among end stage CKD patients attending the Dialysis Unit of National Institute of Nephrology, Dialysis and Transplantation (NINDT), Maligawatta. A cross sectional study was conducted in a sample of 110 CKD patients above 18 years who were attending the dialysis unit of NINDT. A systematic sampling was used to recruit the participants and a pre-tested, interviewer-administered questionnaire was used for data collection. The study was conducted from March 2017 to June 2018. The overall percentage of indigenous treatment (ayurveda, native medicine and homeopathy) usage was 49.1% among the population. Majority of the patients had commenced indigenous treatments while they were on allopathic treatments and they had used both treatments concurrently. Disease duration above one year ($p = 0.01$), difficulty in affordability ($p = 0.04$) and excessive time consumption for allopathic treatments ($p = 0.046$) and race; being a Sinhalese ($p = 0.027$) was significantly correlated with the usage of indigenous treatments. Above average satisfaction towards the allopathic medical practitioner was significantly ($p = 0.002$) associated with the exclusive usage of allopathic treatments for CKD. Indigenous medicine usage was prevalent among end stage CKD patients with relation to their race; being a Sinhalese, duration of the disease above one year, inability in affordability and high time consumption for allopathic treatments while patients' satisfaction towards allopathic medical practitioner has led them towards the exclusive allopathic treatment usage for CKD.

Keywords: allopathic medicine, dialysis, alternative medicine, stage 5

KNOWLEDGE, ATTITUDES, PRACTICES ON PALLIATIVE CARE AND THE ASSOCIATION BETWEEN KNOWLEDGE AND WORK-RELATED FACTORS AMONG NURSING OFFICERS OF MEDICAL AND SURGICAL WARDS OF NATIONAL HOSPITAL OF SRI LANKA

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The objective of this study is to determine the knowledge, attitudes and practices on palliative care and association between knowledge on palliative care and work-related factors among nursing officers in medical and surgical wards of National Hospital Sri Lanka. Period of the study was from 5th of January of 2018 to 4th of June of 2018. A descriptive cross-sectional study was carried out among nursing officers of medical and surgical wards of NHSL. 108 eligible nursing officers were randomly selected by stratified cluster sampling to complete a self-administered questionnaire. The median age of the population was 29 years (age range 23-56 years). The majority (93.2%, N = 103) were females as well as of Sinhalese ethnicity (98.1%). Of the participants, 90.3% belonged to lower nursing grades (grade 1 & 2), while 51.5% had work experience below 3 years (range 1-27 years), and 93.2% had been previously employed in a teaching hospital. A majority (73.8%) were having overall poor knowledge on all the aspects of palliative care, nevertheless 54.4% of the participants had good practice on palliative care. The attitudes of nursing officers on palliative care was significantly good with 100% for most aspects. Good knowledge was found to be associated with good practices on palliation among the study population (x^2 = 8.082, p = 0.004). Work experience was not significantly associated with knowledge on palliative care. The nursing officers of medical and surgical wards of NHSL are having inadequate knowledge on palliative care, but they hold positive attitudes towards palliation. More than half practiced good palliative care. Work experience was not significantly associated with knowledge on palliative care while practices on palliation were significantly associated with the knowledge level. Basic knowledge on palliative care should be improved, through educational programs, workshops and guidelines especially among nurses.

Keywords: palliation, awareness, perception, patient care, health care, application of knowledge

A STUDY ON THE NASAL COLONIZATION OF *Staphylococcus aureus*/MRSA AMONG STUDENTS OF ALLIED HEALTH SCIENCES, UNIVERSITY OF SRI JAYEWARDENEPURA: PREVALENCE, ASSOCIATED FACTORS AND ANTIBIOTIC SENSITIVITY PATTERNS

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Staphylococcus aureus is a microorganism that can be found as a commensal on the skin. Also, it colonizes the mucosal membrane of the nasal cavity. Some people are asymptomatic and are called carriers. Anterior nares are the most commonly colonized site for *Staphylococcus aureus* in both adults and children. *Staphylococcus aureus* can infect almost any tissue and organ and the infections can range from minor to life threatening conditions such as skin infections, osteomyelitis, meningitis, pneumonia, endocarditis, toxic shock syndrome and septicemia. This study was carried out to determine the nasal carriage rates of *S. aureus*/MRSA in students of Allied Health Sciences, University of Sri Jayewardenepura (USJP) and to describe the Antibiotic Susceptibility Test (ABST) patterns of isolates. In addition, potential association between nasal colonization of *S. aureus*/MRSA and some selected factors were studied. Two hundred and forty students studying in Allied Health Sciences, USJP were enrolled in the study. Informed written consent was obtained and questionnaires were completed by all the participants. One swab from both anterior nares of each participant was taken. Swabs were incubated for 24 hours at 35^{o}C in 7% NaCl nutrient broth and plated on MacConkey agar plate. Isolates were confirmed as *S. aureus* by standard tests. ABST was performed by the CLSI disk diffusion method for all *S. aureus* isolates and Minimum Inhibitory Concentration (MIC) of vancomycin for MRSA was determined using E strips. Among 240 participants, nasal colonization of *S. aureus* was observed in 54 (22.5%) subjects. Among them, 7.5% were MRSA and 15% were MSSA isolates. *S. aureus* isolates had high resistance to Penicillin (90.7%), Erythromycin (74.1%) and Ciprofloxacin (59.3%). None of the isolates were resistant to mupirocin and vancomycin. The selected factors other than previous hospitalization did not have a statistically significant association with MRSA/MSSA colonization. A relatively high prevalence of MRSA nasal carriage was detected among the AHS students. Isolated *S. aureus* showed significantly high resistance rates for commonly used antibiotics.

Keywords: nasal colonization, *Staphylococcus aureus,* MRSA

A STUDY ON THE USE OF ERGOGENIC AIDS AMONG YOUTH IN DISTRICTS OF KANDY AND GALLE

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Ergogenic aids (EAs) can be defined as any means of enhancing energy utilization, including energy production, control, and efficiency. Worldwide athletes frequently use these EAs to improve their performance and thereby increase their chances of winning in competitions. Usage of various types of EAs for the performance enhance has become a major part not only among athletes but also among the adolescents and youth. Awareness among the youth to use these EAs in the absence of a proper scientific evaluation of their physical status leads to a severe health risk. There is an increasing trend among Sri Lankan youth towards usage of EAs. Therefore this study was conducted to investigate the use of ergogenic aids among the youth and adolescent in Kandy and Galle districts based on questionnaire and interviews. Survey was conducted for five months using 240 volunteer athletes from both Kandy and Galle districts. Results of descriptive statistics showed that high percentage of youth above age 21 use EAs where highest percentage (45.45%) was found in Galle followed by Kandy districts (26.92%). It was also found that higher the education level lesser the usage of EAs. Specially, none of the Ph.D. holders from both districts used any EAs. But graduates of Galle district showed a deviation to other values which is 38.71% compared to 13.04% of Kandy district. Highest percentage is from Galle district 88.89% reports in weightlifting and only 55.56% for Kandy district. According to the statistics highest EA using sports are weight lifting and boxing. 33.33% and 37.50% of youth are taking EAs due the recommendation of their personnel trainer in Galle and Kandy districts respectively. More importantly 19.44% for Galle and 30.00% for Kandy district users use EAs because of their personnel opinion. Above results conclude that most of the youth athletes tend to use these ergogenic aids without obtaining professional advices from nutritionists, dietician or a responsible health care provider. Therefore ergogenic aids should not be available on the open counter and retailers who are purchasing and distributing EAs must provide with a license and proper knowledge regarding the particular products.

Keywords: energy, efficiency, health, adolescents, Sri Lanka

FOCUS AREA – SHELTER

PERCEIVED CHANGES IN HEALTH, ECONOMIC AND ENVIRONMENTAL STATUS OF RESIDENTS RESETTLED FROM UNAUTHORIZED SETTLEMENTS IN COLOMBO DISTRICT

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Resettling people from unauthorized settlements plays a major role in city planning and development of countries in the modern world. Although government of Sri Lanka is implementing this strategy since recent past, there had been poor evaluation on how the relocated community perceived the changes that occur during the resettlement process. We conducted a cross sectional descriptive study from August to October 2016 including 104 families, with the objective to identify and analyze perceived changes in health, economic and environmental status of residents who were resettled from unauthorized settlements in Colombo district. We observed reduced prevalence in Dengue (1.9%) and Tuberculosis (0.9%) at the resettlement. There had been an increase in developing respiratory infections (21.2%) and bronchial asthma (10.6%). Economic parameters suggested no difficulty in seeking employment (66.3%) or no reduction in income after relocation (69.2%). They had experienced increased expenses on water (92.3%) electricity (53.9%), monthly rental (93.3%) and travel (82.7%). When considering environmental effects, improvement of sanitary facilities (64.4%), reduction of mosquito nuisance ($p = 0.001$), and rat problems ($p = 0.80$) and lowered incidents of road accidents, domestic hazards ($p = 0.085$) and floods were evident at the new settlement. However, the people were dissatisfied with environmental cleanliness ($p = 0.33$), indoor ventilation ($p = 0.152$), lighting ($p = 0.139$), peacefulness ($p = 0.001$) and privacy ($p = 0.001$) when compared to their earlier settlements. Hence, the responsible authorities need to make necessary modifications to rectify the dissatisfactions and provide a better living condition to the communities when establishing in future resettlements.

Keywords: shelter, housing, re-establishment, urban, infra-structure

FOCUS AREA – ENERGY

SOLAR IRRADIANCE FORECASTING USING DEEP LEARNING APPROACHES

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Usage of photovoltaic (PV) solar power is increasing under the concept of renewable energy integration. A prediction model is required to accurately predict the solar irradiance and solar power at current time by using the historical data. The purpose of this study is to come up with a most accurate model for predicting the Solar PV power generation and the solar irradiance. For this study, we have chosen Killinochchi district, Faculty of Engineering, University of Jaffna as it has a lot of potential for solar PV compared to other districts. The data is collected from Faculty of Engineering, University of Jaffna solar measuring station. In this study, we focused on long-term solar irradiance forecasting using the data which was collected from January 2014 to January 2016. Dataset is splitted and 75% of data was used for training and 25% of data was used for testing. In this paper, long short-term memory (LSTM) based deep learning approach is used to predict the solar irradiance. The LSTM unit is a recurrent network unit that is remembering values for either long or short durations of time. Further, LSTM based deep learning approach is also compared with auto-regressive integrated moving average (ARIMA) based time series approach. This study suggests that LSTM based deep learning approach performs well over ARIMA based time series approach.

Acknowledgment: This project was supported by university research grant (URG/2018/SEIT/12) and NVIDIA GPU grant.

Keywords: solar photovoltaic, solar irradiance, prediction model, time series, ARIMA, deep learning, LSTM.

FOCUS AREA – INFORMATION COMMUNICATION TECHNOLOGY AND KNOWLEDGE SERVICES

READINESS FOR TECHNOLOGY-BASED TEACHING AMONG UNDERGRADUATES OF FACULTY OF EDUCATION, UNIVERSITY OF COLOMBO

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The aim of this study was to explore the level of readiness for technology-based teaching (TBT) related to technological competency (TC), pedagogical competency (PC) and technological pedagogical competency (TPC) among undergraduates of Faculty of Education, University of Colombo. Period of the Study was 9 months starting from November, 2017 to July, 2018. The reliability of the modified questionnaire showed a high reliability (Cronbach's alpha = 0.963). Regarding TC, significant majority have the skills to use office applications and communication applications while the competency to use educational tools and instructional designing tools were comparatively low. Majority was aware about new implications of technology. However 40.3% were with high level readiness for TBT related to TC. When considering PC; participants with "low readiness" (57.5%) was higher than the participants with "high readiness" for TBT. Regarding TPC; majority knew how to prepare teaching material using word processing and presentations but the use of spreadsheet and databases were comparatively low. Majority of the participants think critically on ICT use in teaching to make a positive impact and believed that they can minimize its negative impact on students. However 41.4% was with high level of readiness for TBT related to TPC. There was no statistically significant difference between the two academic years in the readiness for TBT in all three domains. There is a high linear correlation between the level of readiness for TBT related to TC and TPC (correlation coefficient = 0.78). However the correlation between PC and TPC was moderately linear (correlation coefficient = 0.41). The level of readiness for TBT among undergraduates of Faculty of Education, Colombo is in a satisfactory level related to all three domains considered. However there are certain areas that should be further improved.

Keywords: technological competency**,** pedagogical competency, technological pedagogical competency

FOCUS AREA – BASIC SCIENCES, EMERGING TECHNOLOGIES AND INDIGENOUS KNOWLEDGE

DESIGNING, FABRICATION AND EVALUATION OF MULTIPURPOSE ORNAMENTAL HEDGE TRIMMER

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Hedge trimming is one of the essential tasks in the landscaping sector. Nowadays, several types of equipment are being used to perform trimming which is powered by several power sources such as manual and fossil fuel. Manual operation is laborious with poor efficiency whilst the cost of fuel and the emission of gases from the burnt fuel into the atmosphere, force the use of the non-conventional energy sources like wind, solar, tidal and biogas. Among these sources, solar energy is widely striking in nature throughout the year. A domestic and solar power driven multipurpose ornamental hedge trimmer was designed and fabricated. The designed ornamental hedge trimmer comprises of direct current (D.C) motors {(12V/1.12A), (12V/800mA), (12V/600mA)}, stainless steel single blade action linear cutting section, adjustable blade section, iron machine body and additional components of a rechargeable battery, solar panel, power supply system, battery level indicators and mobile charging system. Trimming is achieved by the D.C motor which provides the required torque needed to drive the stainless steel blade which is directly coupled to the turning shaft of the D.C motor. The linear blades were operated in both horizontal and vertical direction with a maximum angle of 90^{o} in both sides. Adjustable blades can adjust according to the required shapes of cone, cylindrical, round etc. Both blades operations can be controlled by the dual-switch system. The battery recharges through the solar panel and domestic power. Performance evaluation of the developed trimmer was carried out through statistical (three plants, three stem diameter and three speeds) and economical evaluation. The linear blade of the hedge trimmer was found to have a trimming capacity around 105 m^2/hr and diameter of the cutting branches significantly affect the trimming efficiency. Adjustable blade required around 5 seconds as the maximum time for complete one rotation. The trimmer can operate by a single person which may reduce the labour intensity.

Keywords: fabricated, non-conventional, single action, trimming

DESIGN AND DIAGNOSIS OF AUTOMATED CROP MANAGEMENT SYSTEM FOR ORGANIC AGRICULTURE

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Nowadays automated systems are applied at different fields in the globe. Due to lack of labour and prevailing high labour rates there is an urgent need to create strategies for sustainable organic food production based on advance science and technology. Hence, this study aimed to design a basic structure for an automated crop management system and diagnose the efficiency of the same. The system was designed with wireless sensors network (WSN) and placed in root zone of the plants. This system carries multi sensors to diagnose the soil moisture, light intensity and water availability. In addition, this automated organic garden gives the sensor information, triggering signals to the actuators and also transmits the data through cloud storages with android application to the beneficiary. This controlling or level maintaining programming concept was developed with the set values of light intensity, and soil moisture which were programmed into a microcontroller based system to manage the plant growth. A Node MCU was used to transmit about the condition of crop along with various sensor to firebase cloud real-time database. The study was carried out at 5 locations in Jaffna district, for 3 months as a preliminary investigation to evaluate performance of this automated system. As a starting technology, short duration crops such as leafy vegetable was used to assess the working principles of this system. The study concluded that the automated system was well adapted to agriculture crops without manual monitoring. Merits of the system were automated maintenance, less space requirement and production of healthy produce hence system has the potential to be used in urban areas.

Keywords: crops, development, eco-friendly unit, urban agriculture, WSN

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