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"Sustainable Development through Multidisciplinary Research"

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MESSAGE FROM THE VICE CHANCELLOR

It is with great pleasure and pride I send this message on the occasion of 5th international Conference on Multidisciplinary Approaches 2018, jointly organized by Faculty of Graduate Studies of University of Sri Jayewardenepura and Ministry of Science, Technology and Research and the National Science Foundation. The theme selected for the conference is very timely and important. University of Jayewardenepura as a centre of excellence for higher learning of the country has taken research as a prime responsibility for moulding for future leaders. We have a key role to play in this endeavor to ensure quality leaders are available at correct places with adequate knowledge on multidisciplinary approaches who can drive the innovation in the country. In this context the iCMA 2018 is going to be a challenging but exciting experience.

The Faculty of graduate Studies had taken great pains in organizing this conference. The synergy created by their partnership with Ministry of Science, Technology and Research and the National Science Foundation is going to be beneficial for the country. I would like to thank these organizations for joining the conference as co-organizers for the 3rd time.

Also my sincere appreciation goes to organizing committee of the iCMA 2018 for the untiring efforts by them in ensuring a successful event. I wish that the iCMA 2018 be a ground breaking event for the benefit of all participants and the country.

Senior Professor Sampath Amaratunge
Vice-Chancellor
University of Sri Jayewardenepura
Sri Lanka

MESSAGE FROM THE CONFERENCE CHAIR

As the Dean of Faculty of Graduate Studies of University of Sri Jayewardenepura and Chair of the Organizing Committee of the 5th International Conference on Multidisciplinary Approaches 2018, I am delighted to issue this message.The Faculty of Graduate Studies of University of Sri Jayewardenepura since its establishment in 1996 had come a long way during a comparatively short period and is on the right track of achieving its Vision 'To be the Centre of Excellence in Advanced Learning, Research and Scholarship both within and outside the domain of Sri Lanka'.

Our study programs stems from the strategic disposition of our University, which is thriving towards greater heights in a very modern technological environment but having a solid religious, cultural, traditional knowledge base. The rich natural resources in the country provide opportunities to both local and foreign students to get hands on experience of nature and learn how to manage them for long-term sustainability.

Through its postgraduate courses and research programs, it is intended to produce a knowledgeable and skilled human resources integrated with positive attitudes towards sustainable development.

This Conference is held annually to provide a forum for the researchers to present and debate their findings amidst peers, policy makers and implementers so that the findings will be used in country's sustainable development. The Theme of the Conference this year is 'Sustainable Development through Multidisciplinary Research'. The Co Organizers of this Conference is Ministry of Science, Technology, Research, Skills Development and Kandyan Heritage. Sampath Bank also supported this event. This Conference portrays the role played by the universities in providing facilitation to industry and policy makers and implementers to work together towards achieving suitable development goals.

124 oral presentations in 7 distinct themes will be presented at the Conference along with 50 posters. The participation of internationally reputed personnel as Theme Speakers as well as paper presenters will increase the impetus of the Conference and make it a truly international one. Sessions will be preceded by Theme Talks by veterans in the field. The RoundTable Discussions on Towards Inclusive Green Growth and Industrial; Innovations will paint a sound picture of the current status and way forward in these arenas.

I wish the ICMA 2018 success.

Senior Professor Hemanthi Ranasinghe
Conference Chair & the Dean, Faculty of Graduate Studies
University of Sri Jayewardenepura
Sri Lanka

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& PHYSICAL SCIENCES

A NOVEL APPROACH TO DETECTION OF MELANOMA SKIN CANCER BASED ON IMAGE PROCESSING TECHNIQUES

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Abstract

Skin cancer is the most common type of cancer today. Day by day it has been increasing rapidly all over the world; especially, in recent years, fairly rapid increment can be seen in melanoma skin cancer patients. Melanoma is a deadliest form of skin cancer, must be diagnosed earlier as soon as possible for effective treatments. To diagnose melanoma earlier, skin lesion should be segmented accurately. However the segmentation of the melanoma skin cancer lesion in traditional approach is a challenging task due to the number of false positives is large and time consuming in prediction. Hence, the development of automated computer vision system becoming as an essential tool today. The current study is carried out through the image processing techniques. The main aim of this study is to identify the specific cancer region with accuracy than traditional approaches. So, the objectives of this study are to examine existing systems and identify the major issues of the systems and finding future directions. The proposed methodology is implemented the segmentation for melanoma Skin Cancer detection using Image Processing. For this research, sample of 250 cancer patients' images were collected from Ethical Review Center, University of Jaffna, Srilanka. The input for the system is the image of the skin lesion which is speculated to be a melanoma lesion image, which is then pre-processed to upgrade the image quality. According to our finding, this proposed approach could achieve 97.54% sensitivity, 97.69% specificity, and 97.56% accuracy respectively. This tool is more useful for the rural areas where the experts in the medical field may not be available. Since the tool is made more user friendly and robust for images acquired in any conditions, it can serve the purpose of automatic diagnostics of the melanoma Skin Cancer. Finally, the proposed methodology is also a financially attractive solution, since it runs on simple computers, which are usually available in hospitals too.

Keywords: *Lesion, Segmentation, Canny edge, Thresholding, Watershed*

FOOD ONTOLOGY: A COMPLETE CULINARY KNOWLEDGE MANAGEMENT FRAMEWORK

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Abstract

Culture is the foundation for Knowledge. All aspects of cultures could in a way be rooted on to respective food culture of concerned society. However, some minority cultures are been diminishing or even disappearing as they were been overran by major and popular cultures. As a result numerous forms of social values and traditional knowledge are becoming unavailable and inaccessible. There are two prominent ways in preserving (Food) Cultures; firstly at operational levels and secondly at knowledge levels. In this work, latter to be addressed with the special focus on to (traditional) local food cultures.

Ontology is a promising foundation in order to understand any discourse with sound and complete philosophical basis. Besides the epistemological discussions and some conceptual analysis, for actual applications, scarcity of development and utilization Ontologies is evident in literature. However in advancing Information and Communication Technology and in resulting emerging disciplines, varieties of Ontologies have heavily being developed and being utilized on different (technological) platforms. In this research work we have attempted not only to formalize empirical as well as chronicle know-hows and culinary related knowledge with objectives; but to represent, capture, preserve and then to workout possible innovations.

In order to handle inherited complexity with development of such scale complete food ontology, a three folded A^3 subdivision has been proposed for Actor, Activity and Article as related to culinary discourses. Representation of possible inter-relationships and intra-relationships among constituents of the resulting sub-ontologies is achieved by extending the global standard Unified Modeling Language's Meta-Model (UML) Profile.

Contributions resulted from this research work leads to sound and complete Food Ontology related knowledge management framework. This Knowledge Management Framework is flexible and extensible while ensuring non-technical expert comprehension and usages.

Keywords: Ontology, Knowledge Management, Food Ontology, UML

OPTICAL RECOGNITION OF EMBOSSED BRAILLE CHARACTERS

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Abstract

Here, we describe a Braille character recognition system based on image processing techniques. The developed system identifies Sinhala Braille characters in single sided Braille documents and translates them into Sinhala language. This system is also capable of identifying Grade1 English Braille characters, numbers, capital letters and some words in Grade 2 English Braille system. Implementation of the system was carried out in two different approaches. They were the braille character regeneration method and Support Vector Machine with Histogram of Oriented Gradient feature extraction method. The translated text is displayed in a word processor application as the final outcome. Performance evaluation results reflect that both methods can recognize Braille characters and translate to user selected language either Sinhala or English efficiently, with over 99% of accuracy.

Keywords: *Braille, Braille Recognition, Image Processing, SVM, HOG*

A STUDY ON MAPPING, LOCALIZATION AND AUTONOMOUS NAVIGATION WITH iROBOT CREATE 2 ON ROS INDIGO

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Abstract

This paper proposes a movable robot that can be used to deliver documents between employees of an unstructured indoor office environment. The study reviews literature on robot navigation, apply promising techniques and test their accuracy in an unstructured indoor laboratory environment. There are many technologies available in robot navigation. We have selected free and open source software and inexpensive sensors and materials to build a low cost but accurate robot. Our system comprised of two units: one that process sensor data and another which is the navigating robot having sensors and actuators. We have used Robotic Operating System (ROS) indigo as the ground operating system. iRobot Create 2 was used as the basic robot and a structure was built to carry a mini PC, power cables and the vision sensor. PrimeSense, the vision sensor for our robot uses IR to measure distance. The processing unit was a workstation computer that was kept still. Two parts mainly communicated through a Wi-Fi connection. We have conducted an experiment to examine the capabilities of the setup and studied its behaviour, mapping and localization specifically. An unstructured indoor environment was selected with five users located on the sides. We considered both dark and light illumination conditions on the room. Then, we allowed the robot to navigate autonomously and randomly between users and monitored its accuracy by looking at the completion of the route to a target user. Results show that the robot has about 92% of accuracy on average in both lighting conditions and 88% and 96% of accuracies for light and dark conditions respectively. Finally this system could be practically used in an office environment in any illumination condition.

Keywords*: Indoor robot navigation, Robotic operating system, wireless robot navigation, environment mapping, robot localization*

ANALYTICAL METHODS FOR LUBRICANT QUALITY CONTROL IN ENGINES

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Abstract

Identification of oil degradation in turbo machines and automobile industry is a huge problem which has been prevailing from past decades up to now. Various types of researches have conducted to overcome this matter. In this research work several used wind turbine gear oil samples were analyzed using UV-Visible spectroscopy, Fourier-transform infrared spectroscopy (FTIR) and Fluorescence Spectroscopy methods. In accordance with the graphical analysis of the spectra of three spectroscopic methods, fluorescence data give strong and distinct signals rather than other two methods. Several motor oil samples which were subjected to artificial aging at the laboratory conditions by heating them up to different temperatures for different time periods were analyzed with Fluorescence spectroscopic method. Clear variation of fluorescence emission intensities in each spectrum was observed with the oil age. Results show that Fluorescence spectroscopic method can be used as a good analytical tool to identify oil degradation. So this method can be optimized as novel potential sensor to detect oil quality.

Keywords: *Lubricant oil, Oil degradation, Fluorescence spectroscopy, Analysis of lubricant oil, Identification of oil degradation*

AN AUTOMATED TRAFFIC SIGNAL SYSTEM BASED ON TRAFFIC QUEUE LENGTH

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Abstract

Traffic congestion is a massive problem experienced by many urban cities in Sri Lanka. This study suggests an automated traffic signal system, based on vehicle queues formed at intersections. The presented system focuses on dynamic queue length estimation, designing of traffic phases and signal coordination algorithms, in such a way that provides maximum opportunity for vehicles. The system developed here is for a four-legged junction. To represent intersection network and design traffic phases graph theory concepts are utilized. This paper suggests using sensor networks arranged in an efficient geometry as the estimator of traffic queue lengths. The proposed system results in four sets of traffic phase changes. The system optimizes the traffic flow by providing more opportunity for vehicles while eliminating unnecessary green time assigned for the corresponding traffic streams.

Keywords: *Traffic phases, planar sets, traffic stream lines, compatibility*

ACCURACY ANALYSIS OF GAGAN FOR DIFFERENT TYPES OF SURVEYING APPLICATIONS

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Abstract

With the advancements of technology, the use of GNSS technology in all the surveying applications are significantly growing due to its many several advantages over conventional techniques. However, in most of all surveying applications the preservation of reliability and positional accuracy should be according to the national surveying standards published by Survey Department of Sri Lanka. Therefore, the uses of GPS augmentation systems with local and wide area differential positioning capabilities have increasing demand. Considering the facts, two networks of Continuously Operating Reference Stations (CORS) were established in Sri Lanka, covering a part of Colombo district for real-time augmentation as a paid local area service. While it provides higher accurate differential service the users should have mobile internet with additional hardware, limited coverage and has a cost for the service as well. Satellite-Based Augmentation Systems (SBAS) are being developed worldwide due to their unique advantage of wide area coverage. Similarly, along with Airports Authority of India (AAI), Indian Space Research Organization (ISRO) has worked out a joint project to implement the Satellite Based Augmentation System using GPS, called GAGAN (GPS Aided Geo Augmented Navigation). With the free use and availability of GAGAN in Sri Lanka, this study focuses on validating the applicability of GAGAN in various surveying methods in Sri Lanka. In order to test its performances, Control Surveying, Boundary Surveying and Road Surveying have done with a GAGAN active GNSS receiver by comparing with uncorrected standard positioning. Further, 24 hours of static observations were also collected with GAGAN active GNSS receiver to check the reliability of its use at any time of the day. It is found that accuracy in those applications has improved significantly in SBAS receiver due to real-time GAGAN corrections except in urban and forest areas (disturbing conditions). Further, 24 hour observations confirmed that GAGAN is capable of giving 92.6% of below 1 meter 2D positional accuracy at any time of the day.

Keywords: *GNSS, GAGAN, Field Surveying, Accuracy*

FABRICATION OF SODIUM-ION RECHARGEABLE BATTERY USING SODIUM COBALT PHOSPHATE CATHODE

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Abstract

In recent years many researches were conducted to replace expensive Lithium- ion batteries with low cost alternatives. Sodium- ion batteries perform almost similar to Lithium- ion batteries which are less expensive. In this research a cathode material for Sodium- ion battery was fabricated using Cobalt (II) oxide and Sodium phosphate. Cobalt oxide and Sodium phosphate in 1:1 molar ratio was grinded well using mortar and pestle. The mixture was calcinated at 800 °C for an hour and then it was grinded again and calcinated at the same temperature for about half an hour. This process was carried out for three times. Powder X-Ray Diffraction (XRD) pattern confirmed the synthetization of Sodium cobalt phosphate through this process. Prepared sample was mixed with Polyvinylidene Fluoride (PVDF) and active Carbon at the ratio of 18:1:1 by mass respectively. This paste was applied on an Aluminum foil and dried on a hot plate at 100 °C. The battery was fabricated in a glove box filled with Argon gas. Sodium metal covered with a Copper plate was used as the anode. Cellulose separator in between the cathode and anode was soaked with 1 M Sodium perchlorate dissolved in Propylene carbonate. Prepared battery was tested for charge and discharge cycles with 0.5 mA current. Capacity of the battery was calculated as 9.58 mA h g^{-1}. Future work has to be directed to improve the cyclability and capacity of these batteries.

Keywords*: Sodium- ion batteries, Cobalt oxide, XRD, Capacity, PVDF*

A SYSTEMATIC LITERATURE REVIEW OF DATA MINING IN FIELD OF EDUCATION

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Abstract

This paper aims to understand the different data mining techniques upon the educational data. We investigated the literature on case studies carried out in the area throughout the past ten years (2009-2018). Search terms identified 67 pieces of research work, but insertion criteria restricted the key studies to 46. We analyzed the year of publication, type of the publication, the learning environment, database searched, methods, algorithms, tools, topic, the dataset used, keywords used, respective educational outcomes and findings of these case studies. In this investigation, we have identified methods and algorithms with some experimental data. The most popular method is classification, followed by clustering, association mining and the widely used algorithm is K-Means (Clustering) followed by C4.5 (J48) (Classification), ID3 (Classification), apriori (Association), Naive Bayes (Classification). The most of the researchers focused on analyzing learner behavior/learner behavior modeling (n=16) area. But there were significant contributions towards prediction learner's performance (n=15) and outcomes, identifying learner's risk and drop-out (n=3) areas. Those areas, the prediction was an important method. Therefore classification has become the most common method that researchers used. The most number of the recommended algorithm was K-Means. It is a clustering algorithm. It was a free-dominated one in this review. Because a less number of other clustering algorithms were used by the researchers such as Markov Clustering (MCL), Expectation Maximization (EM), and Fuzzy C-means. We have discovered another factor, that is, WEKA it is mostly used data mining tool. It is an open source tool which provides a group of many data mining and machine learning algorithms. Finally, we have concluded educational data mining helps to investigate students' learning behaviors and the settings which they learn in. We expect to deliver a better influence towards the development of a quality learning environment for both students and teachers and some insights are outlined for further research.

Keywords: *Educational Data Mining, Data Mining, e-Learning, Learning behaviors, Clustering*

NUMERICAL INVESTIGATION OF THE BEST EFFICIENT TANDEM SOLAR CELL STRUCTURES USING THE BASE CELL MODELS OF MZO/CdTe AND CdS/CIGS CELL STRUCTURES

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Abstract

Tandem solar cells have been researched to enhance the performance of second generation (II-VI) thin-film solar cells. In this study we have developed an efficient tandem solar cell model by optimizing the thickness of the (II-VI) layers. The tandem solar cell model consists of top cell, n-SnO_2/n-MZO/p-CdTe and bottom cell, n-CdS/p-Cu(In,Ga)Se_2(CIGS). The model layer parameters such as thicknesses of n-CdS, p-CIGS, and p-CdTe have been varied to improve the efficiency of the tandem solar cell and compared with the reported single junction thin-film solar cells. All the numerical experiments were conducted under one sun illumination condition with AM 1.5 G solar spectrum by using the Analysis of Microelectronic and Photonic Structures simulation software (AMPS-1D) and Solar Cell Capacitance Simulator (SCAPS 1-D) software. In this numerical simulation, the observed open circuit voltage was increased up to 1.413 V and efficiency was increased up to 28.84%.

Keywords: *AMPS-1D, SCAPS-1D, Multi junction solar cell, Photovoltaics, AM1.5g*

LOW COST VEHICLE TRACKING SYSTEM FOR NATIONAL PUBLIC TRANSPORT

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Abstract

Vehicle tracking systems available in developed countries, mainly focus on public transport. However, public transport in Sri Lanka is generally characterized by a lot of chaos; these range from poor management of the vehicles, traffic congestion, reckless driving and unreliable service provision. The main objective of this research project is to develop a customized location-based service for caters the needs of the public transport in Sri Lanka. This project demonstrates the development of a free prototype solution for management of public transport in Sri Lanka. It will provide GPS and GPRS technologies for real-time transmission of coordinates from the tracking devices (Ticketing machine or Android phone) to the central database server and finally rendering to the Android application. The development process of the system entailed the analysis of existing systems used in Sri Lanka, system design and development, evaluation and implementation. The research provides a cheaper solution for saving thousands of human our waiting for buses and effective management of public buses by preventing vehicle misuse. The final solution comprises an Android application. It provides real-time graphical visualization on the "Google map" and it can predict the arrival time of the vehicle.

Keywords: *Low-cost vehicle tracking, GPS, GPRS, Android, Public Transport*

EFFICIENT ULTRASOUND VIDEO STREAMING BY USING HIGH EFFICIENCY VIDEO CODING

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Abstract

High Efficiency Video Coding (HEVC) is designed in such a way to facilitate the efficient storage and transmission of high volume video. Additional features of HEVC provide up to 50% bit-rate saving compared to its preceding video coding standard H.264/MPEG-4 Advance Video Coding (AVC) and supports Ultra High Definition (UHD) with low complexity. However, optimizing HEVC for ultrasound scan video transmission has not been investigated thoroughly. In response, this work investigates the feasibility of using HEVC to stream ultrasound scan video over mobile networks. In this study, ultrasound scan videos are encoded at different quantization parameters to produce video sequences at different bit-rates. These video sequences are then transmitted across a mobile network. The received video sequences are evaluated quantitatively and qualitatively. Initial results indicate that at least 6 Mbps of bandwidth is required in order to transmit a full-high-definition ultrasound scan video at clinically acceptable quality. In other words, the Peak Signal to Noise Ratio (PSNR) of the received video sequence should be at least 50. These results also raise the requirement to develop more efficient HEVC schemes and transmission techniques to facilitate real time ultrasound scan video streaming over mobile networks in advanced telemedicine applications. It is envisaged that this study will pave the path to investigate bandwidth efficient encoding and transmission techniques to facilitate future telemedicine applications such as remote ultrasound scanning and diagnosis over mobile networks.

Keywords: *ultrasound video, video encoding, video streaming, HEVC, telemedicine*

MONITORING REAL-TIME AIR QUALITY AND WEATHER DATA AT TWO DIFFERENT LOCATIONS IN KANDY CITY

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Abstract

Deterioration of ambient air quality in Sri Lanka due to addition of a large number of motor vehicles, traffic congestions, combustion of fossil fuels and poor quality of fossil fuels has made enormous negative impacts to economy and public health of the country. It was observed that Kandy city has a higher degree of ambient air pollution owing to its geographical location and heavy traffic congestions. However proper and effective air quality management plans are not being implemented in Sri Lanka, causing for lack of continuous air quality monitoring and air quality databases. Use of low-cost yet reliable air quality monitoring solutions are a promising solution to monitor air quality continuously and with high spatial and temporal resolutions. In this research, a variety of such electrochemical gas sensors were used to monitor real time CO, NO, NO_2, SO_2 and O_3 concentrations at parts per billion (ppb) levels along with real time meteorological data monitoring. The results presented here are of two locations in Kandy city (Bank of Ceylon (BOC) and Central Province Education Department (EDU) for a period of two weeks. At BOC a maximum hourly CO level of 1.1 ppm was observed and at EDU that value was 1.05 ppm. Further weekend CO averages have shown an increase compared to weekday CO averages. When comparing with the meteorological data CO levels have shown a significant decrease with increasing wind speed and rainfall. However further improvements are to be done for improving the data accuracy of NO, NO_2, SO_2 and O_3 sensors. These sensors are a promising solution for higher costs associated with air quality monitoring due to their many advantages such as low cost, low power consumption, high selectivity and ability to use them in widespread sensor networks.

Keywords: *Kandy air pollution, Air quality and meteorological data monitoring, Low-cost electrochemical sensors*

MODELLING AND SIMULATING AIR FLOW WITH DISPERSION OF FINE PARTICLES IN INDOOR AC ROOMS

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Abstract

Modelling of indoor air-velocity distribution, temperature distribution, pressure variation, air-particulate transmission and path tracking can be a complex mission and where the coupled physics is also given in non-linear and multi-phenomenon. In this study, two fixed orientation models of air-conditioner positions were considered for investigating an air flow movement which entered through a single inlet. Inlet air parameters; supply velocity and temperature were measured using a Thermo-Anemometer. Proposed study, differential physics phenomenon were selected, those are laminar flow, heat transfer in fluids and particle tracing for fluid flow and so forth. Further, stationary and time dependent solvers are chosen for the parameter simulation. In two different orientation models, input values, boundary conditions and initial conditions are applied identically. To solve the physics of laminar flow and heat transfer stationary solvers were applied initially during the computation. After that physics of particle tracing for fluid flow is solved to find a stationary solution by time dependent solver. The second model has shown enhanced air flow movement, velocity distribution and temperature distribution than that of the first model. Proposed method realizes the air-flow pattern of given air-conditioned room with presence of static disturbances and results are verified with the existing experimental outcomes from cited literature.

Keywords: *Multi-physics, laminar flow, Thermo-Anemometer, particulate transmission, air-condition*

ALIGNING BUSINESS INSPIRATIONS WITH BUSINESS PROCESSES: A COMPUTATIONAL APPROACH

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Abstract

A business to get established over the time of it`s operation, proper synchrony between business`s inspirations and business`s processors would be essential. In cases, where business`s vision, mission and objectives (i.e. inspirations) does not align with the internal processors functioning within the business will lead to gradual collapses or bankruptcy in long run. However, though business inspirations and business processors are critical ingredients in any form of business, still there are no proper computational means developed to gauge the synchrony between those two ends. This research proposes a computational conceptualization which could cater that necessity. Existence of an appropriate tool to gauge the inspiration – process synchrony would benefit decision makers in large scale. Hence, an intended type of a tool proposed in this research will act as a guide for decision makers via providing real time synchrony information on business inspirations and processors. This information will enforce awareness and streamlined brainstorming across the decision making parties well in advance, before becoming a wrong decision implemented as a strategy. Knowledge ontologies and natural language processing mechanisms will be used as main technologies in developing this research prototype.

Keywords: BMM, BPMN, KAOS, SAIF-HL7, Ontology

APPLICATION OF THE MapReduce PROGRAMMING FRAMEWORK TO GENOME BIG DATA ANALYSIS

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Abstract

Today the world mainly associates with large amount of data sets. Especially in genome world, there are terabytes of data to store and analyze. Also there are data mining tools which need to be developed for petabytes of data. If we get, the volume of data use in 'Facebook', need to be collected and managed on a daily basis. Those kinds of data can fall under the category of big data. Big data is a collection of large datasets that cannot be processed using traditional computing techniques. This term; Big data is used to describe huge datasets which involves 4V definition; volume, variety, velocity and veracity. Therefore big data technology is important in providing more accurate analysis since it may lead to more concrete decision making giving greater operational efficiencies and cost and risk reduction. In that manner this is very important in genome analysis because there are lots of challenges in storing and analyzing genome data. These are called "Big data challenges". There are two classes of technology; operational big data and analytical big data. Analytical big data technology is used here. This is consisted with MapReduce and Massively Parallel Processing (MPP) database systems that provide analytical capabilities for retrospective and complex analysis that may touch most or all of the data. In this paper, I review the existing applications of MapReduce programming framework and its implementation platform Hadoop and how they support in genome big data analysis. The objective of this paper is to summarize the state-of-art efforts in genome big data analytics and highlight what might be needed to enhance the outcomes of genome big data analytics tools. Materials and methodologies and research findings and results sections have been presented respectively. In discussion, we discuss some developments and limitations in tools. Final section presents the conclusion.

Keywords: *Bigdata, Genome Analysis, MapReduce, Hadoop, Massively Parallel Processing (MPP)*

AERODYNAMIC ANALYSIS OF A VERTICAL AXIS WIND TURBINE

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Abstract

A Darrieus type Vertical Axis Wind Turbine (VAWT) has been designed and analyzed based on analytical and numerical models. The Double Multiple Stream Tube (DMST) model and Ansys Fluent® Computational Fluid Dynamics (CFD) has been used to identify the major design parameters which affect the performance of the design. The initial design of the wind turbine has been optimized using an objective function without altering the initially selected blade profile. The results indicate that the efficiency of VAWT strongly depends on the blade chord length and the number of blades present in the rotor.

Keywords: *CFD, Darrieus VAWT, DMST, Optimization, Wind Turbine*

MODELING OF EFFECT DUE TO LIGHTNING STRIKE ON ELECTRICITY POWER SYSTEM USING DIFFERENTIAL EQUATIONS

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Abstract

The electricity power system (EPS) consists of electrical generators, transformers, transmission lines, distribution lines and power consumers. Lightning is one of the main causes of EPS fault. Electrical devices in the EPS work at a certain voltage range. These devices blow up or get damaged when they receive a voltage way higher than the specified voltage sufficient for their operation. Problem of the research is to study about the changes of the existing current of the EPS due to lightning current. The objective of this study is to model effect due to lightning strike on EPS. Existing EPS is a major circuit consists of many resistors, capacitors and inductors. RLC circuit is an electrical circuit consists of a Resistor(R), an Inductor (L) and a Capacitor(C). So EPS can be simplified to a RLC circuit. Instead of EPS, RLC circuit is used to model effect due to lightning strike on EPS. In real situation lightning impulse struck on the EPS. Instead of that real situation, existing current and lightning current are combined to model the impact of lightning on EPS. Behavior of the circuit can be represented by a differential equation with the help of Kirchhoff's rule. Normally EPS has an Alternating Current (AC current). So AC voltage source is supplied as voltage source in RLC circuit to get circuit current. Lighting impulse voltage is used as voltage source in RLC circuit to get lightning current. Circuit currents are obtained by solving differential equation. Then these two currents are combined to model the impact of lightning on RLC circuit. When lightning impulse struck on a RLC circuit with AC voltage supply, effect of the circuit current is modeled using Maple software. RLC circuit current waveform is totally changed when lightning impulse struck on the circuit. Circuit current is reached to peak value instantly with the effect of the lightning current and it drops with fluctuations. Similarly, existing current wave form in the EPS totally differs when lightning impulse struck on the system. Electrical devices are getting damaged because of the changing of their current for the effect of the lightning current.

Keywords: *Differential Equation, RLC circuit, Lightning impulse, Kirchhoff's Rule*

REVIEW ON INFORMATION TECHNOLOGY COMPETENCY FOR NURSING INFORMATICS

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Abstract

Nursing Informatics can be considered a global trend. This study was conducted to determine the necessity of Information Technology competencies for Nursing Informatics in nursing higher education. The methodology of the study was a literature review using keywords "Information Technology competency for nursing students" and "nursing informatics" The search databases, research gate, google scholar, eric, science direct, academia and ACM digital library. Inclusion criteria included research papers published in peer-reviewed journals and thesis between 2006 and 2017. Among the selected 12 research papers 4 specific papers were used to continue the study. Those 4 research papers were classified according to the year of publication, type, research, objectives, method, and conclusion. Nursing students and Nursing educators were usually competent in informatics, but not in clinical based experience. Yet the informatics competency scale scores show that, nursing students and nursing educators apparent that they were competent in three areas: "basic computer skills, informatics knowledge" and "informatics skills". The findings indicate that nursing students and nursing educators were most confident in basic computer skills such as searching the Internet, word processing, systems-operations skills. Participants also fully recognized the value and positive impact of informatics on nurses and nursing practice. Nursing students and Nursing educators were not confident in accessing or extracting information from clinical data sets (e.g., minimum data set), review of literature, electronic medical record system or as a clinician (nurse), participating in the selection process, and designing, implementing, and evaluating systems, or seeking available resources to help ethical decisions in computing. Comparison of students in the informatics experience differed considerably in general informatics competency, which may reflect students' experience in classroom teaching, computer laboratory practice would improve the clinical experience with informatics competence. Both nursing students and nursing educators needed enhance their informatics knowledge and skills, particularly their clinical based data entry and evaluation, research database-searching skills.

Keywords: *Nursing informatics, Information Technology, IT Competency, Nursing Students, Higher Education*

HEAT AND STEAM RECOVERY SYSTEM FOR PALM OIL INDUSTRY SUBJECTED TO REDUCE THE WATER USAGE

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Abstract

Heat wastage and steam recovery are major problems encounter in the palm oil manufacturing industry. The manufacturing process of the palm oil requires a massive amount of water in the process of extracting oil from the kernel and the shell of the palm fruit. The objectives of this project to recover the waste heat and reduce the usage of water in the process by recycling boiler water and the process water. This emerging concern of reducing water usage lead Watawala Plantation PLC to seek efficient effluent treatment methods, which can reduce the amount of effluents in their palm oil mill. Initially, all the physical parameters of the effluent were tested. The results showed the pH value of effluent as 4.65 where the moisture content was 96.9 % (w/w). Outlet temperature was 70℃. Effluent flowing with a rate of 2 litres/min was dumped while the rate of production of effluent was 10 tons per shift (12Hrs). The waste steam pressure was 3.2 bars and the temperature was 133.56℃. This waste steam is used in the evaporation process. Finite Element Analysis and Computational Fluid dynamics modelling were carried out to achieve pre-planned results. Initially, the heat exchanger Air was used initially as the transfer medium in the heat exchanger. However, air could not transfer sufficient heat to evaporate effluent. Then palm oil was used as the transfer medium. Although it is a good transfer medium, the heat exchanger was modified to work directly with steam. A set of falling film evaporators in series connection were used to increase the amount of evaporation up to 40% as a further development. Thus condensed steam can redirect to the boiler and the evaporated water can reuse in the process of palm oil manufacturing.

Keywords: *Effluent Treatment, Evaporator Design, Heat Exchanger, Waste Steam, CFD Analysis*

VALUE CREATION IN MICRO AND SMALL AND MEDIUM ENTERPRISES (MSMEs) IN SRI LANKA

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Abstract

Micro and small and medium enterprises (MSMEs) are identified as the most 'popular' scale that play a major role with their contribution on innovation, Gross Domestic Product (GDP), and employment in economy. The MSME sector in Sri Lanka making up more than 98% of total establishments, accounts for only 52% of GDP and 75% of total employment. Value creation is producing a product or a service that meets customer demands, which focus on creating value for customers and ultimately stakeholders. These customer value propositions are delivered through internal business processes. Three key categories that create value in businesses have been identified as productivity, activity, and price. The study, with explanatory purpose and survey strategy, was carried out for in 2017 covering 194 MSMEs in three sectors in Sri Lankan economy, namely industry and construction, trade, and service. Data was collected with observation and structured questionnaire referring to seven tactics of value creation. Mix research method was employed for data collection and analysis to ensure achievement of research objectives. The results show that more than 55% of MSMEs demonstrate low value creation (in five-point likert scale) with their productivity and activities, with lack of access to finance, resource, skill acquisition and development, weak technology infrastructure, lack of opportunities and assistance for entrepreneurs, and inadequate institutional capacities. However, MSMEs like any other establishment, try to maintain effective pricing (include both input and output), as it is one of key factor for business continuity. There is vigorous need to promote MSMEs by enhancing productivity (improving operational efficiency by investing on people, technology, and process) and strengthen technology infrastructure; enhancing activities (including utilizing scale economies and improving product mix) to create high value. However, appropriation of created value finally needs to enhance with enhanced value creation, to ensure competitive success for these MSMEs.

Keywords: *Micro and small and medium enterprises (MSMEs), value creation, operation, productivity, Sri Lanka*

INVESTIGATION AND COMPARISON OF THE MAJOR CHARACTERISTICS OF CEMENT VARIETIES USED IN CONSTRUCTION INDUSTRY

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Abstract

Cement is categorized as either non-hydraulic or hydraulic binder. All the cements in Sri Lanka are hydraulic and four varieties of those cements; Ordinary Portland Cement (OPC), Blended Hydraulic Cement (BHC), Portland Limestone Cement (PLC) and Masonry Cement (MC) have been introduced for the industrial and general construction purposes. The inadequate knowledge about the characteristics of cements, directs to inappropriate and inefficient utilities. Therefore, this study aims to emphasize essential characteristics, demonstrate their gravity and make relationship between the cement varieties used in Sri Lanka and those used in Asian countries (e.g. India) and Europe. This study may also help to minimize the trade barriers in cement trade with Sri Lanka. Since the test parameters of cements assist to quantify significant characteristics of cements, in this study, comparison is made on test parameters and their specification given in the Sri Lankan standards with those in the Indian standards as well as European standards. Cements, specified for constructions in Sri Lanka are similar with the relevant cements manufactured by European countries as per EN 197-1 or any other country where their national standards are formulated based on EN 197- 1. Indian OPC grade 43 and 53 are similar with Sri Lankan OPC class 32.5N and 42.5N respectively. No any other Indian cement complies with Sri Lankan cements. Series of past data, collected from the test results of cement samples tested under the two schemes (Import Inspection Scheme and Product Certification Scheme) available in SLSI, shows the quality of cements have been improved consistently and considerably during previous years, and it is evident that the effectiveness of implementation of cement standards by the schemes.

Keywords: *Cement standards, construction materials, hydraulic cement, standard strength, cement characteristics*

MODELLING AND SIMULATION OF CONCRETE HYDRATION FOR RAPID CONCRETE PROPERTY ANALYSIS

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Abstract

Hydration of concrete is difficult to predict and it is modelled by affinity hydration phenomena. Then the model was simulated with realistic parameters which are combined with formwork by finite element approach. Time dependent modelling and simulation were carried out for 15 [dm^3] concrete blocks to non-isothermal conditions maintain inside the model. The **1/8** portion of a real geometry was used for modelling and simulation which is given as the symmetric and homogeneous profile. Initially, modelling and simulation was performed while the concrete block was insulated by polystyrene (EPS). The model was numerically and graphically validated using scholarly literature. Temperature and the degree of hydration (DoH) of each case of studies were analyzed by separate models and simulations. Thereafter, extended modelling and simulation were carried out when a wooden formwork is present. Finally, the results were compared and validated for given cases of insulated concrete by polystyrene layer which is made for uniform hydration of concrete. Finally, Affinity hydration model is validated with experimental data obtained under definite procedure. Thus, proposed model can be used as an accurate and valid approach to model and simulate the concrete hydration phenomena under defined formwork as well as different temperature profiles or changes in the environment.

Keywords: *Hydration, Temperature, Finite element analysis, Concrete, Affinity*

TECHNICAL SESSIONS
ON
ENVIRONMENTAL SUSTAINABILITY, GREEN INNOVATION & NATURAL RESOURCES MANAGEMENT

SUSTAINABLE PLACE MAKING IN OUTDOOR ADVENTURE RECREATION AT HORTON PLAINS HIKING TRAIL, SRI LANKA

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Abstract

Measuring effectiveness of man-made elements related to the user's experience is common in the outdoor adventure recreation literature. However, this is almost non-existent in Sri Lanka despite having hundreds of outdoor adventure sites with man-made elements. Due to lack of research-based place making method, the natural environment becomes the subject of hazardous impacts and accidents. The literature suggests that "space of the place" directly affects the adventure experience of the human being, but it varies according to the "difficulty rate" of the trail. Purpose of the study is to measure effectiveness of man-made elements by using "place measurements" and "nature responsiveness" as indicators related to "space of the place". The indicators were applied to three selected places at Horton Plains hiking trail, a class 02 type of trail in Sri Lanka. The results show that both natural context of the trail and the man-made elements play a key role in experience of the user. Moreover, the experience can be enhanced by placing designed elements in the hiking trails with emphasis on the above indicators.

Keywords: *outdoor adventure recreation, user experience, difficulty rating system, place and space, sustainable architecture*

A LAND ASSESSMENT TOOL FOR CULTURAL RECOGNITION IN ENVIRONMENTAL SUSTAINABLE MANAGEMENT: CASE STUDY OF KADURUGODA VIHARA – JAFFNA

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Abstract

Culture enables environmental sustainability at various levels through the intrinsic links between cultural diversity and biodiversity, through its influence on consumption patterns, and through its contribution to sustainable environmental management practices. The land selection methods which are cultural and environmentally appropriate are determined first and foremost by characteristics and location, which involves commonsense knowledge of architects for cultural recognition. The principal difficulties relate to the number and variety of factors that need to be screened. It is relatively easy to identify individual factors that, in a general context, are likely to affect cultural recognition. It is much more difficult to identify factors of only land selection; to determine their relative importance; and to ensure that the list of locally important factors is comprehensive. Further, functional and social parameters describe significant evidence of cultural recognition. In this paper I present an intelligent land assessment tool in ecosystem service provision a sub field of architecture domain of land selection to come up with land classifications as physical, functional and social indicators. At first commonsense knowledge in land selection is converted into a questionnaire. Removing dependencies among the questions are modeled using principal component analysis. Classification of the knowledge is processed through fuzzy logic module, which is constructed on the basis of principal components. Further explanations for classified knowledge are derived by expert system technology. The tool was tested in 10 sites, of varying cognitive abilities and diagnoses of cultural heritage. The questionnaire has been constructed with 31 questions and the principal component analyzer detected 9 principal components in filtering process. The tool scored for Kadurugoda Vihara in term of physical, functional and social as 7.072626%, 44.11221 % and 48.81516% respectively. This shows significant contribution of functional and social indicators respectively. The land assessment tool is to be a reliable assessment tool for cultural recognition in Kadurugoda Vihara by showing significant contribution of cultural recognition in ecosystem service provision.

Keywords: *Land selection, Cultural recognition, sustainable environmental management, land assessment tool, Fuzzy logic*

CONCEPT MODEL TO INCREASE PUBLIC PARTICIPATION FOR GREEN ENERGY GENERATION

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Abstract

This paper describes a concept model that increases participation of the general public, enterprise and other entities for green energy generation. In this model any consumer of electrical energy, any individual, group or organization (Investor) interested in participating in this initiative could make an investment and purchase share(s) for generating energy. The utility company would honor this contribution through a company (Facilitator) who undertakes the responsibility to generate the said amount of energy and feed the national grid/utility grid. Once the power generation facility is commissioned, the investor could be considered as an active generator of electrical energy. The utility company could now honor the participation of the consumer / investor by providing net metering facility to the utility account of the investor or purchase energy based on agreed rates.

Using this method any consumer could get the benefit of net metering on a fixed generation capacity for an agreed period while a power generation company takes the responsibility to supply the grid with the said amount of energy. The power generation can happen on a clustered or unified manner, avoiding hosting of micro level generation facilities within the Investor's premises which could be non-optimal.

This business model enables residents of apartments, tenants (occupants on rent), and commercial entities, Non-Governmental Organization, places of worship or technically any individual or organization to be active contributors for green energy generation.

Keywords: *Green energy generation, Increase public participation, Concept Model, Net Metering, Micro Power Generation*

REMEDIATION OF CI DIRECT BLUE 201 TEXTILE DYE: GREEN SOLUTION THROUGH NOVEL BACTERIA ISOLATED FROM TEXTILE WASTE WATER EFFLUENTS, SRI LANKA

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Abstract

Textile industry is one of the industries which extensively use various types of dyes and generate huge amount of wastewaters. Present study was carried out on the decolorization of CI Direct Blue 201 Textile Dye by bacteria isolated from textile wastewater effluent sites. Overnight grown bacterial cultures were starved in sterile saline water (0.01 M sodium chloride). Turbidity of the bacteria cell suspensions were equalized (A590 = 0.35) and introduced 5% (v/v) of bacterial suspension into filter sterile dye solutions at final concentration of 50 mgl^{-1} and incubated at 28 $^0C \pm 1\ ^0C$ under static conditions. Sample aliquot (3 ml) was removed daily and standard spectrophotometric method was used to determine the decolorization percentage. The effect of temperature, carbon and nitrogen sources, shaking and static conditions, initial dye concentration were studied with an aim to determine the optimal condition required for maximum decolorization. Control experiment was carried out in the same manner without addition of bacteria. Among the 157 bacterial isolates, three bacterial isolates showed almost complete decolorization ability within 72 h of incubation. 16S rRNA sequence analysis identified three bacterial isolates as *Micrococcus* sp, *Alcaligenes* sp. and *Staphylococcus* sp. CI Direct Blue 201 textile dye (50 mgl^{-1}) removal of isolated strains was detected as 97 % ± 1, 95 % ± 1 and 92 % ± 1 respectively while control remaining constant. It was found that the decolorization was effective for the tested bacterial isolates at 32 ^0C, under static conditions with the supplement of yeast and peptone as sole carbon and nitrogen sources. Thus, present study is a green light for future biotechnological approach for the treatment of colorful nuisance textile wastewater effluents in environmental friendly aspects.

Keywords: *Decolorization, Textile dyes,* Micrococcus *sp,* Alcaligenes *sp.,* Staphylococcus *sp*

QUANTIFICATION OF METHANE EMISSIONS OF BIOGAS PLANTS FROM DIFFERENT WASTE MATERIALS & TECHNOLOGIES

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Abstract

Global warming and climate change occur due to natural causes and anthropogenic activities. Disposal of organic waste results in considerable amount of methane (CH_4) emissions. At the same time, the interest on alternative energy sources has increased in the background of rising energy crisis. Biodegradable wastes are a good source of alternative energy and helps to reduce CH_4 emissions. The main objective of this study was to quantify the CH_4 emission of biogas plants based on different waste materials and technologies used in biogas plants in Sri Lanka. Out of a list of 218 active biogas plants obtained using the information collected from reputed biogas plant designing agencies, 132 biogas plants were selected for the study using a stratified sampling method, considering the sizes of the biogas plant, waste materials used, and technology adopted. The amount of CH_4 emission were measured using a metered instrument connected to the gas releasing outlet and flow meter outlet connected to the cooker. Using this setup, the biogas quantity used during a 2-hour period was measured for each biogas plant. The quantity of biodegradable waste fed to the plant was measured in locations where possible. Methane concentration in most of the tested plants was around 48% from gas yield which is closer to the values reported in literature. The highest CH_4 generation (74% out of total gas yield) was recorded from a plant installed in a hotel despite overloading the digester with excess waste water from the wash rooms. Approximately 81% of the plants used kitchen waste as the main feeding material while 23 % used cow dung and 20% used sewerage feeds. Noticeable changes recorded in CH_4 production between sewerage (74%) and kitchen waste + *Gliricidia sepium* (70%) as waste material feedstock. Highest CH_4 concentration was generated from continuous flow fixed dome technology type and it was about 57% of the total gas yield. Plants with Flug-flow technology recorded 55% CH_4 yield. Although, there is a correlation between waste material and technology type of biogas plant to the production of CH_4, digester required significant amount of heat to maintain bacterial function for the stability of gas production and the outdoor climatic conditions also found to affect CH_4 generation.

Keywords: *Biogas, climate change, organic waste, alternative energy*

SPATIAL AND TEMPORAL DISTRIBUTION OF WATER QUALITY PARAMETERS OF SURFACE WATER IN THE KELANI RIVER BASIN USING GIS

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Abstract

Water pollution is considered as the presence of excessive amounts of pollutants in water in such a way that it is no longer suitable for drinking, bathing, cooking or other uses. Thus, sustainable development of a country depends on the quantity and quality of the water. The demand for water in Sri Lanka is gradually increasing trend for domestic consumption and production. Contribute surface water pollution causing changes of physico-chemical and biological parameters of water. Kelani river is one of the major river in Sri Lanka and provides about 80% of the drinking water supply to the capital city of Colombo. The present paper describes the application of GIS for spatial distribution of some important water quality parameters of the surface water in the Kelani river basin. 45 surface water sampling locations were selected for the study and physico-chemical and microbial contamination was recorded using the standard methods. Conductivity values of surface water was high during the dry period than the wet period. Later part of the meandering region showed high conductivity ranged from 10000 to 40000 µS/cm. High BOD was recorded at head and meandering regions (> 5.0 mg/l) during the southwest monsoon period (<0.50-23.94 mg/l) where as high COD was recorded (> 100.0 mg/l) during the southwest monsoon period (1.33-402.90 mg/l). High hardness was recorded from the lower part of the meandering region (>100.0 mg/l). High nitrite concentrations recorded in meandering region of the river basin (>5.0 µg/l) with highest values (>10.0 µg/l) during the southwest monsoon period (<1.00 - 24.06 µg/l). Nitrate concentration was high during the southwest monsoon from both head and meandering region of the river basin (>2.0 mg/l). pH range from 7.0 to 7.5 was recorded in head and meandering part of the river basin. Total coliform and Feacal coliform contamination were high during the southwest monsoon and the later part of the meandering region showed contamination greater than 1100< MPN/100ml. GIS spatial distribution maps give better graphical summary to understand the spatial and temporal distribution pattern to overlook better conclusion. The finding of the study concluded that surface water quality of river basin is in deteriorating trend towards to the meandering zone of the river basin and proper strategic management plan with awareness about catchment protection is needed to safeguard surface water of the Kelani river basin for human consumption.

Keywords*: Kelani river basin, Surface water, Physico-chemical and microbial parameters, Spatial distribution maps*

THE INFLUENCE OF DRINKING WATER AND SELECTED SOCIO ECONOMIC PARAMETERS ON THE DISEASE INCIDENCE OF CHRONIC KIDNEY DISEASE UNIDENTIFIED – A CASE STUDY IN PADAVIYA DIVISIONAL SECRETARIAT, SRI LANKA

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Abstract

Chronic Kidney Disease Unidentified (CKDu) is one of the widely attended human health issue in Sri Lanka especially prevalent in the dry zone. It was originally discovered among the rice paddy farmers in the North Central Province (NCP) of Sri Lanka in Anuradhapura and Polonnaruwa Districts. The disease has now spread to neighboring districts in the North Western, Eastern, and Uva as well as the Central and Northern Provinces. The CKDu prevalent area covers approximately 17,000 km with a predominantly rural population of 2.5 million. The etiology is suspected as a combination of factors among which drinking water quality is considered high on the agenda. The present study aimed to investigate primarily the relationship between drinking water quality and the disease incidence. Attempt had also been made to correlate other socio economic factors to the disease incidence. The scope of the study was to evaluate two GN divisions in Padaviya Divisional Secretariat having high incidence of CKDu. Purposive sampling method was used to select households in which at least one member is having the CKDu disease. Non CKDu households were used as control. Using a structured questionnaire the households were interviewed for a number of socio economic parameters. Water samples were collected from the well used for drinking water purposes. The water samples were brought to the laboratory in clean bottles and analysed for hardness and heavy metals including Cadmium, Lead, Chromium and Zinc using titrimetric and the Atomic Absorption Spectroscopy method respectively. The results showed that there is a statistically significant ($P<0.05$) relationship between the disease incidence and hardness of the drinking water. The heavy metals tested in all the water samples were within the World Health Organisation (WHO) allowable limits. The results of the questionnaire survey showed a positive correlation between the disease incidence and following parameters; no of years of consumption of water from the same source (20 years or above), education level (higher in people having up to GCE O/L), age (people above 60 years more significant), gender (more males affected), hours of working in the field (10 or more hours), period of exposure to agrochemicals (20 or more years). The alcohol or tobacco consumption, heredity, use of ayurvedic drugs, the drinking water source while working, snake bites did not show a significant relationship to the disease incidence. The study recommended to improve the hardness in water by purification and introduce methodologies to regulate the purchase and use of the agrochemicals as a prevention strategy for the incidence of CKDu.

Keywords: *Chronic Kidney Disease, Total hardness, heavy metals, Padaviya*

ANALYSIS AND IMPACT OF THE MEASURES TO MITIGATE CLIMATE CHANGE IN SRI LANKA

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Abstract

Sri Lanka has been a party to the United Nations Framework Convention for Climate Change (UNFCCC) since 1993; Kyoto Protocol since 2002 and most recently the Paris Agreement in 2016. In line with the latter, Sri Lanka prepared Intended Nationally Determined Contributions (INDCs) to include climate change mitigatory actions in five sectors namely energy, industry, transport, waste and forestry and eight adaption sectors such as agriculture, fisheries and livestock, health, water and irrigation. This papers analyses the potential of the mitigatory actions in the aforesaid sectors by constructing mitigation scenarios as against the baseline scenario (Business as Usual (BAU)) up to year 2030. In constructing these scenarios, the available secondary information by ways of published reports, policies, strategies and action plans in the relevant sectors as well as at national level were reviewed. The primary data was obtained from the Ministry of Mahaweli Development and Environment in connection with the Third National Communication Project.

The results showed that the achievement of the targets set out in the Intended Nationally Determined Contributions (INDCs) vary among the sectors concerned; some sectors having greater potential while others to a lesser extent. In the energy subsector - electricity, it is envisaged that the Green House Gas (GHG) Emissions will reduce from 24,000 in the Business as Usual (BAU) projected amount to 10,000 ($C0_2$) equivalents Gg in 2030 in the mitigation scenario if the most recently approved Long Term Generation Plan of the Ceylon Electricity Board (2018-2037) which has emphasized the use of renewable energy and Liquid Natural Gas is fully operational. Certain demand side management actions too contribute to this reduction. In the transport sector, the relevant figures 16,000 ($C0_2$) equivalents Gg in the BAU case compared with 12,000 ($C0_2$) equivalents Gg in the mitigation scenario. The reduction will be less significant in the industry sector (from 1100 to 900 ($C0_2$) equivalents Gg) in 2030. The forestry sector will enhance the $C0_2$ sequestration significantly when the existing forest cover will increase from 29% to 32% in year 2030. A significant reduction of the GHG emissions is expected in the waste sector which is envisaged to reduce the value from 350 ($C0_2$) equivalents Gg in the baseline scenario to 25 ($C0_2$) equivalents Gg in the mitigation scenario. However, except for the electricity sub sector, in other sectors clear targets of GHG emission reduction is not present and this poses a drawback in reaching the expected mitigation of GHG.

Keywords: *GHG, mitigation, INDC, emissions, energy, waste, forestry, transport*

PHYSICO-CHEMICAL AND PATHOGENIC CONTAMINATION STATUS OF GROUNDWATER IN CKDU AFFECTED WILGAMUWA IN MATALE DISTRICT

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Abstract

Chronic Kidney Disease of Unknown aetiology (CKDu) is an emerging disease in Sri Lanka which is prevalence in North Central, Uva and Eastern Provinces. In consequence, Wilgamuwa Divisional Secretariat (WDS) in Matale District was recently identified as the high CKDu prevalence area and WDS is restricted for high number of CKDu cases and, more than 95% of patients are belonging to the farming community. Therefore, the present study was aimed to analyze groundwater quality and microbial contamination of WDS as groundwater is the main drinking water source of the area. During the study period, hundred and thirty-four wells were sampled and the selection was based on distribution and prevalence of the CKDu patients in Grama Niladari Divisions (GND) of the WDS. The sampling was performed from December 2017 to February 2018. Water temperatures, Dissolved Oxygen (DO), pH and conductivity were measured at the site itself using standard meters. Chemical Oxygen Demand (COD) and Total Hardness (TH) were measured using standard colourimetric and titrimetric methods. Fluoride was measured using standard Ion Chromatography (IC) and the total and faecal coliform counts were obtained from the standard membrane filtration method. It was found that 90% of samples were contaminated with total coliform and out of 90%, 69% of samples were positive for faecal coliform. The results of the study showed that the pH of water varied from 5.8 to 8.4 where DO remained between 1.4 to 9.9 mg/L. Water conductivity, COD, Total hardness, and fluoride ranged from 45 to 1170 µS/cm, 1 to 47 mg/L, 34 to 916 mg/L and 0.02 to 2.97 mg/L respectively. Further it was found that 15% of the tested wells were not within the standard values given for drinking water by the Sri Lankan Standard Institution (SLSI). Accordingly, water quality and CKDu prevalence in Wilgamuwa area shows clear-cut correlation between water hardness and fluoride. Therefore, detailed studies in terms of *in-situ* and *in-vitro* are needed to find a relationship between CKDu and water quality of the affected areas.

Keywords: *Groundwater, Wilgamuwa, CKDu, Fluoride, Water quality, microbial contamination*

THE ECOLOGICAL FOOTPRINT INITIATIVE: DRIVING SUSTAINABILITY THROUGH ACADEMIC INNOVATION

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Abstract

Humanity inhabits a single planet and yet our use of ecological resources far outstrips type planet's ability to regenerate them. This project aims to improve our understanding of human use and depletion of ecological systems and also to drive policy-making towards stronger forms of sustainability, particularly at the level of national governments but across every sector of society. To be more specific, how can we: Serve an expanding population harbouring legitimate material aspirations (SDGs), while; Phasing out fossil fuels within decades (Paris), and protecting the integrity of the planet's ecosystems (Aichi targets)? For these goals to be met within a realistic timeframe, we need to rethink the ways in which we conduct and share research; we need to much more conscious of and engaged with the end-users of that scholarly effort. The Ecological Footprint Initiative (EFI) is at the junction of the social and physical sciences, where fields like ecological economics have emerged to upset conventional disciplinary norms that have proven themselves inadequate for the transformative change that is required if we are to head off catastrophic effects of climate change, deforestation and species loss. We also need to build on emerging forms of pedagogy that allow students at the graduate level as well as postdoctoral scholars to learn the skills of research that can drive change. These goals need universities and scholars to engage in new and purposeful relationships: with NGOs and progressive state agencies, building new forms of collective capacity and change. This paper will set out the goals of the EFI and explore opportunities for international collaboration.

Keywords: *Environmental indicators; sustainability; academic innovation*

POTENTIAL UTILIZATION OF *EICHHORNIA CRASSIPES* FOR COMPOST PRODUCTION

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Abstract

Water hyacinth is a common noxious weed found in majority of aquatic systems in Sri Lanka. Consequently, water hyacinth is considered as an invasive alien species and total eradication of this plant is not a feasible option. Effective utilization has been identified as the best method for management of unwanted invasive weeds such as water hyacinth. The present study was aimed to evaluate the possibility to utilize water hyacinth to produce organic compost. The study sites were selected based on the nitrogen and phosphorus content in water. Accordingly, water hyacinth fresh samples for chemical analysis were collected from Boralesgamuwa lake, Attidiya marsh, Delkada keppu ela, Atalugama lake, Kada panaha tank and Parakrama samudra representing both wet zone and dry zone. Nitrogen content was measured by micro-kjeldahl method and metal concentrations were quantified using Atomic Absorption Spectroscopy (AAS). Phosphorous was measured using the spectrophotometric method where total carbon was quantified using Walkley-Black method. Analysis revealed that the total organic carbon was within the range of 40.21%-51.44%. Essential plant macronutrients such as Potassium, Nitrogen and Phosphorous were recorded as ranges of 0.13%-6.9%, 0.62%-50.85%, 0.06%-5.63% respectively. The other macronutrients; Ca (354.66- 3727.66 ppm), Mg (4038- 13 778 ppm) and micronutrients; Fe (120- 42 918 ppm), Mn (1.1-416.04 ppm), Ni (0-9.03 ppm)**,** Zn (0.148-148.05 ppm), Cu (294-1644 ppm) were found in considerable concentrations. Further, it was found that the plant contains beneficial nutrients such as Na (31.2- 706.8 ppm) and Co (0-54.97 ppm) at satisfactory level and these nutrients are rarely seen in synthetic fertilizer. Heavy metals; Cd, Cr, As and Pb were found as 1.379 ppm, 19.4 ppm, 64.65 ppb and 69 000 ppm respectively. According to the SLSI standards given for compost in Sri Lanka, the heavy metal concentrations found in water hyacinth are not in hazardous level and fiber content of the plant is in accepted range (6.89%- 19.45% m/m). However high moisture content (63.68%-95.35% m/m) retained in water hyacinth is not preferable for compost according to SLSI standards. The lowest C: N ratio (47.8:50.9) was detected in roots where the highest was found in leaves. All parts of the plant; Leaves, roots and petioles show high affinity for metals, essential plant growth promoters and trace elements which cannot be supplied from synthetic fertilizers. Therefore, the findings of the present study reveals that the water hyacinth is a suitable candidate to produce cost effective organic compost in future as well as a solution to remove noxious invasive water hyacinth.

Keywords*: Water hyacinth, Compost, nutrients, Heavy metals*

ANALYSING THE EFFECT OF EXTENSIVE AGROCHEMICAL USAGE ON THE QUALITY OF GROUNDWATER IN INTENSIVE VEGETABLE CULTIVATION AREAS IN SRI LANKA - A CASE STUDY IN DIYATHALAWA

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Abstract

Groundwater is an important water source which provides freshwater. The quality of groundwater varies from place to place, mainly depending on its geological origin and it is deteriorated heavily by various anthropogenic activities. Objective of this study was to analyse the effect of extensive agrochemical use on the quality of groundwater in intensive vegetable cultivation areas in Sri Lanka. The study was conducted as a case study in Diyathalawa where vegetable cultivation is practiced intensively and agrochemicals are used extensively. Within the area intensive vegetable cultivation area was identified with the GPS coordinates, where people mostly used groundwater for various purposes and near to the sources which the groundwater quality may affect. 0.5 km^2 land area which is encircled by intensively vegetable cultivated lands was selected and 40 well water samples were collected as before and after addition of agrochemicals to test for the Temperature, Turbidity, pH, Electrical conductivity (EC), Total Dissolved Solids (TDS), Nitrate (NO_3^-), Phosphate (PO_4^{-3}), Sulphate (SO_4^{-2}), Bicarbonate (HCO_3^-), Carbonate (CO_3^{-2}), Chloride (Cl^-), Fluoride (F^-), Potassium (K), Magnesium (Mg), Copper (Cu), Sodium (Na), Cadmium (Cd), Calcium (Ca), Manganese (Mn), Iron (Fe) and Strontium (Sr). Data were analysed by using Minitab 18.0, GW Chart and Visual MINTEQ 3.1. The distribution of Electrical Conductivity and Total Dissolved Solids were almost same in all the samples collected from the selected area. Cadmium concentration exceeded the SLS maximum permissible limit defined in Sri Lanka Standards for potable water of SLS 614: 2013. Therefore, it is important to further analysis for Cadmium as it is considered as a major cause for Chronic Kidney Disease of uncertain aetiology (CKDu). The other parameters did not exceed the maximum permissible limits in almost all samples. Therefore, it is possible to conclude that groundwater in the area is in good quality except for Cadmium concentrations.

Keywords: *Groundwater contamination, Extensive agrochemical use, Intensive vegetable cultivation*

TECHNICAL SESSIONS

ON

HEALTH SCIENCES & NUTRITION

FORMULATION OF A NATURAL AND NUTRITIOUS FLAVOUR ENHANCER USING LOCALLY AVAILABLE INGREDIENTS WITH HAVING UMAMI TASTE AS A REPLACEMENT FOR MONO SODIUM GLUTAMATE (MSG)

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Abstract

Mushrooms, Tomatoes, Carrots and Garlic were dehydrated and powdered prior to be used as ingredients. These ingredients were mixed according to Taguchi L8 design by changing the ratios to form eight different formulations. The main objective of this study was set as formulation of a natural and nutritious flavor enhancer using locally available ingredients with having umami taste as a replacement for Mono Sodium Glutamate (MSG). Formulations were evaluated based on seven point hedonic scale. Sensory tests were carried out with dhal and bread. Thirty untrained panelists were contributed in the sensory evaluation and samples were analyzed for Appearance, Taste, Odor, Mouth feel and Overall Acceptability. Results were analyzed using MINITAB 14 for Kruskal Wallis non parametric analysis and Mann-Whitney test. Based on the results of two sensory evaluations, sample 767 formulae (Tomato 2: Mushroom 2: Carrot 1: Garlic 1) and 671 formulae (Tomato 2: Mushroom 1: Carrot 2: Garlic 2) Formulae 767 showed the best results. Considering overall results of three sensory evaluations sample 767 was selected for the final product development. Out of all the sample, selected formulae (Tomato 2: Mushroom 2: Carrot 1: Garlic 1) contains the highest level of tomato and mushroom along with the least amount of carrot and garlic compared to other samples. In conclusion, sensory evaluations for eight different ratios of mixing above ingredients revealed that formulae 767 gave the best composition that could be a good replacer for MSG.

Keywords: *Mono Sodium Glutamate, Flavor, Sensory Evaluation, Umami taste, Natural*

ONTOLOGY BASED KNOWLEDGE SHARING APPROACH FOR DENTAL EXTRACTION FORCEPS

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Abstract

Tooth extraction is one of the common surgical procedure in the dental field. Without having proper knowledge on the tooth and extracting instruments, it may cause too much complexity on extraction procedure or even some damages to patients' jaws. Mainly when using extraction forceps, the proper forceps should be used according to the teeth and the situation. The information and knowledge need to be provided in a structured and complete way and in a context specific manner. Ontologies emerge as one of the more appropriate knowledge management tools for supporting knowledge representation, processing, storage, and retrieval. By considering the importance of sharing the knowledge on dental extraction, as a first stage, we gathered the information regarding the dental extraction forceps from the experts in the field. Then we started developing ontology as a second stage. Finally, the developed ontology was evaluated by ontology experts and inbuilt tools as an iterative approach. The needed description logics (DL) queries were developed in order to answer the competency questions (CQs). Those CQs and answers provided by the corresponding DL queries were checked again with the professionals in the dental domain. We strongly believe that our novel approach to dental extraction forceps ontology can support the dental students, dentists, as well as their assistants, improve the sharing of knowledge and learning practices. We are planning to develop a knowledge management portal on dental extraction as our future plan.

Keywords: *Dental Extraction Forceps, Ontology, Knowledge Sharing, Health Care Sector*

ASSESSING THE LEVEL OF AWARENESS ON CUTANEOUS LEISHMANIASIS INFECTION AMONG PEOPLE LIVING IN POLPITHIGAMA MEDICAL OFFICER OF HEALTH (MOH) AREA IN KURUNEGLA DISTRICT, SRI LANKA

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Abstract

Cutaneous Leishmaniasis (CL) is the most common manifestation of Leishmaniasis reported in Sri Lanka. According to the records from 2009- 2016, there is nearly an 18-fold increase in Kurunegala District indicating the requirement of an effective control programme. Community awareness on a disease in local communities is a key element in successful disease management. Since this is an emerging infectious disease in the country, level of awareness on the disease among the general public has not assessed in detail. Therefore, the objective of this study was to determine the level of awareness regarding the disease and knowledge gaps among local residences in Polpithigama Medical Officer of Health (MOH) area which is a disease endemic area in Kurunegala District of Sri Lanka. A total of 127 households were visited randomly and their knowledge regarding the disease was gathered using an interviewer administered questionnaire. Of them 44 households indicated with past cases and 83 were recorded with no past records. Interestingly, 45% (n= 57), had no idea about CL. None of them were aware of the causative agent and 80.3% (n=102) was not having any clue on disease transmission. The majority was not responsive to biting time of vectors (98.4%, n=125), diagnostic methods (98.4%, n=125) and protective measures against vector biting (91.3%, n=116). There was no significant impact on improving awareness of the disease with past disease incidence as indicated by two sample t test analyses ($P > 0.05$). Inadequate knowledge and awareness of leishmaniasis in this endemic area is a major challenge in disease control. It is recommended that the health authorities should take immediate steps to improve awareness of this disease among endemic communities.

Keywords: *Leishmaniasis, Awareness, Polpithigama, Sri Lanka*

PERSPECTIVES OF FAMILY MEMBERS OF PEOPLE WITH CANCER TOWARDS PALLIATIVE CARE

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Abstract

Cancer is a one of the global health problems. It is a leading cause of death in many developed countries and the second leading cause of death in developing countries. Palliative care helps to increase cancer survival rates and reduce suffering of cancer patients. The majority of patients with cancer are diagnosed with advanced-stage disease, and the best treatment options are pain relief and palliative care. It focuses on not only patient care but his /her family also. Family members have a pivotal role in palliative care. The aim of this study was to describe family perspectives of palliative care of patients with cancer. In this descriptive cross sectional study, a convenience sample of 300 family members of people with cancer in Apeksha hospital, Maharagama, Sri Lanka was participated. Structured interview were conducted using a questionnaire. Data was analyzed using Statistical package for Social Sciences (SPSS) and Microsoft Excel. The questionnaire included both open-ended and close-ended questions including three parts. The ethical approval was obtained from the ethical review committee, International institute of health Sciences, Welisara, Sri Lanka. Among the sample, the majority was Sinhalese (61.7%) and was in the age group of 41-49 (35%). Only 34.7% of family members have heard the term "palliative care" and 15.3% of them were stated different meanings to the term such as providing pain relief (5.7%), improving quality of life (3.3%) and providing comfort to the patient (4.3%). The majority of participants (76.6%) were satisfied with the nursing care the patients were received. Among the sample 61.3% of family members were happy regarding the facilities in the unit or ward. 16.3% family members strongly agreed that there were adequate medical staff and nursing staff in the unit according to their experience. About 37.3% of participants did not agree for the easily accessible palliative care service in Sri Lanka. The most preferred area to be at the end of life was home (65.7%) and the 82.7% of participants strongly agreed with public enhancing programs on palliative care and easily accessible service facility. The study shows that family members have positive and negative experiences with less understanding of palliative care service. It is important to enhance knowledge and understanding of palliative care through conducting palliative care programs in Sri Lanka.

Keywords: *Family members, palliative care, perception, cancer*

QUALITY OF LIFE AMONG PATIENTS WITH CHRONIC KIDNEY DISEASE AND UNDERGOING HAEMODIALYSIS AT TWO SELECTED TEACHING HOSPITALS, SRI LANKA

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Abstract

The prevalence of chronic kidney disease (CKD) is continued to rise across the globe including Sri Lanka. Haemodialysis (HD) is a method of management of patients with CKD. Quality of life (QOL) is a measurement of how many diseases and its treatment affects the life and feelings of the patients. Improving and maintaining the QOL is a major goal of nursing care for patients with CKD and undergoing HD. However, though there is a high number of patients with CKD receiving HD in Sri Lanka there is a lack of data on QOL among patients with CKD and undergoing HD. This study was aimed to assess the QOL among patients with CKD and undergoing HD who are attending haemodialysis units at two teaching hospitals in Sri Lanka. A descriptive cross-sectional study was carried out among purposively selected participants (n=250) who are attending the haemodialysis units at two teaching Hospitals, Sri Lanka during the study period. Data was obtained through pre-tested questionnaires: Socio-demographic questionnaire and WHOQOL-BREF and analysed for descriptive statistics. Ethical approval was obtained from the ethics review committee, KAATSU International University, Sri Lanka. Findings revealed that majority of participants were male 184 (73.6%), and in the 30-64 age group. Majority of them were unemployed (42%). Most of the 121 (48.4%) had 3 months-1yr duration of HD and 135 (54%) of them admitted three times per week for HD. The Environmental domain has the highest mean value (59.2±16.6) and social relationship domain has the least (49.5±22.5). Physical health and psychological domains have 51.9 (15.6) and 52.3 (19.9) mean values respectively. More than 50% of the participants were having poor physical (82%), psychological (64.8%), social (69.2%) and environmental QOL (52.8%). Most of the participant was (69.2%) represented poor overall QOL. Education level (p=0.000), average monthly income (p=0.002), the frequency of dialysis (p=0.000) and QOL were statistically significant. Results concluded that most of the participant was (69.2%) represented poor overall QOL. Health education programs and nursing interventions should be organized to enhance QOL among patients with CKD and undergoing HD. Further studies are needed to explore this phenomenon in Sri Lanka.

Keywords: *chronic kidney diseases, haemodialysis, quantitative research, Sri Lanka, quality of life*

INCIDENCE & RISK FACTORS OF INJURIES

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Abstract

Injuries like road traffic accident (RTA), domestic accident, work place injuries and intentional injuries lead to a large number of hospital admissions and a huge social and hospital burden. Possible preventive measures could lead to reduce these injuries. Presence of knowledge gaps in these areas restrict the efficacy of interventions. To assess the incidence of different types of injuries, assess the risk factors on RTA, evaluate the incidence and the risk factors for RTA injuries with the individual's socio-demographic characteristics. Patients admitted with injuries to the Base Hospital Kuliyapitiya over a period of month (n=210) were recruited in this descriptive cross sectional study. An interviewer administered questionnaire was used to collect data. Data analyzed using descriptive analysis. Number of admissions due to injuries during period of one month was 210. There were 87. 6% (n=184) admissions due to unintentional injuries. Majority; 76. 2% (n =140) out of them were males. One of the major findings was the most common age group that have undergone to any type of injury was 31-40years 21.9% (n=46). The injuries include Road traffic accidents (RTA), work place accidents, leisure time accidents, injuries caused by violence and domestic accidents which correspondently represent by 52. 4% (n=110) 11% (n=23), 9.5% (n=20) 12. 4% (n=26) and 14. 8% (n=31). When considering the RTA motor bike accidents 58.2% (n=64) (have led to most admissions. Risk factors represent RTA were no driving license (42.9%), helmet not used (26.7%), drowsiness (12.5%), alcohol influence (32.1%), dark or rainy day (53.6%), defective road (51.8%) and technical problems (10.7%). Most of the pedestrians (37.6%) have undergone to RTAs while crossing the road. 32.1% under the influence of alcohol. In this study most common age group that have undergone to any type of injury is 31-40 years. Motor bike is the most common vehicle for RTA and majority haven't got driving license. Considerable sample is under the influence of alcohol at the moment. Males have subjected to the injuries 3 times than females.

Keywords: *Incidence, Risk factors, Injuries, RTA, Alcohol Influence*

DRUG-FACILITATED STREET AND TRAVEL RELATED ROBBERY: IS THE PROBLEM PROPERLY ADDRESSED BY THE AUTHORITIES?

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Abstract

Robbers are wise enough to achieve their aim by using many methods. One such method is changing of the behaviour of the target individual by administering drugs causing clouding of consciousness, amnesia and narcosis. Sedatives, hypnotics, benzodiazepines and opium derivatives are the desired drugs used widely. Forensic clinicians not infrequently encounter patients with same odd yet stereotyped history of meeting a friendly stranger during long-distance travelling or on the streets who offers a drink or even liquor in a very persuasive manner making them drowsy as soon as consuming the drink several hours later to realize that he had been robbed of his valuables and dropped off at a distant place often with minor abrasions and bruises. Drug facilitated sexual offences are not discussed here.

Case 1: A 71 year old wealthy man was robbed by a three wheel driver after offering a drink. The following day he was found at a distant place devoid of any valuables.

Case 2: A three wheel driver was robbed by two passengers after offering short- eats and a drink.

The public including the school children are not well aware of this possibility. The medical doctors in general medical wards should extend their help in identifying the chemical agents used for this purpose. The forensic specialists, police officers, magistrates and such other stake holders should identify and maintain a database of such occurrences and agents used so as to prevent further occurrences and formulate legislative enactments.

Keywords: *drug related crimes, street and travel related robbery, inadequate awareness*

ESTABLISHMENT OF NORMAL LUNG FUNCTION PARAMETERS IN ADULT SRI LANKAN TAMIL POPULATION

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Abstract

Lung function tests play a vital role in diagnosis and monitoring of respiratory diseases. Normal lung function parameters differ between different ethnic groups. Lung function parameters of normal Sri Lankan Tamil adults are not available. This study aims to establish reference equations for lung function parameters of Sri Lankan Tamils in Northern Province of Sri Lanka. A descriptive cross sectional study was carried out in all 5 districts of Northern Sri Lanka. Participants were selected by cluster sampling. Base line data were obtained by a questionnaire (n =658). Standing height, sitting height, weight, arm span and mid arm circumference were measured. Respiratory function was assessed by a Wright compatible peak expiratory flow meter (PEFR) and by a calibrated spirometer (Cosmed Micro Quark, Italy). In males (n=345), and females (n =313) the mean, and standard deviation was determined for Vital Capacity (VC), Forced Vital Capacity (FVC), Forced Expiratory Volume in the first second(FEV_1) FEV1 % and Peak Expiratory Flow Rate (PEFR). The VC, FVC, FEV_1 and PEFR have significant ($p<0.05$) positive correlations with anthropometric measures. Age had a significant ($p<0.05$) negative correlation with lung function parameters. Step wise multiple regression analysis was used to determine the prediction equations.

VC (males) = 0.22 height – 0.018age + 0.022 arm span – 3.476 ($R^2 = 0.440$)
VC (females) = 0.013 height – 0.015 age + 0.019 arm span – 2.267 ($R^2 = 0.409$)

FVC (males) = 0.022 height - 0.022 age + 0.021 arm span- 3.142 ($R^2 = 0.456$)
FVC (females) = 0.014 height – 0.018 age + 0.019 arm span- 2.063 ($R^2 = 0.453$)

The results have established the reference values for lung function parameters of Sri Lankan Tamils. These results can be used to clinically diagnose patients with respiratory disease in the country.

Keywords: *Sri Lankan Tamils, FVC, FEV1, FEV1%, PEFR*

MOLECULAR DETECTION OF *Leishmania donovani* PARASITES IN WILD CAUGHT *Phlebotomus argentipes* USING A PCR ASSAY AND SPECIES ABUNDANCE OF SAND FLIES (DIPTERA: PSYCHODIDAE) IN KURUNEAGALA DISTRICT; AN ENDEMIC FOCUS OF CUTANEOUS LEISHMANIASIS IN SRI LANKA

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Abstract

Leishmaniasis is a vector borne parasitic infection caused by parasites of genus *Leishmania* and transmitted through the bite of female Phlebotomine sand flies. Due to practical limitations in traditional methods such as microscopic observation and culture of parasites in selective media to detect *Leishmania* spp within sand flies, molecular based methods have become more popular among scientific community due to its high reliability and specificity. In this study, the field caught sand flies were dissected and identified to the species level using available morphological keys. These specimens were washed with saline and DNA extraction was carried out using MightyPrep reagent for DNA (Takara Bio Inc, Japan). The resulted lysates were tested for *Leishmania donovani* parasites by PCR using kinetoplast mini-circle sequence as the target sequence and SalotraConv_F/SalotraConv_R (591bp) as the primers. A total of 1,662 sand flies were collected and majority of them were *Phlebotomus argentipes* (n=1517, 91.27%) followed by *Sergentomyia punjabiensis* (n=140, 8.72%). The parasite *Leishmania donovani* detected from 2 *P. argentipes* out of 87 screened sand flies indicating an infection rate of 2.3% while, none of the screened *S. punjabiensis* was positive for *L. donovani.* The results agree with the previous studies conducted in Sri Lanka, which also reports *P. argentipes* as a potential vector. The observed higher infection rate for *P. argentipes* during the current study confirms the role of the species as a potential vector for leishmaniasis in Sri Lanka and it also emphasizes the importance of further studies on assessing vectorial capacity of this species which may be useful in defining the risk area.

Keywords: *Leishmaniasis, Sri Lanka, Leishmania donovani, PCR, Phlebotomus argentipes*

PATIENTS TRANSFERS TO PROVINCIAL GENERAL HOSPITAL RATHNAPURA: REASONS AND PERCEPTION OF PATIENTS

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Abstract

Judicial decision making is at utmost important in making a decision to refer to tertiary level. This was done to describe reasons and perception of patients among transfer to Provincial General Hospital Rathnapura (PGHR). A descriptive cross sectional study was done in PGHR. A 'transferred patient' is defined as a patient who is transferred from other government hospital of any category with a filled transfer form. A structured pretested interviewer administered questionnaire and a data sheet were used. Transferred patients were identified from the admission registry. Ethical approval was obtained from ERC, Ragama. Mean age of participants was 46.7 years (SD 17.9). Most were belong to 31-45 category (33.5%). There were more males (73.5 %). Most of transfers were originated from Base Hospitals (53.5%) and BH Diyathalawa had contributed to the majority. In most of instances obtaining Surgical opinion was noted as the reason for transfer (n=114, 26.5%) while 15.8% were sent requesting further management. There were more males among those who were transferred because of obtaining specialist surgical opinion ($p = 0.02$) and more females were among those were taken for Ultra Sound – Abdomen ($p = < 0.01$). Perceptions of the transfer among patients were assessed by asking 8 questions arranged in a likert scale. In most of responses subjects were happy about transferring them to PGH Rathnapura. Mean age of transferred patients was 46.7 (SD 17.9) and there were more males (73.5 %). Most of transfers were originated from Base Hospitals (53.5%) and Base Hospital, Diyathalawa had contributed to the majority Obtaining Surgical opinion was noted as the commonest reason (26.5%) and there were more males among them ($p = 0.02$). In most of responses subjects were happy about transferring them to PGH Rathnapura.

Keywords: *Patients transfers, Provincial General Hospital Rathnapura*

LEAVES OF *Rosa* SPECIES – GREEN SYNTHESIS OF SILVER NANOPARTICLES AND THEIR ANTIOXIDANT AND ANTIMICROBIAL PROPERTIES

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Abstract

Metallic nanoparticles are promising as they are known to have astounding antimicrobial properties due to their large surface area to volume ratio. The green synthesis of nanoparticles is an eco-friendly, inexpensive and non-hazardous technique utilised in the synthesis of nanoparticles and there have been several plants used for the successful synthesis of nanoparticles such as copper, platinum, zinc oxide, silver and gold. This research focuses on the green synthesis of silver nanoparticles from five different varieties of *Rosa* leaf extracts and determining their antimicrobial and antioxidant properties in comparison to their water extracts. Assays incorporated to determine the antioxidant properties of both the water extracts and nanoparticles in this research were total phenolic content assay, total antioxidant capacity assay, ferric reducing antioxidant power assay, total flavonoid content assay, 2,2′-Azino-bis (ABTS) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. The antimicrobial properties were determined by well diffusion against *Staphylococcus aureus* (MRSA) and *Escherichia coli* (ATCC 10798). Mueller-Hinton agar was used as a medium where gentamycin was used as a positive control and distilled water as a negative control. After incubation, the zone of inhibition was measured. The results showed that nanoparticles have high total antioxidant capacity, total phenolic content and total flavonoid content in comparison to the water extracts. Considering the radical scavenging activity assays ABTS and DPPH water extracts showed a higher scavenging activity in comparison to silver nanoparticles however, in the FRAP assay nanoparticles showed a higher scavenging activity. The well diffusion results show that overall nanoparticles have a higher antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*. The results from this study prove that silver nanoparticles could be incorporated in various industries such as pharmaceutical or nutraceutical industries.

Keywords: *Green Synthesis, silver nanoparticles, water extracts, rosa leaves, antioxidant*

MICROWAVE ASSISTED ONE-POT GREEN SYNTHESIS OF SILVER NANOPARTICLES USING LEAF EXTRACTS FROM *Vigna unguiculate*: EVALUATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES

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Abstract

Oxidative stress is caused by the increased levels of free radicals in the body which leads to various diseases. Antioxidants are known to reduce the risk of diseases caused by oxidative stress as they have the ability to donate electrons to these harmful free radicals. In addition to the natural antioxidants present in fruits and vegetables, synthetic antioxidants are also available. With the emergence of nanotechnology, the applications possessed by nanoparticles are limitless. One such application is in nanomedicine where nanoparticles are incorporated to study biological systems. The properties of the nanoparticles depend on the type of metal used and the method of synthesis. The use of plants for the production of silver nanoparticles (AgNPs) is key point of interest as it is rapid, eco-friendly, non-pathogenic and economical. Furthermore, this "Green synthesis" requires a single step for the biosynthesis of the nanoparticles as the silver ions are reduced and stabilized from the biomolecules present in the plant extract, hence the term 'one-pot'. In this study, cowpea leaf extracts were used for the one-pot green synthesis of silver nanoparticles to determine its antioxidant properties using phytochemical assays; Total flavonoid content (TFC), total phenolic content (TPC), total antioxidant activity (TAC), and free radical scavenging assays; Ferric reducing antioxidant properties (FRAP), ABTS and DPPH. The phytochemical assays showed a greater activity in AgNPs compared to the water extracts except in the TFC. The free radical scavenging assays showed a higher scavenging activity in the water extracts compared to the AgNPs. The antimicrobial activities of the synthesized AgNPs were tested against two strains of bacteria which were gram positive methicillin-resistant *Staphylococus aureus* (MRSA) and gram-negative bacteria *Escherichia coli* (ATCC 10798), assessed by well diffusion method on Muller-Hinton agar petri plates using gentamycin as a positive control and distilled water as a negative control. The antimicrobial activity showed greater zones of inhibition (ZOI) in AgNPs compared to the water extracts for *Escherichia coli*, in contrast, *Staphylococcus aureus* showed a higher ZOI in the water extracts compared to the AgNPs.

Keywords: *Silver nanoparticles, cowpea leaf, green synthesis, antioxidant, antimicrobial*

KNOWLEDGE AND PRACTICE ON PREVENTION OF RESPIRATORY DISEASES AMONG ROAD TRAFFIC POLICE OFFICER IN GAMPAHA AND COLOMBO DISTRICTS, SRI LANKA

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Abstract

Air pollution is very high in Kandy, Colombo and Gampaha districts in Sri Lanka. The traffic police in Gampaha and Colombo district are continuously exposed to air pollution and are at and increased health risk. Report of the WHO Global Urban Ambient Air Pollution Database, heart disease, acute respiratory diseases and chronic respiratory diseases are growth for the people who live in the urban area in the world. The objective of this study was to assess the level of awareness and practice on respiratory diseases among road traffic police officers in Gampaha and Colombo districts Sri Lanka. The descriptive cross sectional study was conducted among 131 road traffic police officers who working in Gampaha and Colombo Districts through the self-administered questionnaire. Among 131 participants, 40% had work experienced more than 5 years. 25% respondents stated that they are suffering from asthma and 67% had common cold. 25% of the participants complained about chronic respiratory diseases. 76% of the participants were working on the road more than six hours. Most of them (62%) admitted that they don't wear face mask during duty times and out of that 43% mentioned that face masks are unavailable. 35% mentioned that wearing face mask is unnecessary and uncomfortable. 37% of them had frequently coughed specially at night with other respiratory disease symptoms. The majority of the participants (56%) noted the best face mask is the dust mask to prevent from the respiratory disease. 56% Respondents noted that the main aggravating factor of the respiratory diseases is dust. Majority of the police officers had fair knowledge on respiratory diseases but they had a poor practice to prevent from respiratory diseases.

Keywords: *Road Traffic Police officers, Air Pollution, Heart diseases, acute respiratory diseases, chronic respiratory diseases*

SEAWEED-MEDIATED *In vitro* GREEN FABRICATION OF SILVER NANOPARTICLES: DETERMINATION OF THE POTENCY OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITY

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Abstract

Free radicals mediated diseases are becoming more persistent in the world. This has lead to the frequent cases of cancer, cardiovascular diseases and diabetes around the globe. Additionally, in the past few decades a prominent rise in bacterial infections has greatly increased the mortality rates all throughout the world. Although miscellaneous synthetic antioxidants are available, chronic exposure to these synthetic antioxidants result in severe consequences. Therefore, scientific research has focused on discovering more reliable treatment methods with fewer side effects. Seaweeds a type of marine macro algae have exhibited significant health benefits in traditional seaweed consumers. Comprehensive research reveals seaweeds have demonstrated with potent antioxidant and antimicrobial activity. Silver nanoparticles synthesised different plant extracts expresses enhance antioxidant and antimicrobial features. This study emphasises on determining the antioxidant and antimicrobial activity of seaweed mediated green fabrication of silver nanoparticles. The water extracts of six species of fresh seaweeds were utilised for the synthesis of the silver nanoparticles. Silver nanoparticles were successfully synthesised for 5 species of seaweeds. The characterisation of the synthesised silver nanoparticles accomplished with UV-Visible Spectroscopy. The antioxidant activity of water extracts and the silver nanoparticles were determined with Total Flavonoid Assay, Total Phenolic Content, Total Antioxidant Content, 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay, 2,2-azinobis-3-ethylbenzothiazoline-6-sulfonic acid (ABTS) assay and ferric reducing antioxidant power (FRAP) assay. The antimicrobial activity was determined against *Escherichia coli* and *Staphylococcus aureus* through well diffusion. The results reveal *Turbinaria ornata* seaweed species to have the highest antioxidant activity among water samples. A precise sample exhibiting substantial antioxidant activity for silver nanoparticles was not identified. A higher antibacterial activity against *Staphylococcus aureus* was observed than for *Escherichia coli*.

Keywords: *Green synthesis, Silver nanoparticles, Seaweeds, Antioxidant activity, antimicrobial activity*

PREVALENCE AND RISK FACTORS OF UPPER BACK PAIN AMONG HEAVY VEHICLE DRIVERS IN GALLE DISTRICT, SOUTHERN PROVINCE, SRI LANKA

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Abstract

Musculoskeletal Disorders (MSD) due to occupational factors is more common among drivers at present. Various factors such as driving for long hours, driving seat position and angle, and driver's posture can affect the drivers to get Musculoskeletal Disorders. Professional drivers are a high-risk group for musculoskeletal disorders involving the spine, shoulder, back, neck, knee and pains in upper and lower extremities. Objective of this research was to assess the prevalence and risk factors of upper back pain among heavy vehicle drivers in Galle district. A descriptive cross sectional study was done on a conveniently selected sample of 80 heavy vehicle drivers in Galle district using a self-administered questionnaire. A majority of 77.8% of the drivers drive for more than 6 hours per day and among them, 63% complained of numbness in their neck and shoulder area. 54%of them stated that the pain affects their carrier. 62% out of them stated that they get upper back pain while driving. 47 participants have stated that they get upper back pain mostly on the following day after a drive. Majority of them (64%) do not keep any back support and they lean to the seat while driving. Only 32% of the participants had sought medications for their conditions. Majority of them have used home remedies for their musculoskeletal pain without seeking any medical advice. According to this research heavy vehicle drivers were more prone to get musculoskeletal disorders. Among heavy vehicle drivers, upper back pain is one of the most commonly identified Musculoskeletal Disorder. Driving for long hours and the wrong sitting posture were the most common risk factors for upper back pain among heavy vehicle drivers.

Keywords: *Muscular skeletal disorders, Risk factors, Upper Back Pain, Heavy Vehicle drivers, Galle district*

PREVALENCE OF CALF MUSCLE TIGHTNESS ASSOCIATED WITH ANKLE RANGE OF MOTION AMONG SEWING MACHINE OPERATORS IN TEXTILE INDUSTRY IN KURUNEGALA DISTRICT, SRI LANKA

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Abstract

Tailoring industry is a vast scale industry employed by a large number of Sri Lankans. The objective was to find out the prevalence of calf muscle tightness associated with ankle range of motion of sewing machine operators. The calf muscle tightness and range of motion were assessed by a knee to wall test and measured using a measuring tape in centimetres. To perform the test the worker should be barefoot and kneeling with the tested leg in front. The 1st toe should be 10cm away from the wall depending on their height. The worker then shifts their knee forward, trying to touch the wall with the knee while keeping the heel flat on the floor. If the knee cap touches the wall, it stated that the worker has sufficient dorsiflexion mobility. If the knee cap cannot touch the wall, dorsiflexion is restricted. A mixed method was performed on 110 conveniently selected sewing machine operators in a textile factory in Kurunegala district. Operators were assessed through an interviewer-administered questionnaire. Ethical clearance for this study was obtained from the bio-inquirer ethics review committee. Statistically analysed data using SPSS revealed that among participants 83.6% used their right leg as their dominant leg to operate the sewing machine. The workers who used their right leg to operate the machine obtained a knee to wall test average mean value of 20.53cm for their right leg and 21.02cm for their left leg. Respectively, the workers who used their left leg to operate the machine was 21.31cm for their right leg and 22.14cm for their left leg. The results show that they do not have statistically a significant difference in their calf tightness regardless of the dominant leg of machine operation (P=0.5).

Keywords: *Calf muscle, tightness, range of motion, sewing machine operators, textile industry*

ASSESSMENT OF PHYSICAL HEALTH STATUS OF INSTITUTIONALIZED ELDERLY IN GALLE DIVISIONAL SECRETARY AREA

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Abstract

By 2030 Sri Lanka is expected to have 22 per cent of its population aged over 60 and significant proportion of elderly in Sri Lanka are being institutionalized due to various reasons. Hence assessing health status of institutionalized elderly become important issue. A descriptive study was done involving all the institutionalized elderly in Galle Divisional Secretary area. An institutionalized elderly is defined as, a person who is above 60 years of age and permanently residing in a registered elderly home. There are three registered Elderly homes in Galle DS area and all the residents were invited. A pre tested interviewer administered questionnaire was used. Questionnaire was administered following informed written consent and confirming the physical and mental capability of the subject to answer. There were 142 in the eligible individuals and only 112 were participated in the study. Mean age of the sample was 72.2 years (SD 10.2) and majority were females (75.9%). Among all 31.2% had hypertention while 28.6% were suffering from osteoarthritis. Out of participants 27.7% had complained difficulty in sleeping while 16.1% had loss of appetite. According to data 85% were having visual defects while 70% had hearing problems. Only 11.6% were doing exercise and 32.1% were eating fruits regularly. But 51.7% and 58.1% had assessed their blood sugar and blood pressure respectively over last year. Similarly 55.3% had checked their vision. Females were more likely to complain osteoarthritis ($p = 0.02$) and difficulty in sleeping ($p = < 0.01$). Among study population hypertention was the commonest medical problem while 27.7% had complained difficulty in sleeping, 16.1% had loss of appetite. A larger population were having visual defects and hearing problems. Healthy habits were not satisfactory but majority were checked their blood sugar, pressure and vision. Females were having more health issues.

Keywords*: Institutionalized elderly, physical health*

AWARENESS ABOUT RISK OF DEEP FRIED FOOD AMONG YOUTH OF WESTERN PROVINCE, SRI LANKA

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Abstract

Over the past years patients with prostate, endometrial, ovarian, lung, kidney, and oesophageal cancers have raised in number. According to NutritionFacts.org, the main cause for these is the food they consume and deep fried foods play a vital role among them. Annual health bulletins in Sri Lanka for show that there are high cancerous risks in mid ages in both males and females. This study was to assess the level of awareness on the risk of deep fried food and to assess the risk for cancers among youth of western province Sri Lanka. The descriptive cross sectional study was done on youth in western province, Sri Lanka, who are over 18 years of age using convenient sampling by an online questionnaire.154 participants are distributed among 80 female and 70 males. From them 62 of them consume 2-4 times when 29 of them consume more than 8 times. Among them, 81.2% are aware about the side effects of deep fried food and 17.5% of them had no idea. From them 33.8% were not aware on the risk for cancer. From those who consume deep fried food, 93 of them know the risks of cancers. 17 out of 20 respondents who were overweight and 9 out of 10 who were obese consumed deep fried food. From 108 undergraduates, 74 knew the risks for cancers associated with consuming deep fried foods and 34 weren't aware. Most of the youth consume deep fried food because of its taste as well as the choice of restaurant depends on the taste of the foods. Sri Lankan youth are moderately aware on the risks of deep fried foods but the awareness on risks for cancers was found to be low.

Keywords: *Deep Fried Food, Acrylamide, Cancer, Side Effects, Obesity*

PERCEPTION & AWARENESS ON IMMUNIZATION AMONG URBAN MOTHERS IN THE GAMPAHA DISTRICT, SRI LANKA

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Abstract

Vaccination is an injection of a killed microbe in order to stimulate the immune system against the microbe, thereby preventing disease. Vaccinations, or immunizations, work by stimulating the immune system, the natural disease-fighting system of the body. The study objectives are to correlate the education level of the mothers with regard to their immunization, to find the proportion of immunization in infants in relation to the knowledge of the mother and to assess the knowledge of the community about the weaning of infants and its requirement. Descriptive study was done on 106 urban mothers in Gampaha district using convenience sampling through a self-administered questionnaire .Among 106 eligible participants 73 had their children vaccinated up to date and 46 of them observed fever, 12 of them observed pain and swelling as a main side effect.23% was aged 30 to 40 with mostly having the education up to advanced level, among the study sample 56.6% have two children in the family. Among 106 eligible participants 82 participants said that vaccination is important, when asked of importance of vaccination 77.4% of the population had a positive response while only 20.8% had a negative response. The participants included the reasons for immunization, from that 39.6% were aware and 94.4% unaware. Three percent had a positive response, 17.9% negative response and 49.1 % was not unaware when assessed of the intensity of harm due to vaccination. Missed vaccination is a common problem worldwide. In our pre-sent study, we observe that despite good knowledge and attitude towards EPI. According to the results it is found that the awareness of mothers is adequate regarding the importance of immunization.

Keywords: *vaccination, urban mothers, awareness, perception, Gampaha district, Sri Lanka, immunity*

QUALITY OF LIFE OUTCOMES IN AYURVEDA TREATMENT ON CHRONIC KIDNEY DISEASE OF UNCERTAIN AETIOLOGY PATIENTS IN NORTH CENTRAL REGION, SRI LANKA

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Abstract

Chronic Kidney Disease of uncertain etiology (CKDu) is a slowly progressive irreversible disease. Patients affected with CKDu are among farming communities mainly in north central region of Sri Lanka at their prime adult working years. The disease affects their quality of life, earning potential and the overall productivity. Since haemodialysis, peritoneal dialysis and renal transplant serve the only available options for patients suffering from CKDu, a considerable proportion has resolved to receive alternative treatments such as Ayurveda and Sri Lankan Traditional Medicine (SLTM). The objective of the current study is to determine the effects of a selected Ayurveda treatment practice in North Central region by assessing the Health Related Quality of Life (HRQOL) of individuals with CKDu.Kidney Disease and Quality of Life Short Form version 1.3 (KDQOL-SF) questionnaires was used to assess the quality of life of 96 patients attending to a selected Ayurveda clinics for CKDu in North Central province. The KDQOL-SF tool was used to assess 11 domains specific to kidney disease and SF-36 was on 8 common domains with 100-point scale. Trained interviewers collected information from CKDu patients before starting treatment and 6 months later. Statistical analysis was conducted using SPSS version 23. Total number of 25 patients (mean 58±9 years) completed the KDQOL-SF. Cognitive function was found to be significantly improved after 6 months of treatment compared to baseline ($p = 0.01$). Significant improvements were shown in SF-36 related domains of physical functioning ($p < 0.001$), pain ($p = 0.01$) general health ($p = 0.043$) and quality of social interaction ($p = 0.040$) at the end of 6 month period of treatment. SF-12 Physical composite score was significantly improved after the 6 month period ($p = 0.01$). However mental composite summary score was not significantly improved during the first six months of treatment. A six month treatment period with Ayurveda medicine was shown to significantly improve physical and cognitive functions among CKDu patients.

Keywords: *Chronic Kidney Disease of uncertain aetiology, Health Related Quality of Life, Sri Lankan Traditional Medicine, KDQOL-SF*

APPLICATION OF VIOLENT EXTREMIST RISK ASSESSMENT (VERA) FOR EX-POLITICAL RADICALISTS IN THE LOCAL SETTING

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Abstract

The rise of terrorism globally have greatly highlighted the need for understanding the phenomenon of radicalization/terrorism and, most importantly the need to generate knowledge required to make early predictions possible and to prevent them. Different countries use a number of different risk assessment methodologies for the purpose of identifying vulnerable individuals or assessing the likelihood of those already on the path towards extremism to commit violence. The study sets out to investigate usefulness of VERA in risk assessment of political radicalists in the local setting. Case studies on 5 males were carried out and each factor rated by a Behavioral Psychologist. Attitude factors were observed to be present in the highest percentage (93%) whilst historical items were seen to be least significant among majority (22%). All other items scored a moderate rating. Most VERA factors are applicable for risk assessment of future violence among identified cohort of political radicals in the local setting.

Keywords: *VERA, Sri Lanka, political radicalists*

CALCIUM INTAKE AND FACTORS ASSOCIATED WITH THE USE OF CALCIUM SUPPLEMENTS; A CASE STUDY IN MAHARAGAMA DIVISIONAL SECRETARIAL DIVISION, COLOMBO DISTRICT

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Abstract

The objective of this study was to understand whether people in study area are obtaining adequate amount of calcium from available sources, and factors influencing the use of calcium supplements and providing recommendations for an initially introducing calcium supplement into the market. Survey is a legitimate and scientific process of acquiring data and opinion of public. Food frequency questionnaire that was based on several theories, feedback of experts, and personal interviews with members of the target group was distributed among a random sample of 175 households (673 respondents) in the Maharagama division, Colombo. Variables based on the theory of planned behaviour were assessed through questionnaire that was constructed to form scales measuring attitudes, subjective norms, perceived behavioural control, and intention to consume calcium supplements. Attitudes toward calcium supplements and perceived behavioural control contributed to model for predicting intention, whereas subjective norms of the respondents showed the intention towards the calcium supplements. Among the population in-between the age 20 to age 65 had more positive attitudes, normative beliefs and higher self-efficacy expectations with respect to using calcium supplements than other age categories. Subjects, who already using calcium supplements were more often female and had more positive attitudes and normative beliefs than non-users. Their attitude in the direction of the health concern and the awareness headed to osteoporosis also higher than the others. Study revealed that 98.2% of people from sample population aren't obtaining the adequate amount of calcium. Major demanded sources of the calcium are milk, white bread, brown rice and cooked fish. Apart from that calcium obtaining is varying with age and the gender. With reference to new calcium supplement launching, can be recommended that, more attention should be provided to female population who were in between the 20-64 age categories and product necessitate to meet their requirements.

Keywords: *Calcium, Calcium supplement, Market Survey, Food frequency questionnaire, Theory of planned behaviour*

EFFECT OF DETERGENT CONTAMINATIONS ON ROUTINE SERUM BIOCHEMICAL ANALYTES – A LABORATORY BASED STUDY

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Abstract

The potential use of Teepol, Lysol and sodium hypochlorite is frequent in recycling of specimen collection tubes by the state hospitals in Sri Lanka. The presence of detergent residues in collection tubes was thought to be the reason for uncertain results in recent past. This raised the concerns to evaluate the effect of washing of the specimen collection tubes by various detergents on analysis of serum creatinine, Aspartate Transaminase, Na^+ and K^+ and to determine detergent contamination by detergent residue testing (pH and conductivity). Three sets of newly purchased glass Khan tubes were washed using 1% Teepol, 1% Lysol and 0.1 % sodium hypochlorite .Ten randomly selected detergent washed tubes of each set were subjected to detergent contamination tests. Blood (1000 µl) from a single donor was aliquoted to a Teepol washed (Test) tube and to a newly purchased plain glass Khan tube (Control). Both tubes were tested for serum creatinine, AST, Na^+ and K^+. Twenty such specimens were analyzed to study the effect of Teepol washed tubes over newly purchased plain glass Khan tubes. Same procedure was followed to assess the effect of Lysol and sodium hypochlorite washed tubes on the selected serum analytes with controls to each detergent washed tube. Paired t-test results worked out using SPSS-21 revealed that there was no significant difference ($p>0.05$) in serum creatinine, AST and potassium results when Teepol, Lysol or sodium hypochlorite washed tubes were used in specimen collection. Serum sodium results were significantly different in specimens collected to Lysol washed tubes ($p<0.05$) only. The Lysol washed tubes were significantly contaminated with acidic detergent residues. No significant contamination of neutral pH ionic detergent residues were found in conductivity meter testing In conclusion if the cleansing is done according to WHO guidelines with domestic detergents (Teepol, Lysol and sodium hypochlorite) will not have any significant effect on some analytes. Newly purchased tubes should be recommended in critical investigations such as serum electrolytes to improve the accuracy of laboratory reports.

Keywords: *Teepol, Lysol, Sodium hypochlorite, creatinine, AST, sodium ions and potassium ions*

VALIDATION OF SODIUM SULPHITE PRECIPITATION METHOD FOR FIBRINOGEN DETERMINATION

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Abstract

Among many complex, expensive, lengthy, antigenic methods for fibrinogen antigen quantification, sodium sulphite precipitation method is an easy, inexpensive, and a rapid method. Therefore validation of this method became important. This experimental study was carried out using 45 plasma samples obtained from the patients attending the thrombolytic clinic, National Hospital Sri Lanka (NHSL). Validation parameters were measured according to Clinical Laboratory Improvement Amendments' (CLIA) guidelines at the haematology laboratory, University of Sri Jayewardenepura (USJP). Results obtained from validated method were compared with results of existing method and clauss method. Statistical analysis was done using SPSS16. Currently this method uses an albumin standard to plot the standard curve. So an attempt was taken to validate the method using a fibrinogen standard which is more reliable to plot the standard curve. Reaction mixture gave peak absorbance at 412 nm. Suitable time duration to obtain results was 6-10 minutes. Limit of detection (LOD), limit of quantitation (LOQ) and analytical sensitivity were 0.5066 g L^{-1}, 0.802 g L^{-1} and 0.086 respectively. Both existing method ($p=0.002$) and clauss method ($p=0.001$) have positive high correlation and significant association with the validated method. Positive high correlation (Pearson correlation coefficient: >0.8) and significant association was yielded between values that obtained in different laboratory setups (labs in NHSL and USJP) in validated method. It was concluded that fibrinogen concentrations within 0.802 g L^{-1}-5.5 g L^{-1} can be measured by validated method with accepted precision and accuracy. Validated method is more reliable and precise than existing method. Both validated method and existing method were less precise to measure low fibrinogen concentrations. 12.5% sodium sulphite reagent can be used only for three days after preparation.

Keywords: *Fibrinogen, Dysfibrinogenemia, Antigen, Sodium Sulphite Precipitation method and Method Validation*

GENETIC ORIGINS AND CLINICAL DESCRIPTION OF SICKLE CELL DISEASE IN SRI LANKA

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Abstract

Sickle cell disease (SCD) is found at a low prevalence in Sri Lanka. A recent hospital based survey identified about 50 patients in the country. The clinical spectrum of SCD in Sri Lanka has not been studied and its genetic origin remains unknown. This study was conducted to identify the genetic origin (s) of Sickle haemoglobin (Hb S) and to carry out a clinical description of SCD in Sri Lankan patients. Patients were recruited from Ragama, Anuradhapura, Hambantota and Kurunegala thalassaemia centres. All patients were examined and clinical details were recorded. Genetic analyses were performed to identify the haplotype of HbS, *Xmn I* polymorphism, α plus thalassaemia and β-mutations. A total of 49 SCD patients were studied. Ages ranged from 5 – 47 years (mean 20.4). 45 (91.8%) patients were Sinhalese and the rest were Muslims. 43 (87.7%) patients had sickle- β-thalassaemia (SBT) and 6 were homozygous (HbSS). Joint pain was the commonest symptom among SCD patients. Clinical presentations in SBT varied from those with none to frequent crises. Clinical management varied with only 21 (42.86%) patients being on hydroxyurea. Most patients had not inherited the known disease ameliorating genetic factors with 47 (95.9%) patients not having α plus thalassaemia and 44 (89.8%) patients not having *Xmn I* polymorphism at (+/+) framework. Three Sickle haplotypes were identified including; Arab-Indian, Benin and Bantu. There appears to be at-least three genetic origins of HbS in Sri Lanka. SCD is extremely clinically variable in Sri Lanka. The reason for this variation needs further study, as most patients seem not to have common inherited disease ameliorating modifiers.

Keywords: *Sickle, Sri Lanka, Haplotype, Origin, Clinical*

PERCEPTION AND AWARENESS REGARDING HPV VACCINE AMONG THE GENERAL PUBLIC IN SRI LANKA

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Abstract

Human papillomavirus (HPV) is a common sexually transmitted virus all over the world. But HPV is important mainly because it can cause cervical cancer in women. It is the second leading cause of cancer deaths among women around the world including Sri Lanka. Many Sri Lankans are unaware of HPV and its prevention and the risk of spread of cervical cancers are increasing. It is important thereby to assess the knowledge and perception regarding the prevention vaccination of HPV. A descriptive study was done on 150 urban Sri Lankan individuals using convenience sampling through a self administered online questionnaire to assess knowledge, awareness and perceptions on HPV vaccination. Among the 107 eligible participants, when asked whether they were aware of HPV, 64 responded yes, but only 5 were actually aware. Nine of them had partial knowledge and 49 of them were completely unaware of the conditions of the virus. Ninety-one of the respondents had not been vaccinated because 73 of them were unaware of the vaccine, 4 of them were allergic, another 4 were fearing the side effects and 10 thought the vaccine was not available in the country. Out of the 15 who were vaccinated, only 5 received it in the ideal age; which is between 9-13 years of age. Only 68.2% had a positive perception on the action of HPV vaccine when they were asked of their general thoughts on this. Research findings demonstrate that the urban public are ignorant of the HPV vaccine and hold negative perceptions. Steps need to be taken to reduce this condition and prevent complications caused by this infection.

Keywords: *Human Papillomavirus, Awareness, developing countries, urban public, perception, Sri Lanka*

THE EFFECT OF *P.urinaria* EXTRACTS ON ADIPOGENIC AND OSTEOGENIC DIFFERENTIATION OF HUMAN UMBILICAL CORD DERIVED (HUC) MESENCHYMAL STEM CELLS (MSCS)

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Abstract

Mesenchymal stem cells (MSCs) are multipotent stromal cells. They can be differentiated into many cell lineages including osteocytes and adipocytes. *Phyllanthus urinaria* (Rathupitawakka/Chamber bitter) is used to treat gonorrhea, urogenital diseases and dysentery in Ayurveda. Present investigation was focused on the effect of root and aerial extracts of *P.urinaria* on differentiation of MSCs into osteocytes and adipocytes.

Segments of human umbilical cord were incubated in Dulbecco's Modified Eagle Medium high glucose (15-20 mL) medium supplemented with FBS (10%) until appearance of spindle shape fibroblast like cells. Media changes were carried out in 3-4 days' time intervals. The cells were trypsinized and sub cultured. Toxicity of aqueous extracts of root and aerial parts of *P.urinaria* on MSCs were determined using MTT assay. MSCs were treated with osteogenic and adipogenic differentiation media. Nontoxic concentrations of plant extracts were pre-evaluated for the experiment and 100 µg mL^{-1} of each plant extract was used to co-expose with osteogenic and adipogenic differentiation media. Negative controls with normal basal medium as well as with the adipogenic and ostegenic differentiation media were carried out simultaneously. Osteogenic and adipogenic ability were evaluated using alizarin red, and oil red-O assays respectively. The effect of the extracts of root and aerial parts on adipogenic and ostegenic differentiation was compared with the cells cultured in respective differentiation media.

MSCs viability was decreased in a dose dependent manner with root extract (PUR) and aerial (PUA) parts extract of *P.urinaria* indicating toxicity at high concentrations. The percentage cell viability was higher than 90% at 100 µg mL^{-1} for both root and aerial parts respectively. PUA showed significantly higher cell viability ($p< 0.05$) than PUR at 100 µg mL^{-1}. Root extract of the plant did not show a significant effect on adipogenesis, however showed an inhibition of osteogenesis ($p<0.05$).Contrastly, aerial parts inhibited adipogenesis and no significant effect on osteogenic differentiation.

Differentiation of MSCs into osteocytes and adipocytes were inversely correlated. Based on the findings it can be concluded that *P.urinaria* root (PUR) extract decreased the osteogenesis while PUA decreased the adipogenesis. PUA might be a possible lead to treat obesity.

Keywords: *P.urinaria, adipocytes, Ocsteocytes, mesenchymal stem cells*

EVALUATING THE USABILITY OF ASCVD PLUS™ MOBILE APPLICATION IN ASSESSING THE RISK OF CARDIOVASCULAR DISEASES IN SRI LANKAN ADULTS

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Abstract

The updated "ASCVD Risk Estimator Plus™" by the American College of Cardiology is an application used to assess and estimate heart disease and stroke risk. Both currently and in 10-years for Athero-Sclerotic Cardiovascular Disease (ASCVD) risk. This application has been designed in order to be used on mobile platforms and has been validated in North America and has been used as a research tool as well. However, the usability of it among the South Asian populations and an idea about its ability to predict the risk of ASCVDs has not yet been pretested. A descriptive study was done on 100 adults selected using convenience sampling from Colombo, using an interview-administered questionnaire and ASCVD™ plus mobile application. Out of 94 adults ranging from 40 to 80 years, the majority (n=48) of them were males. It was deduced that the lifetime ASCVD risk among males is higher than that of females, by a mean difference of 12.85. It showed the same patterns for the current ASCVD risk, the males mean risk 6.5400 and females having 2.2405. These values could increase if they kept indulging in the risk factors. Gender wise males stress levels for both lifetime and current ASCVD risks were at a greater percentage. An additional finding of this research was that stress has contributed towards developing cardiovascular disease to the current ASCVD risk by 38.7%. Moreover, statins were an effective therapeutic agent. The prevalence of ASCVD risks matched the predicted risks of updated "ASCVD Risk Estimator Plus™". Therefore, it is a useful screening and monitoring tool for Sri Lankan adults.

Keywords: *ASCVD (Atherosclerotic Cardiovascular Disease), LDL (Low-Density Lipids), Lifetime ASCVD(percentage of lifetime atherosclerotic cardiovascular disease), Current ASCVD(percentage of risk currently), Statins(lipid-lowering medications)*

RISK FACTORS FOR DELIBERATE SELF-HARM IN PATIENTS PRESENTING TO PSYCHIATRIC UNITS AT COLOMBO SOUTH TEACHING HOSPITAL AND HOMAGAMA BASE HOSPITAL: A DESCRIPTIVE CROSS- SECTIONAL STUDY

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Abstract

DSH is one of the leading psychiatric conditions referred to mental health units in Sri Lanka. This study was conducted to describe the risk factors for DSH in patients presented to psychiatric units at Colombo South Teaching Hospital and Homagama Base Hospital. A cross-sectional descriptive study was carried out of patients aged above 18 years who attempted DSH for 3 months period from December 2017. Ethical clearance was obtained. Data collected from Interviewer-administered questionnaire based on preventing Suicide, WHO guideline 2017. Questionnaire pretested. The anonymous data were analyzed using IBM SPSS 19. Out of 121 patients referred, 89 were included in the study. Female preponderance (71%) was noted. Mean age was 19.4. Loneliness (9%), lack of partner (20%), unemployment (42%), employment related problems (21%), economic difficulties (30%) were less prevalent among study group. Poor educational attainment (46%), poor relationship with family (46%), friends (35%), and neighbours (24%), lack of interest on community (16%) and leisure (21%) activities, lack of sharing problems (45%) had high prevalence. Medicinal overdose was commonest DSH (93%), 24% had previous attempts and 66% were impulsive acts. Break up of love affairs was the commonest trigger (35%), weak personality the commonest belief (67%) and 78% wanted to escape from unbearable thoughts. Sadness (23%) was commonly felt at the time of the event. Majority were aggressive (71%), solving problems by themselves (65%) as coping. Youth who didn't get considerable educational attainment and poor integration with domestic society and interpersonal relationships are vulnerable. Sadness, inability to face stresses, weak personalities and poor coping abilities were identified as risk factors.

Keywords: *Coping strategies, Deliberate self-harm, DSH, Motivations, Risk factors*

APPARENT EXPOSURES TO RABIES AND ADMINISTERING ANTI RABIES VACCINES IN GENERAL HOSPITAL HAMBANTOTA

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Abstract

Anti-Rabies Vaccination bears a huge cost to the health sector. This study was conducted to describe apparent exposures to rabies and practice of administering anti rabies vaccines in General Hospital Hambantota. A descriptive cross sectional design was at GH Hambantota by including patients who attend with suspected Rabies exposures. A structured pretested interviewer administered questionnaire and a data sheet were used as study instruments. Variables were selected by reviewing Circular on Post Exposure Prophylaxis for Rabies issued by Ministry of Health. Mean age was 41.2 wish SD of 15.5 and majority were males (54.7%). In 71.2% of instances dogs were responsible for bites while cats were responsible in only 26.7%. In 54.4% of incidents the animal had an owner and 68.0 % were in observable status. But majority were not vaccinated or not known (72.8 %). Most of bites were happened in public roads (45.6%). Also 63.7% were categorized as non-provocative. Being a female ($p = <0.001$) and age between 21 – 30 ($p = <0.001$) were significantly associated with an incident other than a dog, usually a cat. Most of dog bites were occurred in public roads ($p = <0.001$). Among all presentations 47% were not given Anti Rabies Vaccination (ARV) of Anti Rabies Serum (ARS). Out of the rest 38% were given ARV and 15% were given ARS. Majority who had suspected exposures were males. Dogs were responsible for most of incidents. Among 54.4% incidents the animal had an owner but majority were not vaccinated against rabies or not known the vaccination status. Majority of bites were happened in public roads (Among all presentations 47% (n=187) were not given Anti Rabies Vaccination (ARV) of Anti Rabies Serum (ARS). Out of the rest 38% (n=149) were given ARV and 15% (n=61) were given ARS.

Keywords: *Rabies, Anti Rabies Vaccination, exposure to Rabies*

KNOWLEDGE ON ETIOLOGY, PRESENTATION, DETECTION AND MANAGEMENT OF CHRONIC KIDNEY DISEASE AMONG MEDICAL OFFICERS IN BASE HOSPITAL, TISSAMAHARAMA

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Abstract

Chronic kidney disease of (CKD) is a serious public health problem in Sri Lanka. Knowledge on etiology, presentation, detection and management Chronic Kidney Disease among doctors has a significant impact on clinical outcome of patients. A descriptive cross sectional study was performed at Base Hospital, Tissamaharama. There were 35 medical officers and all the eligible individuals were invited. A self- administered structured questionnaire was used. Text books in clinical medicine were reviewed in selecting items and further to that expert opinion was obtained in nephrology and clinical medicine. Principal investigator, himself collected data. Raw data will be entered using Excel and analysis will be done with SPSS statistical software. Out of the total eligible population of 35, 33 took part. Mean age of the sample was 32.7 years (SD 3.0) and majority were females (60.6%). Most of them were graduated from Ruhuna Medical Faculty (63.6%) and majority had less than 5 years of service (69.7%). Only 24.2% could correctly identify the 3 commonest causes. There were few (24.2%) knew that CKD doesn't cause any symptoms at early stage and 39.4% didn't know that Creatinine start to rise only at the late stage. For further analysis a composite score was given and the mean knowledge score was 20.6 (SD 4.3) which ranged from 14 to 29. Gender and graduate faculty didn't show any association. Those who had less than 5 years of experience had shown a better knowledge than their senior counterparts ($t = 3.45$, $p=0.001$). Though knowledge on certain aspects seem to be not satisfactory, mean knowledge score was 20.6 (SD 4.3) which ranged from 14 to 29. Those who had less than 5 years of experience had shown a better knowledge than their senior counterparts ($p=0.001$).

Keywords: *Chronic Kidney Disease, knowledge*

TECHNICAL SESSIONS
ON
HUMANITIES & SOCIAL SCIENCES

SOFT POWER OF EMERGING POWERS (CASE STUDY OF INDONESIA)

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Abstract

Power has always been a key concept in international relations and it plays a pivotal role in determining the nature and scope of international relations. The concept of power is defined and identified from different perspectives. During the 1990's, American scholar Joseph Jr identified two major forms of power namely, hard power and soft power. While hard power is identified with force or coerce, soft power deals with attraction. Over the last few decades, soft power has gained greater prominence in international relations. Today, almost all the countries in the world, irrespective of how strong they are within the international system, gives greater priority to soft power in the foreign policy formulation and in this regard, Indonesia is no exception. Given its geographical and population size and economic capacity, Indonesia has been widely regarded as one of the emerging powers in the world, projected to be among the top ten economies in the coming years. Against this backdrop, objective of this study includes, the identification of main soft power tools possessed by Indonesia and to critically evaluate how successful Indonesia has been in projecting these soft power tools at the world stage to attain its national interests. This is a qualitative case study research based on both primary and secondary data. With regard to timeframe of the study, special focus is made on Indonesia under the current president Joko Widodo. Under the current President, greater prominence has been given to country's soft power potentials. The results of the study reflect key aspects of Indonesia's soft power capabilities. First, as an emerging powerhouse it possesses an ample of soft power potentials in the form of resilient economy, tourism, profound history and culture, foreign policy and democracy etc. Next, out of these soft power potentials, Indonesia tends to focus more on economic and financial elements such as international trade, investments and tourism and rightly so the country has able to achieve great success in terms of its economic capabilities. The study also finds the existence of a significant gap between Indonesia's soft power potentials and their realization. In other words, Indonesia has been underperforming in some of major soft power elements. Thus, the study calls for a better interconnected mechanism to exhibit country's soft power potentials at the regional and international level.

Keywords: *Soft power, Indonesia, Emerging power, Democracy, Trade*

ENGLISH VOCABULARY ACQUISITION OF ESL LEARNERS THROUGH PICTURE-WORD INDUCTIVE MODEL

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Abstract

Vocabulary is generally the total number of words that exist in a particular language. Moreover, it functions as the foundation stone without which any language is impossible to exist in this world. Harmer (1993) says that if language structure makes up the skeleton of language, it is vocabulary that provides the vital organs and flesh. This study aims to assess the efficacy of the Picture Word Inductive Model (PWIM) in the acquisition of new English words of ESL learners. In this study, two aspects of vocabulary acquisition were concerned, namely, the recognition of vocabulary forms (spelling and pronunciation) and general understanding of word meaning in the short term. This study was conducted with eighty four undergraduates during a three-week intensive program in English in a state university of Sri Lanka, where the subjects were made to face a pre-test to diagnose their entrance level ability in use of vocabulary and to a post-test to measure their achievement level after the three weeks of instruction. The eighty four undergraduates were divided into two groups: 1) the action group who used Picture Word Inductive Model (PWIM) in acquiring new English words; and 2) the control group who used vocabulary list to acquire the new words. The pre-test showed that all the participants had an equal proficiency level related to vocabulary. After the three weeks of practical, the post-test scores revealed that both groups have developed their vocabulary skills, but the group taught by the PWIM gained relatively higher test scores and performed more actively in the classroom. Teaching by the PWIM is found to be effective in learning the new English vocabulary of Second Language Acquisition (SLA).

Keywords: *Picture Word Inductive Model (PWIM), English vocabulary acquisition, Second Language Learners, spelling, meaning*

MOTIVATION AND ENGLISH LANGUAGE PEDAGOGY: A STUDY ON UNDERGRADUATES' PERCEPTIONS OF LEARNING AND TEACHING ACTIVITIES USED

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Abstract

With the increasing demand of proficiency in English Language, student-centered pedagogies are rapidly evolving. Along with that, 'Motivation' is a factor that is required in language learners who aspire to become proficient in the language/s they learn. Consequently, motivation lays a foundation to any English language learner as well. However, the level of motivation towards learning English may differ according to the age, the brain capacity, attitude and level of exposure to the language. They can make the circumstances varied. Therefore, the pedagogies should be made considering those variables. This study has specifically focused on finding out what activities; which are already being used in teaching English, can motivate the undergraduates the most and what English Language pedagogies should be more weighed at the university level. The motivational levels triggered through an existing set of activities are identified using a questionnaire with closed ended questions, which was circulated among 40 undergraduates of a state university. According to the analysis of quantitative data gathered, it can be observed that there is a tendency that students get motivated to learn English when there are interactive sessions (pair or group activities, peer led teaching etc) and technology based activities (using audios/videos, computer study games, online discussion forums etc). It infers that most of the students are highly or averagely motivated through student centered methods used. On the other hand, it is also proved that traditional pedagogies like traditional lectures, reading comprehension still have its value in motivating students to learn English. The only activity which is less effective in motivating them is speaking impromptuly about a given topic. Hence, these perceptions on activities should be considered in determining effective English Language pedagogies for undergraduates. Certain activities can be directly adopted while some others should be altered sufficing the high level of motivation and promoted among undergraduates.

***Keywords** : Motivation, Pedagogy, Student-centeredness,Undergraduates*

ශ්‍රී ලංකාවේ ළමා ලිංගික අපයෝජන අවම කිරීමෙහිලා අන්තර්ජාලයේ ශක්‍යතාව

ගුණසේකර එච්.ඩී.ඊ.

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සංක්ෂිප්තය

ලොව පුරා ශීඝ්‍රයෙන් ව්‍යාප්ත වන අන්තර්ජාලය ශ්‍රී ලංකාව තුළ ද වර්තමානය වන විට ජනතාවට ඉතා අත්‍යාවශ්‍ය අංගයක් බවට පත්ව ඇත. බොහෝ දෙනා අන්තර්ජාලය අනවශ්‍ය බලපෑම් එල්ලකරන දෙයක් ලෙස සළකමින් සිටිති. නමුත් මෙම පර්යේෂණය තුළ දී තහවුරු වූයේ අන්තර්ජාලයේ යහපත් භාවිතාව පිළිබඳවයි. ශ්‍රී ලංකාවේ ළමා ලිංගික අපයෝජන අවම කිරීම කෙරෙහි අන්තර්ජාලයේ ශක්‍යතාවය නම් පර්යේෂණයේ ප්‍රධාන ගැටලුව වූයේ, මෙරට ළමා ලිංගික අපයෝජන අවම කිරීම සඳහා අන්තර්ජාලය භාවිතා කළ හැකි ද? එසේ භාවිතා කළ හැකි නම් ඒ කවර ආකාරයෙන්ද? යන්නයි. ඒ අනුව අධ්‍යයනයේ ප්‍රධාන අරමුණ වූයේ ශ්‍රී ලංකාවේ ළමා ලිංගික අපයෝජන අවම කිරීම සඳහා අන්තර්ජාලය භාවිත කිරීමේ හැකියාව පිළිබඳව යෝජනාවලියක් ඉදිරිපත් කිරීම හා ළමා ආරක්ෂාව පිළිබඳව පුළුල් සමාජ කථිකාවතක් නිර්මාණය කිරීමයි. පර්යේෂණයේ උපන්‍යාසය බවට පත්වූයේ ශ්‍රී ලංකාවේ ළමා ලිංගික අපයෝජන අවම කිරීම සඳහා අන්තර්ජාලය ඵලදායී ජනමාධ්‍යයක් ලෙස භාවිත කළ හැකිය යන්නයි.

එමෙන්ම පර්යේෂණයට අදාළව දත්ත රැස්කිරීම සඳහා ප්‍රධාන වශයෙන් පර්යේෂණ ක්‍රමවේද 04ක් භාවිත කරන ලදි. ඒ ප්‍රශ්නමාලා ක්‍රමය, සම්මුඛ සාකච්ඡා ක්‍රමය, සිද්ධි අධ්‍යයන ක්‍රමය හා අන්තර්ජාලය සමඟ සම්බන්ධතා පැවැත්වීම වශයෙනි. එම ක්‍රම ඔස්සේ ලබාගත් දත්ත ගුණාත්මක දත්ත පදනම ඔස්සේ විශ්ලේෂණය කරන ලදි.

ඒ අනුව පර්යේෂණයේ උපන්‍යාසයද සනාථ කර ගනිමින් එළඹි ප්‍රධාන නිගමනය වූයේ, "ශ්‍රී ලංකාවේ ළමා ලිංගික අපයෝජන අවම කිරීම කෙරෙහි අන්තර්ජාලය ඵලදායී ජනමාධ්‍යයක් ලෙස භාවිත කළ හැකිය" යන්නයි. එහිදී ප්‍රවෘත්ති වෙබ් අඩවි හා වෙනත් ජනප්‍රිය වෙබ් අඩවි, ෆේස්බුක්, ටුවිටර්, යූටියුබ්, "පොප්අප්" දැන්වීම්, වෙබ් රේඩියෝ, වෙබ් රූපවාහිනී, ස්කයිප්, වයිබර්, බ්ලොග්, එෆ්ටීපී, විද්‍යුත් තැපෑල වැනි හැකියාවන්ද උපයෝගී කර ගනිමින් ළමා ලිංගික අපයෝජකයන්ගෙන් ආරක්ෂාවීම පිළිබඳව ළමයින් දැනුවත් කෙරෙන තොරතුරු හා ළමයින් ඉන් ආරක්ෂා කිරීම පිළිබඳව වැඩිහිටියන් දැනුවත් කෙරෙන තොරතුරු සමාජගත කළ හැකි බව මනාව තහවුරු විය. ඉතා පැහැදිලිව සඳහන් කළ හැකි වන්නේ ඉහත තාක්ෂණික ක්‍රම භාවිත කරමින් ශ්‍රී ලංකාව තුළ සිදුවන ළමා ලිංගික අපයෝජන අවම කිරීම සඳහා සාමාන්‍ය ජනතාව මෙන්ම වගකිවයුතු රාජ්‍ය යාන්ත්‍රණය කටයුතු කළ යුතු බවයි. සමස්ත සාමාජීය මතය අන්තර්ජාලයේ අවභාවිතය සම්බන්ධව ගොඩ නැගී ඇති යුගයක, එහි ඇති යහපත් ශක්‍යතාවයන් පිළිබඳව තාර්කිකව සොයා බලා ඇති මෙම පර්යේෂණය මෙකී විෂය ක්ෂේත්‍රය තුළ සිදු කිරීම කාලෝචිතය.

ප්‍රමුඛ පද: *අන්තර්ජාලය, නීති, ළමයින්, ලිංගික අපයෝජන, ශක්‍යතාව.*

ශ්‍රී ලංකාවේ පළාත් සභා මට්ටමින් ස්ත්‍රී සහභාගීත්වයෙහි තීව්‍රතාව තීරණය කිරීම සඳහා බලපාන සාධක

බණ්ඩාර ඩබ්.එම්.එස්.සී.

දේශපාලන විද්‍යා අධ්‍යයන අංශය,
කැලණිය විශ්ව විද්‍යාලය, කැලණිය, ශ්‍රී ලංකාව
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සංක්ෂිප්තය

ශ්‍රී ලංකාවේ 1978 ආණ්ඩුක්‍රම ව්‍යවස්ථාවට එක් කරන ලද 13 වන ආණ්ඩුක්‍රම ව්‍යවස්ථා සංශෝධනය සහ 1987 අංක 42 දරණ පළාත් සභා පනත මඟින් පළාත් සභා ක්‍රමය හඳුන්වා දෙන ලද්දේ ජනවාර්ගික අර්බුදයට විසඳුමක් සහ පළාත් මට්ටමින් ජනතාවගේ දේශපාලන සහභාගීත්වය වර්ධනය කරලීමේ පියවරක් වශයෙනි. වර්තමානය වන විට ශ්‍රී ලංකාවේ පළාත් සභා නවයක් ක්‍රියාත්මක වෙමින් පවතී. පළාත් සභා හරහා බලය බෙදීම තුළින් බලාපොරොත්තු වන ප්‍රධාන අරමුණක් වන්නේ පළාත් මට්ටමින් දේශපාලන සහභාගීත්වය වැඩි කිරීම යි. මෙම පර්යේෂණයේ අරමුණ වන්නේ ශ්‍රී ලංකාවේ පළාත් සභා මට්ටමින් කාන්තා නියෝජනය සිදු වී ඇති ආකාරය පිළිබඳ විමර්ශනය කිරීම යි. කෙසේ වෙතත් ශ්‍රී ලංකාවේ පළාත් සභාවල අත්දැකීම් අනුසාරයෙන් බැලූ කල පළාත් සභාව තුළ කාන්තා නියෝජනය අඩුවීමට බලපා ඇත්තේ කුමන සාධක ද යන්න පරීක්ෂා කිරීම මෙහි පර්යේෂණයේ ගැටලුව වේ. එහි දී ප්‍රාථමික දත්ත ලෙස සම්මුඛ සාකච්ඡා ක්‍රමය සහ ද්විතීයික ලෙස මෙම පර්යේෂණය සඳහා පළාත් සභා නිල වාර්තා, මැතිවරණ දෙපාර්තමේන්තුවේ වාර්තා, රජයේ වෙනත් වාර්තා සහ පර්යේෂණ ලිපි ආශ්‍රය කරගනු ලැබීය. ශ්‍රී ලංකාවේ ජනගහනයෙන් අඩකට වඩා වැඩි ප්‍රමාණයක් සිටින්නේ කාන්තාවන් වන අතර මෙරට ශ්‍රම වෙළඳපොළ තුළ සක්‍රීය ස්ත්‍රී සහභාගීත්වයක් දැකිය හැකි වන අතර රටේ දේශපාලන ක්‍රියාවලිය තුළ, තීන්දු තීරණ ගන්නා පද්ධතිය තුළ කාන්තා නියෝජනය අඩු මට්ටමක පවතී. පර්යේෂණයේ දී හඳුනා ගැනීමට හැකි වූ කාරණා කිහිපයක් විය. එනම් කාන්තාවන් දේශපාලනයට සම්බන්ධ වීම කෙරේ පවතින සමාජ ආකල්ප, දේශපාලන පක්ෂවල නොසැලකිලිමත් භාවය, පුරුෂ පක්ෂයන් විසින් දේශපාලනය තුළ මූලික වශයෙන් තීරණ ගැනීම, දේශපාලන බල අරගලය තුළ කාන්තාවනට සෑම විට ම සම්බන්ධ වීමට නොහැකි වීම, කාන්තාවන් සම්බන්ධයෙන් පවතින සමාජ සංස්කෘතික ආගමික සීමා වැනි කාරණා නිසා පළාත් සභා මට්ටමින් කාන්තා නියෝජනය අඩු වී තිබේ.

ප්‍රමුඛ පද: *කාන්තා නියෝජනය, පළාත් සභා, දේශපාලනය, දේශපාලන සහභාගීත්වය, පළාත් මට්ටම*

CAUSES FOR ACCELERATION OF SLOPE INSTABILITY: A CASE STUDY CONDUCTED IN RAMBUK-ELA GRAMA NILADHARI DIVISION IN AKURANA DIVISIONAL SECRETARIAT, KANDY

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Abstract

Slope instability is a major threat to the land, properties and human life in Sri Lanka where mostly experiences mass movement. The spatial patterns of mass movements are depending on the physical factors as well as human intervention on slopes. According to the National Building Research Organization (NBRO), 4/5th of landslides occur due to human modification of slopes. On this context, this study was carried out on the purpose of identifying the Causes for Acceleration of Slope Instability in Rambuk-Ela Grama Niladhari Division.The study uses both primary and secondary data and information given more weight to quantitative techniques to attain the above objective. The sample area was purposely selected from rambuk – ela division based on the divisional secretariat records and field observation where the slope failure highly occurred. To identify the causes of slope instability both physical and human factors were concerned. The topography, soil property and its infiltration rate and rainfall data were gathered. The land use map in 1986, 2003 and 2016 were used to identify the changes of land use on slopes. The questionnaire survey, key informant investigation and field observation were used to identify the people's adaptations to slope management measures and its effectiveness of slope instability. A number of slope failures occurred in the area particularly in 2012 , 2014 and 2016 December and made several socio and economic issues in this area. Slope cutting failure is widely occurring in this area during the rainy period. The study explored that due to dense construction of settlements on steep slopes and poor slope protection measures are the key factors to accelerate such types of slope instability in this area. Therefore, it is essential to adapt appropriate slope management practices to prevent accelerating slope instability in this area.

Keywords: *Slope instability, Slope failure, Anthropogenic factors, Land use, Slope management*

ශ්‍රී ලංකාවේ ප්‍රාථමික මානවයාගේ සිතුවම් තාක්ෂණයේ විවිධත්වය පිළිබඳ මානව පුරාවිද්‍යාත්මක අධ්‍යයනයක්

අරුණසිරි. කේ.යූ.

පුරාවිද්‍යා දෙපාර්තමේන්තුව, ශ්‍රී ලංකාව
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කුරුටු සිතුවම් කලාව හෙවත් ප්‍රාථමික සිතුවම් කලාව නූතන මහා සිතුවම් සම්ප්‍රදාය ආරම්භයේ මූල ස්ථානය යි. මෙරට ආදිවාසි සිතුවම්හි කාල නීර්ණය පිළිබඳව විධිමත් විද්‍යාත්මක පර්යේෂණයක් සිදුනොවීම මත එම සිතුවම් වැදි හෝ ප්‍රාග් ඓතිහාසික මානවයාගේ නිමවුම් ලෙස පිළිගැනේ. ආදි මානවයා තම චිත්තවේගයන් දෘශ්‍ය මාධ්‍යයට ගෙන ඒමේ තාක්ෂණයේ විවිධත්වයක් තිබේද යන්න අධ්‍යයනය මෙහි මූලික ගැටළුව වේ. මෙහි අරමුණ මෙරට ආදිවාසි සිතුවම් තාක්ෂණයේ විශේෂතා හඳුනාගැනීම වේ. සිතුවම් තලය, වර්ණ නිපදවා ගැනීම හා වර්ණ තැවරීම යන පැතිකඩ ඔස්සේ මෙම අධ්‍යයනය සිදුකරන ලදි. ආදිවාසීන් සිතුවම් නිර්මාණයේදී උපයුක්ත කරගන්නා ලද තාක්ෂණයේ පැහැදිලි වෙනස්කම් රාශියක් මෙම පර්යේෂණයේදී හඳුනාගන්නා ලදි. සියලු සිතුවම් සඳහා තලය ලෙස රළු පෘෂ්ඨයන් භාවිතා කර තිබේ. ගල් ලෙනේ ඇතුලු පෘෂඨය බහුල ලෙස සිතුවම් තලය ලෙස භාවිතා කර ඇත. බිල්ලව, තන්තිරිමලය, ස්ත්‍රීපුර, අලුගල්ගේ, සන්ගමන්කන්ද, කිරිපොකුණහෙල ඊට නිදසුන්ය. ඉන් පරිභාහිරව කොණ්ඩගල හා බුදුගලදී ගල් තලාවන් මත ද මලයඩිකන්ද ලෙනේදී මැටි බිත්තයක් මත ද සිතුවම් ඇඳ ඇත. උක්ත සිතුවම්කරණයේදී වර්ණ භාවිතයෙන් හා කැටයම් ස්වරූපයෙන් සිතුවම් නිර්මාණය කර තිබේ. වර්ණ භාවිතයේදී ඒක වර්ණ හා බහු වර්ණ ලෙස විවිධත්වයක් ගෙන ඇත. හුලන්නුගේ, කිරිපොකුණහෙල, ස්ත්‍රීපුර ලෙන හා අලු ගල්ගේ ලෙනේදී ඒක වර්ණ සිතුවම් ද තන්තිරිමලයේදී හා සංඛපාල ලෙනේදී බහුවර්ණ සිතුවම් දැකගත හැකි වේ. කැටයම් ස්වරූපයෙන් සිතුවම් නිර්මාණය කිරීමේදී ගල් තලය දෘඩ හා තියුණු තුඩකින් සූරා තිබේ. බුදුගල හා දොරවක්කන්දේදී ගල් පෘෂ්ඨය ද මලයඩිකන්දේදී මැටි පෘෂ්ඨය ද සූරා සිතුවම් ඇඳ ඇත. වර්ණ භාවිතයේදී වර්ණ තැවරීම සඳහා ඇඟිලි සහ විශේෂයෙන් සකස් කරන ලද උපකරණ භාවිතා කර ඇති බවට සාධක වේ. තවද වර්ණ තැවරූ අත්ල අච්චුවක් ලෙස භාවිතා කර ඇති අවස්ථාවන් කුරුල්ලන්ගලින් හා යාල වනයෙන් ලැබේ. වර්ණ ශාක, සත්ව ලේ හා ඛණිජ ද්‍රව්‍ය උපයෝගී කරගෙන තනා ගැනීමේදී ඇඹරීමක් සිදුකර පසුව ජලය හෝ කෙළ හෝ ශාකීය ලාටු මිශ්‍ර කර භාවිතයට ගෙන ඇත. ප්‍රාථමික සිතුවම්හි තාක්ෂණිය පිළිබඳව අධ්‍යයනයේදී තලය සකසා ගැනීමක් නොකළ ද යම්තාක් දුරට වර්ණ නිෂ්පාදනය කරගැනීමක් මෙන්ම වර්ණ නිෂ්පාදනය හා වර්ණ භාවිතයට උපකරණ භාවිතයක් ද තිබූ බව සනාථ වේ. සිතුවම් කලාවේ ප්‍රගමනයට අතීත මානවයින්ගේ සරල තාක්ෂණික ආරම්භය වැදගත් වන්නට ඇත. මානවයාගේ කපාල ධාරිතාව වර්ධනයවත්ම තාර්කික චර්යාව හා අත්දැකීම් මත දියුණු උපකරණ නිපදවා තලය සංවිධානයට යොමු වී තිබේ.

ප්‍රමුඛ පද: *ප්‍රාථමික, සිතුවම්, මානවයා, තාක්ෂණය, වර්ණ*

AN ANALYSIS OF THE CHARACTER OF ADELA AS A TRAGIC HERO IN "THE HOUSE OF BERNARDA ALBA" WITH SPECIAL REFERENCE TO THE ARISTOTELIAN TRAGIC HERO

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Abstract

The present study attempts to investigate the character of Adela in 'The House of Bernarda Alba' by Federico García Lorca (1898-1936), with special reference to the Aristotelian concept of tragic hero relates the lives of seven women in the rural Andalusia, Spain, who are repressed with complete frustration and desperation, which basically leads to understand the drama in depth. The dramatist depicts microcosm of the then Spain under Franco's regime through the House of Bernarda Alba. Lorca's genius was to display Adela as an individual to place socio-politics in the domestic arena, which conveys the struggle between individuality and conventional society. This clearly demonstrates how the failings of an individual family can reflect the fate of nation. Adela plays a vital role as the boundary breaker in dealing with the titular character Bernarda who represses her and the sisters from the freedom and love represented through Pepe el Romano. The research takes as its key point that it depicts much of Aristotelian's thought of tragic hero in the character of Adela. To obtain this goal; this study essentially focuses on an analysis and comprehension of the characteristics and psychological perspectives of the character of Adela. Through her actions the study tries to illustrate how women were unfairly treated and who are oppressed by the equivocal Spanish traditions. Adela confronts the most extreme situations when her freedom to express her emotions comes under threat that ultimately resulted in committing suicide. In the light of Aristotelian concept of tragic hero and based on analytic-descriptive method and library sources, this research identifies Adela as a tragic heroine since she bears the resemblances of Aristotelian tragic hero.

***Keywords**: Adela, Aristotelian tragic hero, Suppression, Suicide, The House of Bernarda Alba*

A STUDY ON EMPLOYEE MOTIVATION IN HUMAN RESOURCE MANAGEMENT WITH REFERENCE TO *BHAGAVAD GĪTĀ*

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Abstract

Bhagavad Gītā which is the most important Hindu scripture that has a philosophical significance has contributed for many fields for their betterment. Contemporary business world is more competitive than in the past centuries. Therefore, the management of the organizations has the obligation to lead the company to achieve organizational goals effectively by utilizing financial, human and material resources. The role of an employee is significant for a company and their performance directly affects the growth of the organization. The management has to motivate employees in order to get their best outcome for the organization and access **to** its growth. For that, the motivation which causes repeated behavior and improve one's behavior, can be used in order to achieve organizational goals. Organizations should have to understand the de-motivational factors of the employees and show them the direction to overcome that demotivation. The objectives of the study are to identify the contemporary relevance of *Bhagavad Gītā,* its interconnection between employee motivation in human resource management and the ways in which it can improve the effectiveness of the management system of a company. Comparative and analytical method is being used in this study. In *Bhagavad Gītā*, Lord Krishna leads *Arjuna* to achieve a goal by motivating him. Although *Arjuna* who was the prince of *Pāndavas,* had a goal to protect his kingdom, he was demotivated after seeing his relatives on the other side who were willing to fight with him. Lord Krishna helped him to motivate again and made corrections when needed by evaluating performance of *Arjuna*. The characters of *Bhagavad Gītā* have expressed different types of motivational theories which have introduced by modern psychologists. Mainly, this study concerns about the motivational support which was given by lord *Krishna* to *Arjuna* in order to achieve the task and the way in which it can be useful to the contemporary human resource management.

Keywords: *Bhagavad Gītā, motivation, management, organizational goals, effectiveness*

THE IMPACT OF ANXIETY ON LEARNING ENGLISH AS A SECOND/FOREIGN LANGUAGE

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Abstract

According to examinations records, the failure rate in compulsory English of the first year undergraduates in the Faculty of Humanities and Social Sciences of a state university in Sri Lanka is considered high. Of the many factors related to this phenomenon, anxiety related to second language learning is considered to be a major cause. The objectives of the research were to study the degree/level of anxiety of the students learning English as a second language, to examine the relationship between the students' overall language anxiety and their language achievement as measured by the End Semester Examination marks and to investigate the relationship between the three components of the Foreign Language Classroom Anxiety Scale: communication anxiety, test anxiety and fear of negative evaluation and language achievement While the end semester course grade was taken as a measure of language proficiency, the Foreign Language Classroom Anxiety Scale that was developed by Horwitz, Horwitz and Cope in 1986 was administered to 50 students to measure the language anxiety experienced by the students. Interviews and observations were also used to gather further data. The findings revealed that language anxiety was present among the sample of students, that it had a negative impact on their language achievement. Moreover, the correlation between Communication Anxieties and End Semester Marks (-.286) indicated that the relationship between the two variables was negative and that the relationship between Fear of Negative Evaluation and the End Semester Marks was also negative (-.364). However, the relationship between Test Anxiety and exam marks was positive which could be attributed to many environmental factors. The recommendations were given under promoting the teaching of the target language at school level, teacher training, use of modern techniques in the language classroom and enhancing support given to students.

Keywords: *language anxiety, performance, communication, fear of negative evaluation*

A MODEL SEMANTIC NETWORK TO TEACH MULTIPLE MEANINGS OF ENGLISH POLYSEMOUS WORDS TO ENGLISH AS A SECOND LANGUAGE (ESL) LEARNERS IN SRI LANKA

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Abstract

Éva Kovács (2011) defines polysemy as "the phenomenon whereby a linguistic unit exhibits multiple distinct yet related meanings is a very common feature of any language". Therefore, a Polyseme in English language can be identified as a word, which has several meanings that bear relations with one another. Though there are numerous foreign studies that focus on using cognitive linguistics based method to teach English polysemous words, as far as the Sri Lankan context is concerned, there has been a minimal attention focused to this area of learning English polysemous words. Therefore, this particular study attempts to develop and use semantic networks containing the multiple meanings of English polysemous words to ESL learners in Sri Lanka. A group of 20 pre-intermediate undergraduates of level one following the English for Social Sciences course unit at the Department of English Language Teaching, University of Kelaniya has been selected for the study. Five English polysemous words: SEE, BREAK, GIVE, TAKE, and RUN were selected and their meanings in the Oxford English Online Dictionary were arranged from the core meaning, to other extended meanings on the basis of cognitive linguistic theories. Five reading passages were developed for each polyseme. The experimental group was taught the polysemes through the paragraphs and the control group learned the same polysemes as word lists with example sentences. Both groups faced a post-test of 40 marks. The conclusions derived from the test results were: the core meaning and the extended meanings of a polyseme can be as a network and when the ESL learners are taught the multiple meanings of a polyseme, the teacher should show the relations between different meanings of the same polyseme in various contexts. In addition, the ESL learners show some difficulty when they have to identify a polyseme that has an extended meaning which has less similarity with the core meaning and ESL learners can identify an extended meaning of a polyseme if there is enough contextual information given, but they show difficulty when they are given a polyseme to identify in an unusual context. Thus, the study conducted arrives to the conclusion that using semantic networks is productive in teaching multiple meanings of English polysemes to ESL learners.

***Keywords**: Cognitive Linguistics, ESL, Experimental study, Polysemy, Vocabulary Teaching*

LIMITS OF TRUTH: NAGARJUNA AND DERRIDA ON APORIAS

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Abstract

An aporia is defined as an irresolvable internal contradiction or logical disjunction in a text, argument, or theory. The concept is basically found philosophy and indicates a philosophical puzzle or expression of doubt. In its etymological roots, aporia is linked with platonic mythology. Particularly, Socrates successfully pointed that his counter debaters have no fitting definition for certain topics, for instance, piety, love, courage, justice, etc. At a later stage in the Western thought, aporia is meant to indicate something similar to an impasse or paradox (Derrida, 1997). Derrida put forward the concept of "possible-impossible aporias" – while loaning the idea of aporia from the original a Greek term, which means puzzle, but it has come to mean, when it comes to Derrida, something more like an impasse or paradox. Derrida found a range of paradoxes in conventions, for example, conventions like giving, hospitality, forgiving and mourning create ceaseless contradictions, rather aporias. According to Derrida, the condition of possibility of an aporia is also, and at once, the condition of their impossibility. Masterpieces of Nāgārjuna (150 – 250 CE) and Jacques Derrida (1930 –2004), for instance, Mūlamadhyamakakārikā, Given Time, Of Grammatology and The Gift of Death have been used for the hermeneutics analysis of aporia, where limits of truth comes to play. Both Derrida and Nāgārjuna confine in their explanation of the truth as subject-predicate structure of truth-bearing items have inherent limitations that lead to aporia. It is highly misleading to perceive the world as an object-based reality, as modern scientific thought indulged, ignoring its subject predicate structure.

Keywords: *Nāgārjuna, Derrida, Aporia, Mūlamadhyamakakārikā, Truth*

තෝමස් ඇක්වයිනාස්ගේ දෙවියන් පිළිබඳ අචින්ත්‍යත්ව විග්‍රහය (Incomprehensibility of God), නාගාර්ජුනගේ ශූන්‍යතාවේ විරෝධාභාසය හා ඩෙරීඩාගේ නිෂ්ප්‍රාය පිළිබඳ තුලනාත්මක අධ්‍යයනයක්

කුමාර ජේ.ඩී.ඒ.

දර්ශනය අධ්‍යයනාංශය, පේරාදෙණිය විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව
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සංක්ෂිප්තය

තෝමස් ඇක්වයිනාස් මධ්‍යතන යුරෝපයේ කතෝලික පූජකවරයෙක් වන අතර කිතුනු සම්ප්‍රදායයේ න්‍යායික පසුබිම ගොඩනැඟූ චින්තකයෙකු ලෙස සලකනු ලැබේ. ෂාක් ඩෙරීඩා 20 වැනි සියවසට අයත් ප්‍රංශ දාර්ශනිකයෙකු වන අතර නාගාර්ජුන ක්‍රිස්තු වර්ෂ දෙවැනි සියවසට අයත් ඉපැරණි ඉන්දියානු බෞද්ධ දාර්ශනිකයෙකි. දෙවියන් වහන්සේගේ අචින්ත්‍ය බව (Incomprehensibility) තෝමස් ඇක්වයිනාස් අදහසක් ගෙන ආ අතර නාගාර්ජුනයන් විසින් සංසාරය සහ නිවන අතර වෙනසක් නොවන බව හා ස්වරූපය ම ය ශූන්‍යය, ශූන්‍යය ම ය ස්වරූපය යන විරෝධාභාසයක් ගොඩනඟනු ලැබිණ. ෂාක් ඩෙරීඩා විසින් යමක් පැවැත්ම සඳහා යම් ප්‍රවණතාවක් ඇත් නම් නොපැවැත්ම සඳහා එම ප්‍රවණතාව ම ඇති බවට විරෝධාභාසයක් නිෂ්ප්‍රාය නමින් හෙළි කළේය. මෙනයින්, මෙම දාර්ශනිකයන් තිදෙනාගේ සාම්‍යයක් හඳුනා ගැනීමට හැකි වන අතර ඒ පිළිබඳ මානව ශාස්ත්‍රානුකූල තුලනාත්මක අධ්‍යයනයක් මෙහි දී සිදු කෙරේ. එහි දී අර්ථ විවරණ (Hermeneutics) පර්යේෂණ ක්‍රමවේදයක් යොදා ගැණුනු අතර පර්යේෂණයේ අවසන් නිගමනය වශයෙන් අර්ථ දැක්විය නොහැකි යමක් පිළිබඳ මෙම දාර්ශනිකයන් තිදෙනා ම ඇඟවුම්කරණයක යෙදෙන බව පෙන්නුම් කෙරේ. එබැවින් ම, ඔවුන් තිදෙනා ඉදිරිපත් කරන මෙම අර්ථයන්ගෙන් විරහිත වූ අචින්ත්‍ය වූ විරෝධාභාස සඳහා විවෘත යමක් ඇත යන්න හෝ නැත යන්න හෝ ප්‍රකාශ කිරීම ම නැවත පාරභෞතිකයේ පැවැත්මක් (Metaphysics of Presence) ගොඩනැඟීමක් වනු ඇත.

ප්‍රමුඛ පද: *තෝමස් ඇක්වයිනාස්, නාගාර්ජුන, ෂාක් ඩෙරීඩා*

A LIVELIHOOD ANALYSIS OF THE FISHING COMMUNITY IN BATHTHALANGUNDUWA ISLAND OF KALPITIYA, SRI LANKA

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Abstract

The concept of livelihoods is being increasingly applied in research on regional development, poverty alleviation, rural agricultural development and rural resource management. The sustainable livelihood denotes people's capacity to maintain living by surviving shocks, stress and enhancing quality of life on long-term basis. This paper is based on a study of fishing community substantially depends on the harvest or processing of fishery resources in Baththalangunduwa Island. However the limitations were arisen for their sustenance as; lack of awareness about island, less attention by government and NGOs. Within the sustainable livelihoods framework, this study was geared to assess the livelihood assets and strategies of the fishing community, find relationship between fishery industry and development of Livelihood Strategies (LS), identify the problems of LS and examine institutional intervention and discuss how the LS relate to their asset base and vulnerability context. A sample of 14% out of 710 households was selected according to stratified random sampling method and five different methods were employed for data collection; questionnaire survey, semi structured interviews, direct observation, case studies and photographs. Data was analysed using qualitative and quantitative methods. The study found that 84% of households were undertaken fishing while 16% engaged in fish drying process as supplementary means of income. Conditions of houses were very low with 98% of cadjan huts. The majority had education level up to Ordinary Level while few of them had no education. The study further ascertained that people are generally deprived of basic utilities. The lack of intervention by government, NGO and geographical location of the island were the main cause for inadequate facilities. The study finally concluded with the suggestion that the relevant government institutes has to be taken action to overcome issues on a long-term basis to facilitate for the means of livelihood of fishing community in Baththalangunduwa.

Keywords: *Fishing Community, Isolated Island, Livelihood Assets, Livelihood Strategies, Sustainable livelihoods framework*

FLOOD RELATED LAND USE CHANGES FOR LAST 40 YEARS (WITH SPECIAL REFERENCE TO RATNAPURA MUNICIPLE COUNCIL AREA)

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Abstract

Ratnapura flood plain area is an effective ecosystem area and also provides spaces for human settlements, food production and their agricultural productions. Compared to other natural disasters, flood becomes most vulnerable disaster at present. It occurred frequently in the monsoon time period. The study of flood related land use is very important in the present situation. The persons who conducted studies related to floods, identified that flood plain areas are very important for human activities, especially in agricultural sector. The result showed that most of flood affected land-use class was agriculture. The main objective of this research is to study the flood related land use changes in Ratnapura Municipal Council Area for the last 40 years. This study mainly focused on Ratnapura municipal council area. The data was collected using both qualitative and quantitative methods. The data was analyzed using Geographical Information System (GIS) and the Remote Sensing (RS) software included with satellite images, aerial photographs and the digital data.According to the research, the agricultural land use types are the most changed land use type due to the floods compare with other land use types such as transport and administrative sector. The Divisional Secretariat office and some other administrative offices have already been shifted to another area as a result of the floods. Transportation system can be highlighted as unchanged land use type in spite of the flooding. Controlling illegal mining activities and low land filling constructions projects are some of the recommendations that can be highlighted for the controlling of floods.

Keywords: *land use, flood related land use types, changes, disasters, ecosystem*

TEMPORAL CHANGES OF AGRICULTURAL LAND USE (WITH SPECIAL REFERENCE TO AKMEEMANA DIVISIONAL SECRETARIAT DIVISION)

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Abstract

Agricultural land use is one of the types of land use which always faces with changes in Sri Lanka. This study focus to study temporal changes of agricultural land use during the period from 1956 to 2016, based on Akmeemana Divisional Secretariat Division (DSD) in Galle District. There were observable changes in the area, such as Southern expressway, tsunami rehabilitation program, land sales and abandoned paddy lands. Although development have been done in this area, there are not much researches of agriculture have been conducted. The area is highly affected to changes of agricultural land use due to the data of Akmeemana DSD. This study mainly focused to identify temporal changes of agricultural land use, the areas of affected to changes and reasons, and prepare an updated map of agricultural land use for the study area. Data were gathered from, observation, informal discussions with villagers and Grama Niladhari officers, questionnaires, aerial photographs, digital data of Geographical Information System and metric maps. The sample was selected as 8% among the total numbers of families of the area. Collected data was analysed using ArcGIS 10.1 and simple statistics methods. The result shows, sparsely used cropland, mixed croplands, oil palm have newly achieved. Home garden has taken place at a considerable level. Due to the selected criteria, Southern Expressway and flat lands, development activities, and land fragmentation have affected the temporal changes of agricultural land use. Year 1985 was the year which most affected changes in agricultural land use where taken place. The study recommended, to introduce proper land use methods to the study area

Keywords: *Temporal, Changes, Land use, Agricultural land use.*

ධීවර කර්මාන්තයේ නිරත කාන්තාවන් කුටුම්භ සංවර්ධනයට දක්වන දායකත්වය: මීගමුව ධීවර පරීක්ෂක කොට්ඨාසය ඇසුරින්

ගීතමාලි ආර්.ඩබ්.එම්.ආර්.

භූගෝල විද්‍යා අධ්‍යයනාංශය, මානව ශාස්ත්‍ර හා සමාජයීය විද්‍යා පීඨය, ශ්‍රී ජයවර්ධනපුර විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව
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සංක්ෂිප්තය

වත්මන් කාන්තාව තම සම්ප්‍රදායික කාන්තා චරිතයට සමුදෙමින් පුරුෂයාට සම මට්ටමක උරෙන් උර ගැටෙමින් ජීවන තරගයේ නියැලෙමින් සිටී. මෙසේ නූතන ආර්ථික ක්‍රියාකාරීත්වය තුළ ස්ත්‍රී ශ්‍රම දායකත්වය ඉහළ යාම ගෝලීය ආර්ථිකයේ කැපී පෙනෙන ලක්ෂණයකි. එහිදී කෘෂිකාර්මික ක්ෂේත්‍රය තුළ කාන්තා ශ්‍රමය පිළිබඳ අවධානය යොමු කිරීමේ දී ධීවර කර්මාන්තයට හිමි වනුයේ සුවිශේෂී වැදගත්කමකි. ධීවර කාන්තාව පවුලේ ආදායමට හවුල් වීම නිසා පවුලේ ආර්ථික ක්‍රියාකාරීත්වයට හා අනෙකුත් කටයුතු වලදී ද වැදගත් තැනක් ගෙන ඇති බැව් පෙනේ. ශ්‍රී ලංකාවේ මීගමුව කලපුව ආශ්‍රිත පවුල් 8127ක් පමණ ධීවර කර්මාන්තයෙහි නියැලෙන අතර එහි නිරත කාන්තාවන් කුටුම්භ සංවර්ධනයට දායක වන ආකාරය හඳුනා ගැනීම මෙම අධ්‍යයනයේ ප්‍රධාන අරමුණ වෙයි. එහිදී ධීවර කර්මාන්තයේ නිරත කාන්තාවන්ගේ හා ඔවුන්ගේ පවුල්වල සමාජ ආර්ථික පසුබිම හඳුනා ගැනීම, ධීවර අංශවල නිරත වීම නිසා වන යහපත් බලපෑම් හා ගැටලු හඳුනා ගැනීමත් ඒවාට සුදුසු විසඳුම් යෝජනා කිරීමත් මෙම අධ්‍යයනය මඟින් අරමුණු කෙරේ. මීගමුව නගරය 1 ධීවර පරීක්ෂක කොට්ඨාසයේ ධීවර පවුල් 915න් 10%ක් එනම් පවුල් 91ක කාන්තාවන් අවශ්‍යතාව සඳහා නියැදීම යටතේ තෝරා ගෙන ප්‍රමාණාත්මක හා ගුණාත්මක ක්‍රමවේදයන් යටතේ දත්ත රැස් කරමින් මෙම අධ්‍යයනය සිදුකරන ලදි. කාන්තාව ධීවර කර්මාන්තයේ විවිධ අංශ ඔස්සේ ශ්‍රමය සපයන බවත් එම ධීවර අංශවල නිරත වෙමින් කුටුම්භ සංවර්ධනයට දායක වන බවත් මෙම අධ්‍යයනය තුළින් ගම්‍යමාන විය. කුටුම්භ සංවර්ධනයේදී දරුවන්ගේ අධ්‍යාපනයට උපකාර වීම, පවුලේ ඉතුරුම් සුරක්ෂිත වීම, පවුලේ සමඟියට උපකාර වීම, පවුලේ ආර්ථිකය ශක්තිමත් වීම, කාන්තාවගේ ආර්ථිකය ශක්තිමත් වීම, වෘත්තීය හැකියාවන් ප්‍රගුණ වීම යන යහපත් බලපෑම් හඳුනා ගත හැකි විය. එසේම කාන්තාව ධීවර කර්මාන්තයේ නිරතවීම සඳහා ආදායම, අධ්‍යාපන මට්ටම, වයස් ව්‍යුහය හා වෘත්තීය හැකියාව යන ලක්ෂණ බලපා ඇති බව හඳුනා ගත හැකි විය. ශ්‍රම දායකත්වය සඳහා නිසි පිළිගැනීමක් නොමැති වීම, සමාජීය පිළිගැනීම අඩුවීම, අඹුසැමි සබඳතා ආශ්‍රිත ගැටලු, සම්පත් සඳහා ප්‍රවේශ වීමේ හැකියාව අවම වීම, ආදායම් විචලනය ධීවර කාන්තාව මුහුණදෙන ප්‍රධාන ගැටලු වේ. මෙම ගැටලු අවම කර ගැනීමට උචිත ක්‍රියාමාර්ග ගැනීම තුළින් ධීවර කර්මාන්තයේ නිරත කාන්තාවන් කුටුම්භ සංවර්ධනයට දක්වන දායකත්වයේ පවතින ඵලදායීතාවය වැඩි කර ගැනීමට හැකියාව පවතින බව නිගමනය කළ හැකිය.

ප්‍රමුඛ පද: *ධීවර කර්මාන්තය, කාන්තාව, දායකත්වය, කුටුම්භ සංවර්ධනය, පවුල*

ANTHROPOMETRIC ASSESSMENT OF NUTRITIONAL STATUS AMONG INDIGENOUS CHILDREN OF YAKKURE, SRI LANKA

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Abstract

Yakkure village in Polonnaruwa District is considered as one of the traditional habitats occupied by the indigenous people (IP) of the country: the Vedda. In 1987 they were resettled in the present locality, 'Pahala Yakkure', 5 km away from their traditional land as a result of the expansion of Mahaweli Development Project. Consequents of the restriction of their traditional subsisting patterns, poverty and ignorance have become their major social problems. From 48% of the families who received a monthly income (MI), 65% belongs to lower income category (MI≤Rs.15000). A cross-sectional study of 37 Indigenous children (16 boys and 21 girls between ages 5-11), of Pahala Yakkure Village were undertaken to study nutritional status through the calculation of Body Mass Index (BMI). Anthropometric measurements were collected following house to house survey. According to the National Health and Nutrition Examination Survey (NHANES) subjects who were falling below the age and sex specific fifth percentile (< 5th %ile) of the BMI Cut off Pointes were defined as undernourished. SPSS, MS Excel and BMI metric calculator for children, were used for all statistical analysis. In order to test the level of significance, t-test (independent) was used (P<0.05). Mean height of the girls were 129.5 ±10.96 cm and boys were 128.22±9.56 cm. The body weight of the boys (24-±7.89 kg) was heavier than the girls (23.54 ±6.24 kg). There is no statistically significant difference in the distribution of mean height, weight and BMI between these two groups. Regardless of sex, prevalence of undernourishment among the Yakkure children was 76%. Undernourishment among girls was higher (81%) than boys (69%). Only 12% of the boys were in the obese range. Higher prevalence of undernourishment among Yakkure children is a problem to be addressed immediately to prevent future health risks. Organizing community base awareness programs on the development strategies of their socioeconomic conditions and consequences of the negligence of systematic consumption of nutritionally rich foods are vital.

Keywords: *Indigenous, Yakkure, Nutritional Status, BMI, Undernourishment*

AN ANALYTICAL APPROACH TO THE NOVELS 'THE VILLAGE IN THE JUNGLE' AND 'THE WISE VIRGINS' BY LEONARD WOOLF IN RELATION TO THE PORTRAYAL OF THE FEMALE FIGURE

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Abstract

The role and identity of women are defined and conceptualized as the secondary negligible elements within the conventional superiority of the masculine social sphere. In consequence of the influential socio cultural and socio-political transformations (colonization, industrialization, World Wars, feminist movement etc.) the role and identity of women were defined, produced and reproduced. The study has focused on analyzing the capacity and effectiveness of each novel, 'The Village in the Jungle' and 'The Wise Virgins' to portray, produce, scrutinize and represent the feminine characters corresponding to their gender roles and identity within the related cultures, social contexts and inbuilt social concepts. The content analysis (conceptual analysis, relational analysis), discourse analysis and structural analysis are used in collecting and analyzing the relevant data and the theoretical perspectives of *Simon de Beauvoir* (*'The second sex'*) and *Sigmund Freud*, ('Civilization *and its Discontents',*) are taken into thorough consideration. 'The village in the jungle' portrays the inner battle between the repressed female being and the dominating traditional requirements. The narrative reflects how women are made to be dependent on the masculine authority. 'The Wise Virgins' as a socio-political scrutiny of the feminist ideologies, is interpreted to be a questioning approach to the concepts of love, marriage, Victorian morality and feminine independence. The social awareness of the female figure as the object of desire, an element whose existence is validated for the erotic gratification of the male figure, is ironically questioned through the portrayal of female characters in the narrative. when critically analysing the two narratives, 'The Village in the Jungle' and 'The Wise Virgins' in relation to the portrayal of 'feminine figure' it can be asserted that the author could identify how the dominant masculine authority which established gender prejudices devalues the identity of women irrespective of her true nature and vitality whether it is Eastern or Western culture. Consequently, by comparatively portraying the conventionally fashioned feminine figure and intellectual, liberally thinking independent women Leonard Woolf through his novels could assert the fact that women cannot be devalued merely as the 'objects of desire' since the feminine figure plays an imperative role within the society.

Keywords: *Woman, Identity, Independence, Social constrains, Masculine authority*

INJECTING DRUG USE, UNSAFE PRACTICES AND HEALTH RISK

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Abstract

Drug injecting method is one of the fastest growing drug consumption methods in the world. According to the records of the treatment admissions for drug dependency, injecting drug use has increased in recent past in the country. Objective of the study was to identify the unsafe practices and health risk related to drug injection. The survey carried out on a non-probable sample of Injecting Drug Users (IDUs) and 721 were represented in the sample. Structured questionnaire, In-depth interviews and observations were used to identify the behaviour of IDUs. IDUs were categorized into two groups -as daily users (69%) and occasional users (31%). Most of the IDUs followed unsafe injecting practices, which are reusing (50%) and sharing (44%) the injecting equipment. Drug injection is the context of dealing with the inside of the body and it should be done under safe conditions. The group injecting behavior is another major risk. It frequently occurs with drug using peers who share common behavioural traits, mutual economic ties and social bonds and often develops into drug related partnerships. Most of the IDUs involved in group injections because of the lack of resource and peer pressure. IDUs were guided to sharing practices by the group norms and lack of resources within the group. The other risk factor of injecting drug use is that not cleaning the skin adequately before injecting. If someone injects drug without cleaning the skin, it can cause some of the bacterial infections. The other risk factors are drugs leak out of the veins during the injection and injection of drugs into the fatty layer under the skin. Repeated injection at the same sites of the body can cause damage to skin and veins. When examining the IDUs, some persons had injuries and patches on the skin due to the drug injection to the same site. Unsafe injecting setting, sharing practices and misperception were the risk factors related to drug injection.

Keyword: *Injecting drug use, sharing, reuse, risk*

THE EFFECTS OF THALASSAEMIA AS A LONG TERM DISEASE CONDITION TO SCHOOL EDUCATIONAL PROCESS IN KURUNEGALA DISTRICT

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Abstract

Thalassaemia is a chronic, genetically inherited, autosomal recessive blood disease. Thalassaemia patients suffer from serious illnesses with severe anaemia and need blood transfusions and iron chelation throughout their life time. This disease and it's treatment process severely affect the education of school going patients. Estimated number of Thalassaemia homozygote patients in Sri Lanka is 2000. Almost 62-100 children are born with thalassemia annually in Sri Lanka which cause a serious social problem in affected areas. The main objectives of this study are to analysis the short term and long term effects of thalassaemia disease to educational process of thalassaemia affecters, identify their requirements for better educational process to manage this long term disease. This research was conducted in National Thalassaemia Centre in Kurunegala, This was a community based cross sectional study. The major data collection tools were structured interviews, observation method and secondary literature sources. Sample size is 100. Students with thalassaemia are able to attend school only 10 to 15 days averaging 12 school days per month. Patients going to hospital for blood transfusion and the other side effects arising are the major reasons for high absenteeism.. Unable to participate in extracurricular activities, sports, and low results are the other major problems caused by the disease. The above mentioned education barriers, directly affected their examination results making them unable to pursue higher education and professional goals. These students strongly expect greater psychological motivation and to be treated as normal students. Arrangement of blood transfusion facilities during the weekdays and introducing detailed information about Thalassaemia disease to school syllabus, increase the awareness and encourage the people to do the thalassaemia screening test and treat to the affecters correctly and equally will make a better life style for these patients.

Keywords: *Thalassaemia, Education, Absenteeism, Problems, Changes*

THE STUDY OF SPECIAL CHARACTERISTICS ON *THUNDAA GAMMADU* RITUALISTIC EVENT: WITH SPECIAL REFERENCE TO MORAWAKA CANTON, LOW COUNTRY IN SRI LANKA

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Abstract

These rituals and oblations were traditionally bound with the Sri Lankan people and this thundaa gammadu ritual is one of them. There rites and rituals were special because they were some rituals like pathaha kapima, amba vidamana, haatha pambura dance, maraa ipaddim, and balaa puwath wapirilla conventional characteristics which could not see from the traditional gammadu ritual. The main objective of this research was study about special rites and rituals in thunda gammadu ritualistic event. Researchers were employed the method of general observation, participant observation, interview method and refer literary sources for the data collection. Accordingly, entire study was based on qualitative method. According to the study this special ritual was conventional to the low country areas in Sri Lanka, especially in Morawak Canton. This ritual belonged to the traditional dance in low country. The Pattini deity was the main character who was worshiped in this ritual. An keliya, Porapol gasima, kap induma, kaha diyara kannaLowwa, halan paawaa dima, pathaha kapima, amba widamana, pe bath danaya, gini yakuma, gini paagima like special events were rich in this magical ritual. According to the research data, this ritual was diminishing day by day because of social, economic and political factors.

Keywords: *ritual, rites, Low country, canton*

IMPACT OF THE COMMENCEMENT OF TRANSLATION STUDIES SPECIAL DEGREE PROGRAMME ON THE SUCCESSFUL IMPLEMENTATION OF THE OFFICIAL LANGUAGE POLICY

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Abstract

Language, the most intricate yet dynamic part of any culture plays a major role in communication. Due to the same reason it has been the driven cause for many conflicts around the world. Most of the people view the differences of languages as 'clashes' not as 'diversity.' In Sri Lanka, several governments have tried to find an ever lasting solution to this problem through legal procedures. However, the practical implementation of these legal provisions seems to be poor and one of the major reasons for that is the shortage of translators. As a solution to this, the government with the Ministry of Higher Education and the Ministry of National Languages and Social Integrity has taken the decision to commence a Special Degree Programme in three state universities namely the University of Kelaniya, University of Sabaragamuwa and the University of Jaffna. The objective of my research is to find the effectiveness of this Special Degree Programme for the successful implementation of the Official Language Policy in near future. To gather data for the paper, a sample group consists of 30 persons was selected and the methods of interviewing and providing questionnaires were used to gather data. The newspaper articles and books were used as secondary sources of collecting information. The questionnaires and interviews consisted of the questions that demand answers regarding the implementation of the programme. Newspaper articles and books were used to find out information regarding the Official Language Policy and recommended syllabuses of the degree programmes. The data collected were analyzed using pie charts. When analyzing particular data, it was found that the participants believed that the existing degree programmes should be slightly revised get the maximum results from the particular degree course.

Keywords: *Language, Official Language Policy, Special Degree Programme, Translation*

IMPACT OF SOCIAL MEDIA USAGE ON STUDENTS' ACADEMIC PERFORMANCE IN SRI LANKA

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Abstract

Social media is a famous model of communication amongst Advanced level (A-level) students in Sri Lanka. However heavy social media usage could increase questions about whether academic performance is affected. This study was carried out with the aim of examining the impact of social media usage on students' academic performance in Sri Lanka. A questionnaire was developed to address both qualitative and quantitative information. Daily time duration on social media measured in hours per day was considered. The usage was defined using the number of social media sites they have used within or before the examination period. The level of addictiveness was measured using the level of agreement of the respondent with his/her own social media addictiveness. Sample size of 285 students who did Advanced level exam between 2012 and 2016 were randomly chosen. The questionnaire comprised of 31 questions including five point Likert Rating Scale questions, multiple choice questions, and rank order questions. Among the respondents, only 151 students have used social media during or before the exam and were considered for the further analysis. Pearson's correlation coefficients and regression were used in testing the research hypotheses. The study found out that the Pearson's correlation coefficients of independent variables are correlated with student's academic performance and variables are significant which include: time duration, use of social media and, addictiveness. The main finding of this study is the significant impact of the usage of online social networks on the students' academic performance. Time spent on social media before and during examination period has significantly decreased the students' z-score, addictiveness to the social media and usage of social media have a significantly influence on academic performance. The qualitative research analysis recommended that the social media should be used for educational purposes including, social networking sites should be expanded and new educational pages should be created to improve academic activities, and students should be examined by parents to see their social media usage which will help to create a balance between social media engagement and academic activities of students to avoid drawbacks in the academic performance of the students.

Keywords*: Social media, Academic performance, social media usage, social media and students*

CONSEQUENCES OF WAR TOWARDS THE STANDARD OF HEALTH AMONGST THE PEOPLE AFFECTED BY THE CIVIL WAR IN NORTHERN PROVINCE SRI LANKA

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Abstract

The Northern population faced disastrous tribulations due to the civil war between government and LTTE for 26 years and it is crucial to understand and explore the effect on the health standards of the people. The objective of this study was to understand the psychological issue and Post-Traumatic Stress Disorder (PTSD) and identify the access they have to healthcare organizations. The study also focuses on identifying any health issues and changes in their quality of life during the post war period. The Methodology of the study was a one-to-one, in-depth interview-based phenomenological qualitative study with a study population of 20 who were chosen by purposive sampling from Northern Province between ages 18-65. The results are that the people of the Northern Province have been suffering with psychological issues and post-traumatic stress disorder (PTSD) since the end of the war. In addition to that, they have faced variety of injuries especially musculoskeletal injuries and brain trauma and still carry bomb residues. There is a scarcity of facilities in majority within the hospitals in the Northern Province. Moreover, their quality of life after the war is severely depleted and they struggle to sustain their daily needs. When discussing the results, the scarcity of the health facilities including trained human resources could have an impact on the quality of health service. Majority of the Healthcare professionals are not well versed in Tamil language which prevents them from understanding the psychological disorders of the people living in the Northern Province. The ineffective communication could have led to the negligence cases thus causing a mistrust amongst the people of the Northern Province. The study concludes that the Northern population had suffered from both psychological and physical harm along with the underdeveloped resources and trained staff as the consequence of war which has affected their standard of health.

Keywords: *Civil war, Sri Lanka, Northern Province, Consequence, Standard of Health*

A STUDY ON THE QUALITY OF LIFE AND THE SOCIOECONOMIC STATUS AMONGST FISHERMEN WITHIN THE GAMPAHA DISTRICT -WESTERN PROVINCE

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Abstract

Occupations such as fishing is of high importance to the country's economy. Not much is known about the daily routine and quality of life of fishermen. The objective of this study was to assess the daily routine of fishermen. Their mental, emotional and physical wellbeing was understood and the availability of expendable income was investigated. Likewise, if the fishermen were able to grant their basic needs through their current income was sought upon through scholastic exploration. The methodology of the study consisted of a qualitative, triad interview basis. The study population consisted of 15 participants, as the point of saturation was met. The sampling method used being purposive sampling. The results portrayed that most fishermen follow a strenuous routine with harsh sleeping patterns; includes 5 hours of sleep per night and diets that consist mainly of carbohydrates. Water consumption is however, adequate. Many fishermen believe that although their jobs impact their health both mentally and physically, but they would not exchange their occupation with another. The majority of fishermen do not believe in substantial improvement, they believe that fishing as an occupation would end with their generation. The lifestyle of fishermen allows income to be variable daily. Moreover, the catch is dependent on the weather patterns. Minorities of fishermen are exposed to financial trouble and are not insured. According to their point of view, the quality of life amongst fishermen was sufficient. Most fishermen support larger families. Almost all children were educated and received a primary education. Family life is substantially managed. Moreover, the discussion of the results portrayed, the scarcity with regards to future development could be a result of incoherent census and the lack of awareness by the governing bodies. Supplying improved equipment may also help combat and reduce the effect of the varied income on a daily basis. In conclusion the quality of life was better than expected with regards to their physical and emotional wellbeing, but the socioeconomic status requires more focus.

Keywords: *Lifestyle, Fishermen, Socioeconomic status, Routine, Income*

විශ්ව විද්‍යාල ශිෂ්‍යයන්ගේ දේශපාලන සහභාගීත්වය පිළිබඳ සමාජ විද්‍යාත්මක අධ්‍යයනයක්: ශ්‍රී ජයවර්ධනපුර විශ්ව විද්‍යාලයේ මානව ශාස්ත්‍ර හා සමාජීය විද්‍යා පීඨයේ සිව්වන වසර ශිෂ්‍යයන් ඇසුරෙන්

පෙරේරා ඩබ්.ජී.ඩී., මෙන්ඩිස් එම්.ඩී.ආර්.ඒ.* සහ ගුණරත්න එම්.එම්.එස්.

සමාජ විද්‍යා අධ්‍යයන අංශය, මානව ශාස්ත්‍ර හා සමාජීය විද්‍යා පීඨය, ශ්‍රී ජයවර්ධනපුර විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව
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සංක්ෂිප්තය

මිනිසාගේ දේශපාලන සහභාගීත්වය පිළිබඳ මූලික අදහසක් පුරාතන ග්‍රීක චින්තනය තුළ දී ඉදිරිපත් විය. එහිදී උපතේ සිටම මිනිසා දේශපාලන ජීවියෙක් ලෙස ක්‍රියාකරන බව ඇරිස්ටෝයල් වැනි දාර්ශනිකයින් පවා ඉදිරිපත් කරයි. විශ්ව විද්‍යාල ශිෂ්‍යයා යනු නිෂ්පාදන ආර්ථිකයෙන් බැහැරව සමාජ ප්‍රගමනයට අවශ්‍ය නව දැනුම නිර්මාණයට සහ භාවිතයට ක්‍රියා කරන මානව සමූහයක් ලෙස හඳුනා ගත හැකිය. මෙම පසුබිම තුළ මෙම අධ්‍යයනයේ අරමුණ වන්නේ විශ්ව විද්‍යාල ශිෂ්‍යයන්ගේ දේශපාලන සහභාගීත්වයේ සමාජ විද්‍යාත්මක ස්වරූපය හඳුනා ගැනීම සහ එම ස්වරූපය තීරණය වීමට බලපානු ලබන සමාජ සාධක හඳුනා ගැනීමයි. අරමුණු සාධනයේදී දත්ත සපයා ගැනීම සඳහා ශ්‍රී ජයවර්ධනපුර විශ්ව විද්‍යාලයේ මානව ශාස්ත්‍ර හා සමාජීය විද්‍යා පීඨයේ සිව්වන වසර ශිෂ්‍යයන් 165 දෙනෙකු නියදිය ලෙස සපයා ගන්නා ලදි. දත්ත විශ්ලේෂණය සඳහා SPSS සහ Excel මෘදුකාංග යොදා ගන්නා ලදි. දත්ත විශ්ලේෂණයේ දී පෙනීගිය එක් කාරණයක් වූයේ සමස්ථ නියැදියෙන් 74% දේශපාලන සහභාගීත්වය පහළ මට්ටමක පවතින අතර 26% දේශපාලන සහභාගීත්වය ඉහළ මට්ටමක පවතී. දේශපාලන සහභාගීත්වයක් දක්වන්නන් අතරින් 57% ක් වාමාංශික දේශපාලන මතවාදයක් දරන අතර 43% කි දක්ෂිණාංශික දේශපාලන මතවාදයක් දරයි. 59% කට තමා දරන දේශපාලන මතය පිළිබඳ නිසි අවබෝධයක් නැත. දේශපාලන සහභාගීත්වය සඳහා බලපාන සමාජ සාධක වශයෙන් අධ්‍යාපන ක්‍රමය, මාධ්‍ය භාවිතය, සමාජ ජාල භාවිතය සහ පවුල් පසුබිම යනාදිය හඳුනා ගත හැකිය. මෙම අධ්‍යයනයේ සමාජ විද්‍යාත්මක සොයා ගැනීම වන්නේ විශ්ව විද්‍යාල ශිෂ්‍යයන්ගේ දේශපාලන සහභාගීත්වය අවම මට්ටමක පවතින බවයි.

ප්‍රමුඛ පද: *විශ්වවිද්‍යාලය, ශිෂ්‍යාවන්, දේශපාලනය, සහභාගීත්වය*

LINGUISTIC SHAME AND SHAMING IN THE SRI LANKAN ESL CLASSROOM

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Abstract

Language acquisition or language learning has been regarded by many scholars as uniquely individualized experience which encompasses numerous complex aspects including cognitive, psychological, emotional and social factors that affect the learning process. Specifically, within the sphere of second or foreign language learning, many factors exterior to the cognitive capacity of the language learner, such as the social factors, manage to elicit psychological, physical and emotional responses, often negative, from the learner which directly affect and often predicts the success or the failure of the learning process. These physiological and psychological responses are often associated with the concept of shame and shaming and often materialize in the L2 classroom as linguistic and social discrimination, where learners' inadequacy in terms of language proficiency and social status is used as the basis for discrimination. The frequency with which these circumstances are observed in the Sri Lankan L2 classroom mandates the need for further investigation of this phenomenon in gaining better insights into the language learning process of the learners and understand the factors that hinder language acquisition. Therefore, this research aims at collecting and analysing qualitative data on adult L2 English language learners in Sri Lanka, where the focus is on acquiring insights into the responses of the learner and past learner experiences in facing such discrimination. The study is carried out as semi-structured, face-to-face interviews where I, as the researcher and a lecturer of English as a second language, would attempt at gaining a better understanding of the L2 learner requirements in Sri Lanka. Therefore, the research will investigate the pervasiveness of shame as an emotional response to language inadequacy among the adult ESL learners in Sri Lanka and the psychological and physical manifestations of shame observed in the learner, the impact of linguistic and social discrimination on the learning process and learner's linguistic and social identity as a user (or inadequate user) and a learner of English and finally the reasons for the existence of linguistic shaming and psychological or physiological coping mechanisms exhibited by the learners.

***Keywords**: Linguistic Shaming, L2 Classroom, Adult learners, Language Inadequacy*

SRI LANKAN WOMEN AND SEXUAL HARASSMENTS AT WORKPLACES: IN SEARCH OF LAW REFORMS

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Abstract

Greater participation of women in employment is a common practice in 21st century and it is important for their economic maintenance and sustainability. In the era of rights based approach, the right to work is an essential right of every person and it was noticed that the women are the most vulnerable group of victims under sexual harassment at workplaces. Sexual Harassment generally refers to any act (physical, verbal, gestural, visual, tacit or written) that inflicts physical, mental or other harm or annoyance based on another person's gender and/or sexuality and it can be recognized as a violation of human rights and human dignity, which undermines the equal opportunities and treatment between men and women.

In the domestic scenario, workplace sexual Harassment often goes unreported and women employees who experience the sexual harassment has failed to report the harassing behavior or to file a complaint because of the social or professional retaliation. According to the reported statistics, throughout the last two decades Sri Lanka has being experiencing high rate of increasing incidents regarding the sexual harassments towards the women at workplaces regardless of their social, economic or educational position. The problems at workplace, discourage women to continue working and it has become a significant threat to the working women in Sri Lanka. Accordingly, this paper aims to discuss the problem of protecting women from sexual harassments at workplaces by exploring the inadequacy of laws available in Sri Lanka in terms of both domestic and international obligations and set a policy framework for establishing a legal, institutional and social infrastructure by analyzing the effectiveness of existing laws and regulations. Amending the provisions of some existing legislations, making the employer vicariously liable for sexual harassment occur in workplaces, adopting relevant International Labour Organization (ILO) standards to domestic laws and public awareness are some recommendations on this matter. Moreover, this research examines successful lessons from India for the purpose of analysing the inadequacy of existing laws in Sri Lanka and offers suggestions to enhance prevailing legal framework to protect women from sexual harassments at workplaces in Sri Lanka. This research will mainly follow a qualitative research method based on a literature review and carried out by the reference of primary and secondary sources. Furthermore, the research was enhanced with the data collected through the interviews with State Department and relevant stakeholders in relation to protect women from sexual harassment at workplace.

Keywords*: sexual harassments, workplace, women, Sri Lanka, India*

LANGUAGISM EXPERIENCED BY THE UNDERGRADUATES OF UNIVERSITY OF PERADENIYA AS A RESULT OF THE USAGE OF SINHALA REGIONAL DIALECTS

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Abstract

The paper discusses the manner in which students, who speak regional dialects, are discriminated in the university. The language used in media is recognized to be the standard form of Sinhala, as a result of the authority held with regards to politics in the capital. This has belittled the positions occupied by the dialects of Sinhala. The authority maintained by the majority of the country not to annex words from “a patois” to the vernacular dialect is conspicuous. The majority has the power to amend the language vested upon them. Hence anyone with a dialectic parlance is subjected to discrimination. The inclination of the majority to pursue the fanatical thought that a regional dialect curtails upward mobility creates this partiality. The ones, who are judged, discriminated and stigmatized i.e. the ones who use regional dialects of Sinhala, have to acclimatize to the "standard" way of speaking Sinhala since the generality of people celebrate status quo. The hegemonic power exercised by the majority has misshapen the identity of the oppressed by creating stereotype. Yet the languages are inter-dependent and none can sustain without the other. This aforementioned reliance cherishes the language by adding more words to the language. This research was designed to gather feedback of the university undergraduates about their opinion towards lampooning due to the regional dialects they use in speech. Data was analyzed by conducting interviews from twenty random undergraduates. The blatancy of the discrimination faced by undergraduates due to regional dialects was ensured during the interviews. The languagism of the undergraduates is not only perceived within the university premises, but also in social media. Encouraging and educating the undergraduates about other regional dialects that prevail in the country could be recommended to minimize this predicament which has not been addressed yet locally.

Keywords: *Authority, dialect, discrimination, undergraduates, vernacular language*

PSYCHOSOCIAL FACTORS ASSOCIATED WITH ADOLESCENTS' SUBSTANCE USE (WITH REFERENCE TO NEGOMBO COSTAL AREA)

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Abstract

Adolescence stage is characterized by mischievous curiosity, this curiosity leads to the experimentation of these adolescents on various substances. According to many researchers, drug use is largely initiated during early adolescence. Then continued to chronicity and to the development of drug dependents. The number of illegal adolescent drug users in Sri Lanka has been growing over the last few years. Substance use is recognized as one of the main health and social problems in Sri Lankan society. Mostly, adolescents are found to be amongst the high risk groups. Therefore the aim of this research was to find out the psychosocial factors (PSFs) that affect the substance use of adolescents in Sri Lanka. Selected sample size was 40 males. The ages of the respondents in between 15-18 years. Research was conducted in Negombo costal area. A questionnaire and a structured interview schedule were used as data gathering instruments. Data were analyzed by using simple statistical methods such as percentages. The results showed that, as social factors such as the family and peers are perceived as having the strongest influence. Poor family relationships, poor communication between parents and their adolescent children, poor family management skills such as lack of child supervision, lack of parenting skills contribute towards adolescent drug behaviour. Peer pressure resulting from association with drug taking friends often lead adolescents to experiment with drugs and also having money on their hands play a role in this. As psychological factors lack of self-esteem, self-satisfaction, without having any specific aim for their lives hence lead to using drugs. To reduce this behavior of adolescents' parents should try to create a positive atmosphere in the home, encourage to communicate openly. Adolescents should be guided in their selection of friends and should be encouraged to take part in recreational activities.

Keywords: *Substance use, drug behavior, adolescence, psychological factors, Social factors*

VISIONARY LEADERSHIP IN SRI LANKAN UNIVERSITY EDUCATION: THE CASE OF VEN. WELIVITIYE SRI SORATHA THERO

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Abstract

Ven. Welivitiye Sri Soratha Thero, the founding father of the Vidyodaya University which is known today as the University of Sri Jayewardenepura was a phenomenal leader. His contribution to the revival of Sinhala language, culture and development of university education has been recorded in many books including the Mahawamsa. He was also the hand behind gaining the University status to Vidyodaya Pirivena in 1959, thus enabling it to provide more benefits for the Sinhalese. He opened the doors not only to the Sinhalese but also to the Tamils and the Muslims by later introducing the Tamil Language. He was a person with great foresight who took leadership in introducing subjects such as: "Modern Science", "Business Administration", and "Public Administration" in 1960, an action that was deemed unsuitable for a Pirivena. His foresight of identifying needs and the ability to adapt and create an environment that will facilitate such needs is one of his most admirable features. He was an individual who created a longstanding positive change through leadership. While his leadership is admired through various forms of literature a case study based on his leadership qualities on modern leadership theories has not yet been published. The case study uses theories of two disciplines; Human Resource Management and Language. The paper analyses both the approach taken by the leader and the innate traits that make the approaches possible. The paper uses the theories of Transformational and Transactional leadership to analyze his leadership approaches. The theory of transformational leadership discusses how the method of leadership revolves around the idea of positive change and transactional leadership revolves around the need of stability. It further analyses the traits within Ven. Welivitiye Thero that made such approaches possible through personification of two elements in the theory of language: Nirukthi (Etymology) and Wyakarana (Grammar). Through these theories the paper looks at the leadership that Ven. Welivitiye Sri Soratha Thero takes in making certain changes that helped develop the Sri Lankan University education. The paper will use published literature about Ven. Welivitiye Sri Soratha Thero and informal interviews to gather data for the case study.

Keywords: *Welivitiye Sri Soratha Thero, Leadership, Transformational Leadership, Positive change, Nirukthi, Wyakarana*

අනුරාධපුර පැරණි යෝධ ඇළ භූ-භෞතික පරිසරය පිළිබඳ අධ්‍යයනයක්

කරුණාරත්න එච්.එච්.ඒ.* සහ කපුකොටුව ඇ.

ඉතිහාස හා පුරාවිද්‍යා අධ්‍යයන අංශය, ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව
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සංක්ෂිප්තය

වාරි කර්මාන්ත ක්ෂේත්‍රයේ විශිෂ්ට ගණයේ නිර්මාණයක් ලෙස අනුරාධපුර පැරණි යෝධ ඇළ හඳුනාගත හැකි ය. මාතලේ කදු බැවුම්වල සිට වයඹ දෙසට ගලා එන ජල ධාරාවෙන් පෝෂණය වන කලා වැවේ උතුරු දෙසට හැරී ගමන්ගන්නා යෝධ ඇළ සිය නිම්නයෙන් ඉවත්ව මල්වතු ඔය නිම්නයට ගොඩ වී පහළ වැව්වලට ද ජලය සපයමින් තිසා වැව දක්වා ගමන් කරයි. ධාතුසේන රජු (ක්‍රි ව 455-473) කලා වැවේ සිට තිසා වැව දක්වා ජලය ගෙනයාමට යෝධ ඇළ නිර්මාණය කළ ද එහි භූ-භෞතික පරිසරය පිළිබඳ අධ්‍යයනයේ දී සංකීර්ණ ජල කළමනාකරණ ක්‍රමවේදයක් ඒ තුළ හඳුනාගත හැකි විය. අන්තර් ඇළ මාර්ගයක් ලෙස නිර්මාණය වූ මෙහි කාර්යය දිගු වැවකට සමානය. විෂම වූ භූමි දර්ශනයක් ඔස්සේ සැ.54 දුරක් ගමන් ගන්නා ඇළ මාර්ගයේ නිර්මාණ තාක්ෂණික අංග භූ-භෞතික පරිසරය සමග මනා සබඳතාවක් සහිතව ගොඩනගා ඇති බව පැහැදිළිය. මෙම පර්යේෂණයේ අරමුණ වනුයේ යෝධ ඇළ භූ-භෞතික පරිසරය පිළිබඳ විමර්ශනාත්මක අධ්‍යයනයයි. මෙහි පර්යේෂණ ගැටලුව ලෙස වැවකින් තවත් වැවකට අවශ්‍ය ජලය ලබාදීම සඳහා ඇළ නිර්මාණය වුවා නම් ඒ සඳහා මෙවැනි භූ-භෞතික පරිසරයක් යොදා ගත්තේ මන්ද යන්න අධ්‍යයනයට ලක්විය. මෙහි දී යෝධ ඇළ ගමන් මාර්ගය තහවුරුකර ගැනීම හා ඒ අනුව අයත් භූමියේ භූ-භෞතික පරිසරය තුළින් වාරි තාක්ෂණ සඳහා පරිසරය කළමනාකරණය කර ඇති අයුරු අධ්‍යයනය කරන ලදි. දත්ත රැස් කිරීමේ දී යෝධ ඇළ නිරවුල් ලෙස තහවුරු කර ගැනීම සඳහා ස්ථානීය තොරතුරු වාර්තා කිරීම. ගුවන් ඡායාරූප අධ්‍යයනය කිරීමත් සිදු වූ අතර දත්ත විශ්ලේෂණයේ දී භූ ගෝලීය තොරතුරු පද්ධතිය උපයෝගීකර ගැනුණි. පර්යේෂණයේ දී හුදෙක් යෝධ ඇළ අගනගරයේ ජල අවශ්‍යතාව සඳහා පමණක් භාවිත නොවූ අතර ඇළ ගලා ගිය ප්‍රදේශයේ වැව් හා ජනාවාස සඳහා ද ජලය සැපයීම සිදුවිය. අඩි 40 ගැඹුරු අඩි 40 පළල යෝධ ඇළ වඩාත් ගැඹුරු නොවුයෙන් ප්‍රදේශයේ භූගත ජල මට්ටම ආරක්ෂා කිරීමට ඉදිකිරීම් ශිල්පීය ක්‍රමය උපයෝගී වී ඇත. දකුණු ඉවුර පමණක් හඳුනාගත හැකි වීම නිසා වම් ඉවුරු ප්‍රදේශය ඇළෙහි පෝෂක ප්‍රදේශයක් ලෙස භාවිත විය. ඇළ ගමන්ගත් ප්‍රදේශයට අයත් වැව්වල ඉස්මත්ත හරහා ගමන්කර එම වැව්වලට ඇළ මගින් ජලය ලබාදුන් සොරොව්වල සාධක තහවුරු කරගත හැකි වූ අතර එමගින් වැවට රොන්මඩ තැන්පත් වීම පාලනය වී ඇත. සෑම උස් භූමියක් තරණය කළ පසුම යෝධ ඇළ නැවත පහත් භූමියක් වෙත සමෝච්ජ රේඛාවල විහිදීම අනුව ගමන් කිරීම නිසා කිසිදු බාධාවක් නොමැතිව විෂම භූමිය තරණයට වාරි ශිල්පීන් යෝදාගත් තාක්ෂණික ක්‍රමවේදයකි.

ප්‍රමුඛ පද: *භූ-භෞතික, සමෝච්ච රේඛා, ජල කළමනාකරණය, ඇළ මාර්ග, භූ විෂමතාව*

තීරණ ගැනීම හා සිතෙහි ක්‍රියාකාරීත්වය: මජ්ඣිම නිකායේ අනුපද සූත්‍රය ආශ්‍රිත විමර්ශනයක්

පතිරණ ආර්.එම්.

කථිකාචාර්ය, පාලි හා බෞද්ධ අධ්‍යයනාංශය, රුහුණ විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව
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සංක්ෂිප්තය

පුද්ගලයෙකුගේ සිතෙහි ක්‍රියාකාරීත්වය පිළිබඳ ව බෞද්ධ දර්ශනය මගින් දක්වා ඇති අවධානය ඉතා පුළුල් ය. පවතින මොහොතේ සිතෙහි ස්වභාවය අනුව කෙනෙකු ගන්නා තීරණය නිරවද්‍ය, සාවද්‍ය හෝ මධ්‍යස්ථ තීරණයක් විය හැකිය. ඒ පිළිබඳ බුදුදහම දක්වා ඇති අවධානය අධ්‍යයනය කිරීමේදී භාවිත කළ හැකි මූලාශ්‍රය තුන් පිටකයෙහි ම අන්තර්ගත වෙයි. එහෙත් ඒ අතරින් මජ්ඣිම නිකායේ අනුපද සූත්‍රය විශේෂයෙන් වැදගත් වන්නේ සිත ක්‍රියාත්මක වන ආකාරය පිළිබඳ ව ඵස්ස, වේදනා, සඤ්ඤා, චේතනා, ඒකග්ගතා, ජීවිතින්ද්‍රිය, මනසිකාර, විතක්ක, විචාර, අධිමොක්ඛ, විරිය, පීති හා ඡන්ද යන අවස්ථා 13ක් ඔස්සේ කරන විග්‍රහය කෙරෙහි පුද්ගලයාට තම තීරණ ගැනීමේදී ප්‍රායෝගිකව ම අවධානය යොමු කළ හැකි බැවිනි. ඒ නිසා ම මෙම පර්යේෂණයේ උපන්‍යාසය බවට පත් වූයේ එම කරුණු පුද්ගලයෙකුට තමා ගත යුතු නිවැරදි තීරණ හඳුනාගැනීමට පිටුබලයක් වන බවයි. එනම් ස්පර්ශය, අරමුණෙහි රසය විඳගැනීමේ ශක්තිය, අරමුණ හැඳිනගැනීමේ ස්වභාවය, සිතුවිලි, එක අරමුණක රැඳී සිටීම, ප්‍රාණ ශක්තිය, අරමුණ සිතට නංවා ගැනීම, අරමුණ කල්පනාවට ගැනීම, අරමුණ සිත තුළ හැසිරවීම, අරමුණ විගමනය කරන ස්වභාවය, උත්සාහය, සතුට හා කැමැත්ත යනාදියයි. 'තීරණ ගැනීමක්' යනු නිගමනයකට, නිෂ්ටාවකට, අභිප්‍රායකට හෝ විනිශ්චයකට පත්වීම යි. එය ඉතා සැලකිල්ලෙන් කළ යුත්තකි. සමාජයක් තුළ හරි තීරණ, වැරදි තීරණ, හරි හෝ වැරදි තීරණ, සෘජු තීරණ, අභියෝගාත්මක තීරණ හා අවස්ථානුකූල තීරණ වශයෙන් විවිධ තීරණ වර්ග දැකිය හැකිය. පුද්ගල ජීවිතයේ සාර්ථක හෝ අසාර්ථකභාවයට එම තීරණ හේතු වේ. යම් ගැටලුවකට විසඳුම් මාර්ගයක් තෝරා ගැනීමේ ක්‍රියාවලිය තීරණ ගැනීමයි. මේ අනුව තීරණයක් යනු තෝරා ගැනීමකි. මෙලෙස තීරණ ගැනීම හා එහි සාර්ථක හෝ අසාර්ථකභාවය කෙරෙහි බලපාන ප්‍රධාන සාධක ද්වයකි. ඒවා මානසික සාධක හා භෞතික සාධක ලෙස සැකෙවින් දැක්විය හැකිය. එම මානසික සාධකවලට සම්බන්ධවන පුද්ගල සිත හා එහි ක්‍රියාකාරීත්වයෙහි ස්වභාවය මනාව හඳුනාගැනීමට මජ්ඣිම නිකායේ අනුපද සූත්‍රයේ සඳහන් කරුණු බෙහෙවින් වැදගත් වන බව මෙම පර්යේෂණය මගින් පෙන්වා දී ඇත. එබැවින් මෙහි ප්‍රධාන පර්යේෂණ ක්‍රමවේදය වූයේ පාඨ විශ්ලේෂණය යි. ඒ අනුව මෙම පර්යේෂණ පත්‍රිකාව මගින් පුද්ගල සිතේ ක්‍රියාත්මක වන යටකී සිතිවිලිවල ස්වභාවය මනාව හඳුනාගැනීම තීරණ ගැනීමේදී බෙහෙවින් වැදගත් වන ආකාරය පැහැදිලි කරයි.

ප්‍රමුඛ පද: *තීරණ ගැනීම, සිත, ක්‍රියාකාරීත්වය, බෞද්ධ, උපයෝගිතාව*

GENDER AND ATTITUDES TOWARDS LEARNING ENGLISH AS A SECOND LANGUAGE: A STUDY BASED ON THE 1ST YEAR UNDERGRADUATES IN THE FACULTY OF SCIENCE, UNIVERSITY OF PERADENIYA

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Abstract

Attitudes are considered to be an individual difference and the attitudes influence in the process of Second Language Learning. According to Gardner, attitudes refer to "An evaluative reaction to some referent or attitude object, inferred on the basis of the individual's beliefs or opinions about the referent" (Gardner, 1985). Although many scholars like Gardner, Lambert and Dornyei etc. have identified a positive correlation between learner attitudes and the Second Language Learning process , the gender differences in the attitudes of the language learners have not been researched substantially, especially in the Sri Lankan language learning context. Therefore the main aim of the research is to identify the gender differences in the attitudes towards learning English as a Second Language and whether the variable of gender plays a main role in the attitudinal differences of the learners. The mixed method comprised of both the qualitative and quantitative data methods are used in order to collect data using Microsoft Excel application. The sample for the research is 78 1st year undergraduates from the Faculty of Science, University of Peradeniya. According to the analysis, it is observed that the female learners demonstrate more positive attitudes than the male learners. While 90.90% of the females depict positive attitudes towards learning English as a Second Language, only 51.51% of the males have positive attitudes for the particular factor. Therefore it is possible to identify a difference of 39.39 % between the two genders. In analyzing the behavioural, cognitive and affective components of attitudes, it is observed that the females have more positive behavioural attitudes than the males with percentages of 87.87, 90.90 and 63.63 respectively. With regard to the language skills also the females demonstrate more positive attitudes than the males and the percentage is 93.93%. The attitudes of the learners towards formal and informal language learning contexts also demonstrate more positive attitudes with the female learners than the males. In conclusion, it is observed that the females have more positive attitudes to learning English as a Second Language than the male learners and it affirms the research findings of the scholars as Shoaib and Dornyei (2005) in the Sri Lankan second language teaching context as well. Therefore it is recommended to identify the reasons behind the gender differences in the attitudes of the Second Language learners and apply the knowledge to overcome the barriers in teaching English as a Second language.

Keywords: *gender, attitudes, Second Language Teaching, language skills*

A GEOARCHAEOLOGICAL STUDY ABOUT FOSSILIZATION AND PALEOENVIRONMENTAL RECONSTRUCTION OF RATNAPURA DISTRICT

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Abstract

Ratnapura district belongs to the wet zone in Sri Lanka. It has very rich biodiversity. The name "Ratnapura Series" has been given to a group of river and lake deposits they have an accumulated in the strike valleys of Sabaragamuwa Province. Ratnapura district of Sri Lanka is very important as a Pleistocene Epoch fossils deposit, and it is more similar to the Narmada Shivalic Pleistocene fossils in India. Fossils are preserved remain or trace of animals, plants and other organism from living the remote past. The main objective of this study was to identify fossilization process and buildup the interrelationship between the Paleontology and Archeology. The research was carried out in literature investigation, field investigation and laboratory analysis. Field sampling was carried out during the six month. The sediments from gem pits were collected with an interval of two meters. In addition, landscape of the area, soil color and texture properties and other important findings were recorded. The fossilization process is a good evidence to reconstruct in Palaeoenvironment. The Geological methods which Sieve analysis and Hydrometer analysis were used to analyzing Fossils beds. When having heavy rains to the upper mountain areas much water flows through those rivers and streams, and spread floods on the valley as well as sediments were regularly deposit there. Depositing time is changed according to the grain size. Those are deposited under the calm environment. There are more silt and sand in the compound of soil layers, and that was the reason to condition of Silicification. The Silicification is the process in which organic matter becomes saturated with silica. This structure based on the floodplains climate conditions. When solidification activities were occurring SiO_2 were Increased. Therefore this solidification helped to fossilization.

Keywords: *Fossilization, Geoarchaeology, Palaeoenvironment, Reconstruction, Ratnapura*

ANALYSIS OF STUDENTS' ATTITUDES TOWARDS THE LEARNING ENVIRONMENT OF PUBLIC UNIVERSITIES: EVIDENCE FROM THE UNIVERSITY OF SRI JAYEWARDENEPURA, SRI LANKA

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Abstract

Since, last decades education has developed as a major determinant of human life. In many cases, developments in technology is influenced on learning environment of university education in Sri Lanka. Recently, many issues have been raised regarding the learning environment among the students of public universities. The main objective of this study was to analyze the effects of different variables on students' attitudes towards learning environment of the public universities. The study is based on survey data gathered from the Faculty of Humanities and Social Sciences, Faculty of Management Studies and Commerce and Faculty of Applied Science at the University of Sri Jayewardenepura. Data were gathered through a random sample of 433 students using interviewer administered questionnaire. Both descriptive analysis and multivariate analytical methods were employed in this study. The findings reveal that around more than two thirds of students are females of the sample. Respectively, 45.4%, 36.6% and 18% of the respondents from the Faculties of Humanities and Social Sciences, Management Studies and Commerce, and Applied Sciences were represented. The age distribution of the students varies in between 19 years to 26 years while most of the students are 22 years old. In order to measure the students' attitudes towards learning environment at university, a composite index was constructed using data reduction methods. The average level of attitudes towards learning environment is 66.61. The level of attitudes towards learning environment with respect to the age, gender type, faculty and academic year have revealed that except gender type other three variables significantly influence on the learning environment. It was observed that the positive attitudes towards learning environment including accommodation facilities, learning facilities, cleaning environment, common facilities for day to day activities and sanitary facilities of students at Faculty of Applied Sciences was in higher level than the positive attitudes towards learning environment of students at Faculty of Humanities and Social Sciences. It can be concluded that the variables of faculty of the student, academic year and age of the student have effect on the university students' attitudes towards learning environment. These results suggests that, there is a need of enhancing the facilities at the Faculty of Humanities and Social Sciences in order to increase positive attitudes towards learning environment by the students at the faculty.

Keywords: *Students' attitudes, learning environment, university education, providing facilities*

THE GIS APPLICATION OF AFFECTING FACTORS FOR LANDSLIDE DISASTER IN ARANAYAKE SRI LANKA

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Abstract

Landslides is geophysical events that have become one of the most calamitous natural hazards in Sri Lanka. Movement of landmasses are one of the fundamental geomorphic processes on the earth's surface, which occurs from one landscape to the other. Precipitation, slope angle, soil types and rock types are the main factors affecting the landslide process. And also factors such as vegetation types, buildings, mining and various other human factors affect this landslide process. The hydrology, drainage patterns and climate change can be identified as major controllable and dynamic factors among them. These factors should be obtained time to generate the landslide susceptibility potential map. Nearly 12,500 km^2 of area spread over the many districts seems to be highly landslide prone areas in Sri Lanka. The main objective was to identify the affecting factors for landslide in Kegalle district. For this purpose, an investigation was carried out in ten soil samples representing the landslide area through random sampling and measured slope angle and monthly rainfall. Particularly GIS mapping, Lab testing and statistical methods have been used for analyzing and presenting data. The laboratory analyses mainly focused onto Sieve and Soil type analysis. Research results brought out very important findings in relation to the soil type and slope angle in study area. The main finding of this research, applied varies criteria from using GIS prepared vulnerable map and identified relationship between landslide and affecting factors such as precipitation intensity, soil type, vegetation cover and human activities. Vegetation cover was removed in the top of the affected area. Water seepage can be happened to the bed rock as toilet pits were dug in the top area of the hill. The main factors affected in Aranayaka landslide were the human activities and heavy rainfall.

Keywords*: disasters, landslide, hazard, GIS, Sri Lanka*

RURAL WATER RESOURCES UTILIZATION CHARACTERISTICS AND ISSUES IN THE DRY ZONE OF SRI LANKA

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Abstract

Water is the essential commodity of the life on earth. While one part of the world has water surplus one part is being suffered from lack of water. Sri Lanka is a country where the total land is covered with 103 river basin but water resources are unequal distributed. Especially in the dry zone, due to the high seasonality of rainfall and salinity of water, water related issues and problems are much common. By focusing the objective of identifying the rural water resources utilization characteristics and issues in the dry zone of Sri Lanka, two research sites were selected by considering the severity of the water resource problems according to the judgement sampling technique. Altogether 25 families from Kudamadawachchiya Grama Niladari Division in Puttalam district and Thanthirimale Grama Niladari Division in Anuradhapura were taken as sample and collected data by using questionnaire and informal discussions were analysed descriptively. The research findings shows that there are different water resources utilized by the people such as wells, tanks, tap lines, tube wells and filtered water. As issues of rural water resources utilization, insufficiency of rain water tanks, salinity and the brackish condition of the available water, kidney problems and no proper water distributing mechanism were identified.

Keywords: *Rural water resources, Utilization characteristics, Issues, Dry zone, Sri Lanka*

වර්තමාන කාටූන් නිර්මාණ ළමා මනසට සහ පෞරුෂයට කරන ලද බලපෑම පිළිබඳව මනෝවිද්‍යාත්මක අධ්‍යනයක්

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සංක්ෂිප්තය

වර්ෂ 2010ට පෙර රජයේ සහ පෞද්ගලික රූපවාහිනී නාලිකා තුළ විකාෂණය වූ ළමා කාටූන් නිර්මාණ ළමා මනසට හිතකර මෙන්ම ළමා පෞරුෂය වර්ධනය කිරීමට සමත් නිර්මාණ විය. එයින් ජීවිතයට එක් කර ගත් දෑ බොහෝ විය. නමුත් වර්තමානයේ බොහෝ දුරට විකාශනය වන්නේ විදේශ නිර්මාණය. ඉන් ළමා මනසට මෙන්ම පෞරුෂයට හානි වන ප්‍රමාණය ද වැඩි අතර යහගුණ සහ සදාචාරය දරුවන්ගෙන් දුරස් කිරීමට ද ඇතැම් නිර්මාණ සමත් වේ. කාටූන් නිර්මාණය තුළින් ළමා මනසට පණිවිඩයක් ගෙන යාම ඉතා පහසු බැවින් එය යහපත් බව හෝ අයහපත් බව ළමයාට කරන බලපෑම අනුව ළමා මනස සහ පෞරුෂයට හිතකර හෝ අහිතකර විය හැකි ය. වර්තමාන කාටූන් නිර්මාණ ළමා මනසට සහ පෞරුෂයට කරන බලපෑම සම්බන්ධයෙන් පර්යේෂණ ගැටළුව නිර්මාණය කර ඇත.

මෙම පර්යේෂණයේදී සාහිත්‍ය මූලාශ්‍ර අධ්‍යනය මෙන්ම කාටූන් නිර්මාණ ශිල්පීන් සමග කරන ලද සාකච්ඡා ප්‍රධාන වශයෙන් යොදා ගන්නා ලදී.

ක්‍රමවේදය ප්‍රධාන වශයෙන් ගුණාත්මක සහ ප්‍රමාණාත්මක යන අංශ දෙක තුළම පදනම් වී ඇති අතර එහිදී පෙර පාසැල් ගුරුවරියන්, වයස අවුරුදු 10ට අඩු ළමුන් 25ක් යොදා ගෙන සාකච්ඡා මාර්ගයෙන් සහ ප්‍රශ්නමාලා ක්‍රමය ඔස්සේ දත්ත රැස් කර ගන්නා ලදී.

අධ්‍යනයෙන් හෙළි කර ගත් කරුණු අනුව අතීත නිර්මාණ තුළින් ළමුන්ගේ මනසට සහ පෞරුෂයට හානි නොවන නිර්මාණ ඉදිරිපත් වූ අතර ළමා රසවින්දනය ද වර්ධනය කරන ලදී. නමුත් වර්තමාන නිර්මාණ තුළින් ළමුන්ගේ මනසට මෙන්ම පෞරුෂයට හානි වන ප්‍රමාණය වැඩි අතර ඉන් කුඩා කළ සිට දරුවන් තරගකාරීත්වයට, ආත්මාර්ථයට, කෲරත්වයට නැඹුරු ස්වභාවයක් පෙන්නුම් කරයි. ඊට අමතරව කාටූන් චරිතවල ක්‍රියාකාරකම් ළමුන් තම එදිනෙදා ජීවන ක්‍රියාවලියට එක් කරගැනීම හා චරිත අනුකරණය තුළ ළමා පෞරුෂයට අහිතකර බලපෑමක් ද එල්ල කරන බව පෙනී යයි. එබැවින් අතීත නිර්මාණ අධ්‍යනය කොට ළමුන්ගේ මනසට හිතකර නිර්මාණ ඉදිරිපත් කිරීම කාලානුරූපීව ඉතා වැදගත් වේ.

ප්‍රමුඛ පද: *කාටූන්, ළමයා, මනස, පෞරුෂය, විකාෂණය*

ශ්‍රී ලංකාවේ ධීවර සංවිධාන ක්‍රියාකාරිත්වය හා එමගින් සාමාජිකයන්ට අත්වන සමාජීය හා ආර්ථික ප්‍රතිලාභ පිළිබඳව අධ්‍යයනයක්: මීගමුව කලපුව ආශ්‍රිතව ක්‍රියාත්මක වන ධීවර සංවිධාන ආශ්‍රයෙන්

විතානගේ එස්.ආර්එස්.නු.

මානව සම්පත් අභිවර්ධන ආයතනය (IHRA), කොළඹ විශ්වවිද්‍යාලය, ශ්‍රී ලංකාව
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සංක්ෂිප්තය

ධීවර කර්මාන්තයේ නියුතු ධීවර ප්‍රජාව විසින් ඔවුන් නියාමනය හා නියෝජනය සඳහා පිහිටුවා ගත් සංවිධානමය ව්‍යුහයන් ධීවර සංවිධාන වේ. මේවා රාජ්‍ය මැදිහත්වීම මත පිහිටවූ හෝ ස්වේච්ඡා සංවිධාන වේ. රජය මගින් ක්‍රියාත්මක වන ව්‍යාපෘති සඳහා ධීවර ප්‍රජාව දැනුවත් කිරීම හා ආධාර බෙදා දීම මෙන්ම කර්මාන්තයේ යෙදෙන ධීවර ප්‍රජාව සුරක්ෂිත කරගැනීමට අදාළ ක්‍රියා පටිපාටි සැකසීමේ දී මෙකී ධීවර සමිති මැදිහත් වේ. මෙනිසා එම සංවිධාන වඩා විධිමත් කරවීම සඳහා එකී සංවිධාන පිළිබඳව පුළුල්ව අධ්‍යයන කලයුතුව ඇත. ඒ අනුව මෙකී ධීවර සංවිධානයන් හඳුනා ගැනීම හා එම සංවිධාන මගින් සාමාජිකයන්ට ප්‍රතිලාභයන් අත්වේද යන්න සොයා බැලීම අත්‍යාවශ්‍ය වේ. ඒ අනුව මෙම සංවිධානයන්ගේ ක්‍රියාකාරිත්වය මගින් එහි සාමාජිකයන්ට ආර්ථික හා සාමාජීය ප්‍රතිලාභ අත්වේද සහ එම ප්‍රතිලාභයන් මොනවාද යන්න මෙහිදී විමර්ශනය කර ඇත. මෙම පර්යේෂණය සඳහා තෝරාගත් මීගමු කලපුව කොළඹින් කි. මී. 20 පමණ උතුරට වන්න පිහිටා ඇත. මෙම ප්‍රදේශය තුළ රාජ්‍ය මෙන්ම ස්වේච්ඡා සහ සම්ප්‍රදායික යන ධීවර සමිති ආකාර ක්‍රියාත්මක වනු දැකිය හැකිය. අධ්‍යයනයේ දී ප්‍රාථමික මෙන්ම ද්විතීක දත්ත රැස් කෙරිණි. ප්‍රදේශයේ රාජකාරී නිරත ධීවර පරීක්ෂකවරුන් 11ක්, ධීවර සමිති සභාපති/ලේකම්වරු 45ක්, ධීවර සමිති සාමාජිකයින් 100ක් හා ධීවර සමිති සාමාජිකයින් නොවන ධීවරයන් 50 ක ගෙන් විවෘත ප්‍රශ්නාවලි රාමුවක් ඔස්සේ වාචිකව තොරතුරු ලබා ගැනිනි. එම දත්ත ප්‍රමාණාත්මකව මෙන්ම ගුණාත්මකව ද ඇගයීමට ලක්කර ඇත. ධීවර සංවිධාන ක්‍රියාකාරීත්වය හා සාමාජික ආර්ථික ප්‍රතිලාභ අතර සහ-සම්බන්ධතාවය 0.398 හා sig අගය 0.022 කි. මධ්‍යස්ථ ධන සබඳතාවක් ඇත. ධීවර සංවිධාන ක්‍රියාකාරීත්වය හා සාමාජික සාමාජීය ප්‍රතිලාභ අතර සහ-සම්බන්ධතාවය 0.595 හා sig අගය 0.000 කි. පැහැදිලි ධන සබඳතාවක් ඇත. ධීවර සංවිධාන ක්‍රියාකාරීත්වය හා සාමාජික ආර්ථික ප්‍රතිලාභ අතර සම්බන්ධතාවය ඇගයීමේ දී එම සාධක අතර අනුලෝම සම්බන්ධතාවක් පෙන්වයි. තවද ධීවර සංවිධානවල පැවැත්ම උදෙසා එහි ක්‍රියාකාරී සාමාජික ගණන හා සංවිධානයේ අරමුදල යන සාධක වැදගත් වේ. දැනට ක්‍රියාත්මක ධීවර සංවිධාන ලෙස සමූපකාර ධීවර සමිති, ග්‍රාමීය ධීවර සංවිධාන හා කලපු කමිටුරාජ්‍ය අනුග්‍රහය සහිතව ද දේවස්ථානය මූලිකව පිහිටුවා ගත් ධීවර සංවිධාන හා මා දැල්, කට්ටු දැල්, ආදී වූ සාම්ප්‍රධායික ස්වේච්ඡා ධීවර සමිති ද විය.

ප්‍රමුඛ පද: *ධීවර ප්‍රජාව, ධීවර සංවිධාන, ආර්ථික සංවර්ධනය, සාමාජීය සංවර්ධනය*

EFFECTS ON THE SPOUSES OF THOSE WHO ARE REMANDED FOR A PROLONGED PERIOD: WITH SPECIAL REFERENCE TO MALE SUSPECT IN NEW MAGAZINE REMAND PRISON, COLOMBO

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Abstract

All existing humanitarian laws reveal that "a suspect" is innocent. According to the Code Of Criminal Procedure Act (No. 15 of 1979), the 37 sentence has said that, "Any peace officer shall not detain in custody or otherwise confine a person arrested without a warrant for a longer period than under all the circumstances of the case is reasonable, and such period shall not exceed twenty-four hours exclusive of the time necessary for the journey from the place of arrest to the Magistrate". In spite of these legal assurances more than 60 % of remanders have to wait at the prison for more than one month to two years expecting their final verdict. This can affect their family back ground. It is because every person works closely with their families. This study attempts to find out how a person's imprisonment impacts the family. On the basis of hypothesis, it would be the main question of this study, to see how it affects the spouses of those who are imprisoned for a long time. The general objective is to identify the effects on the married spouses of those who are imprisoned for a long time while specific aims are to identify the nature of relationships that exist between the suspects and the social and economic relationships that exist among the members of the family. Married spouses of male suspects who were imprisoned for more than one year and living in Colombo District were the sample and 110 wives had been chosen using multi stage sampling method. According to the research, majority of spouses had faced several issues such as financial and psychological issues. This was due to loss of defense and protection of their husbands, absence of emotional rapport, and collapse of financial support for the family. It had also seen that majority of spouses engaged even in unsuitable jobs such as sale of illicit intoxicating drinks and drugs and prostitution. As per this study, Suitable self- employment jobs or employment opportunities can arrange through the State, for those women who are engaged in ulterior jobs. The State should mediate in acceleration of court procedure, in order to protect the rights of suspects.

Keywords: *Suspect, Remand, Spouse, Women, Family bond*

STUDY ON THE INFLUENCE OF MOTIVATIONAL INCENTIVES EFFECT ON EMPLOYEE RETENTION (SPECIAL REFERENCE TO MARKETERS IN INSURANCE FIELD

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Abstract

Examine on the influence of motivational incentives effect on employee retention of marketers is one of the foremost conversation that the insurance companies were looking for. Marketers are playing an important role by being the root cause of making profits in insurance companies. They are the ones who decide the monthly sales revenue of each insurance type through achieving daily targets offer by the relevant company. The term of motivational incentives can be defined as an effective way of encouraging the people to achieve personal as well as career growth. To understand motivation one must understand the human nature itself. The employee retention is becoming a major issue especially in insurance companies due to the unrealistic targets given to the marketers. Therefore it is very important to pay consideration on motivational incentives in order to maintain the retention ratio. The main objective of this study is to analyze the effect of motivational incentives on employee retention of marketers with special reference to insurance companies. The research problem of this study is to find out, 'what are the most effective influencing motivational incentives on employee retention in insurance field'. Mainly, researchers measure the most influencing motivational incentive type which is affecting on the employee retention accordance with the selected four insurance companies. Two independent variables are used for testing alternative and null hypotheses recognized as monetary and non-monetary incentives. The structured questionnaire is based on 100 employees by using simple convenience sampling method. Researchers have used correlation and regression analysis in order to analyze the data. The results of this study depict that, there is a high positive correlation between motivational incentives and employee retention recorded as above (0.7), and average regression value is above (0.5) which specify, analyzes have exceeded the strong value. Based on the results, the research conclusion indicates, that the influence of motivational incentives have the tremendous capability of successfully achieve the profits while retain happily satisfied employees.

***Keywords**: field of insurance, motivational incentives, employee retention, marketing targets, sales revenue*

SOCIAL AND MEDICAL ASPECTS OF ADOLESCENT SUICIDE ATTEMPT SURVIVOR

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Abstract

The merging of medicine and sociology will bring much benefit. The authors present this case scenario as a concept paper to create a dialogue among the relevant experts in different fields. A 13 year old school girl had lost her farther at the age of 2 months. The mother left the child at the age of eighteen months with the child's aunt who herself had two children. Apparently the child received care, protection and acceptance on parallel grounds with her two cousins. As the aunt had scolded her over a petty matter the victim self-suspended with her shawl from a ceiling fan in the school. The unconscious girl was detected soon and had been taken to hospital where she recovered without physical complications. Psychiatric referral revealed poor anger management. Suicidal ideation is a complex psychological process. The parentless child might have faced diverse psychological problems during her life. Personal and family counseling play a big role to fix the traumatic experience. Whose role is it to study the complex and interrelated background factors of attempted suicide in our socio-cultural settings? Could such attempts be narrowed down and over-simplified to a plain and simple terminology like 'poor anger management' or 'impulsive behaviour'? The authors after years of experience in clinical forensic medicine believe that such behaviours are more complicated and demand in-depth sociological study. Clinical sociologists, community physicians, psychiatrists and psychologists should engage in extensive multi-centered, collaborative research of both qualitative and quantitative in nature to cover most of the aspects of attempted suicide if the recurrences are to be minimized. Each attempted suicide or an accomplished suicide should be considered as a reflection of failure of health care and social welfare system of the country.

Keywords: *clinical forensic medicine, clinical sociology, family counseling, suicide attempt survivor*

SLUMS AND URBAN CENTRE VULNERABILITY: STAGNATE WATER ISSUE: A CASE STUDY OF THE PELIYAGODA URBAN COUNCIL DIVISION, GAMPAHA

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Abstract

Society, environment and development concepts are interrelated with each other. Those concepts must engage each other mutually. If one get try to overlap each one, the system will be harmed. This research shows how those are overlapped one another. Peliyagoda is an urban centre is situated in the Gampaha district. This study explores the challenges faced by the Peliyagoda area during the water stagnating due to the rain. Especially stagnant water was a major environmental hazard in the research area. They have faced many problems not only environmental issues but also there are political, physical and economic issues too. Water stagnating is disrupt the normal life, damage of structures and infrastructure, destruct the domestic animals and loss of income potentials are the encountered effects of water stagnate in the Peliyagoda area. This study based on data collected using the methods of interviews and secondary data sources to identify natural and human impacts of water stagnating, the study deployed a questionnaire survey using 60 samples in accordance with the random stratified sampling method based on their sex, ethnicity and employment. The findings of the study clearly show that people in the study area face challenges during the stagnate water. Many of the health risks associated with stagnate water in the research area. Many of the insects breeding in the stagnate water, for an example mosquitos, dragonfly and fly. As a result of this skin allergic was widespread in these areas. Improper housing is catalyst for stagnate water in the area and weak drainage system also contributed to this issue. Large section of people from this area feel that the administration was doing very little for stagnate water issue. Urban council intervention is very low and they have not enough facility to overcome this issue. Unfortunately lack of budget allocation for infrastructure facilities in Peliyagoda urban council is the main reason for the issue. Findings show that the individuals are potentially conflict between self-interest and collective interest in this research area. As a result of this they are putting self-interest ahead of the collective interest. So weak social capital among people from the research area is one of the reason that cannot be ended stagnate water issue. Improper waste removal blocked drains and clogged waterways. It was quite clear improper waste disposal also caused to water stagnate in the area. And also Poor infrastructures facilities are caused to water stagnate. It is, therefore recommended that the officials should have cut some temporary channels to drain the water. But unfortunately those officials should not implement proper plans for this issue.

Keywords: *Development, Slums, Stagnant Water, Self-Interest, Urban Council*

A STUDY ON THE FOOD SYSTEM OF PRISON INMATES IN SRI LANKA

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Abstract

Prison inmates are also human beings who have all fundamental needs. But due to the punishment, there are some restrictions of fulfilling the needs. Prisoners do not have the freedom to decide what or how much they want to eat, nor are they able to choose when they eat for the majority of their meals. This study was based on the food system of prison inmates in Sri Lanka. The study was limited to convicted male inmates in "Closed prisons", which held normally under maximum security conditions. Served foods for convicted male inmates were observed in Welikada, Bogambara and Mahara prisons. Information regarding the meal time, serving and special meal related data was collected from 15 senior jailors through in-depth interviews. Data were analysed using qualitative methodologies. Prisoners were provided a no-choice menu. Meals were prepared by prisoners under the supervision of correctional staff. Prepared food was transported in bulk via insulated trolleys to life sentenced prisoner accommodation areas and portioned under supervision. Other convicted prisoners had to come along a "dining line" (*bath põlima*) with an aluminum bucket, from the cell to the place where the food were arranged. It shall be the duty of the medical officer to keep under close observation every prisoner whose health is or is likely to be injuriously affected by any inability of failure to take food or sufficient food, and to subject every such prisoner to any medical treatment that may be necessary at the earliest possible stage after his condition is discovered. All are allowed to fulfill their rituals related to the food and same foods were deserved in different times. This study shows prisoner's food intake does not contain the neutrinos of an average person. As they do not have exercises (except half an hour walking) food intakes should be changed. Providing a black tea with the meal is, distorting the nutritional aims of the menu. It leads to anemia of the prisoners while significant energy and nutrients were being provided. Food budgets are very low, and consistently found that this is a major barrier to improving food in prisons. Delivering particular nutrients in menus with budgetary limitations, constraints more can still be done to provide variety, improve food hygiene, and prevent bullying and contamination.

Keywords: *Closed prisons, Dinning line, Food intake, Hygiene, Prison inmates*

AN ANALYSIS OF THE IMPACT OF SOUTHERN EXPRESSWAY ON RURAL COMMUNITIES: A CASE STUDY FROM WELIPITIYA DSD OF MATARA DISTRICT

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Abstract

Expressways play a significant role in the economic growth of developing countries. Realizing this importance, special focus has now being given on constructing new expressways in Sri Lanka too. But, constructions of expressways are not a simple task and these projects are often typified by risk and complexities which create a wide range of issues and problems that has to be dealt with utmost care. Thus, this study was undertaken to identify the impact of expressways constructions on community of the study area. There are some effective reasons for the selecting of this area such as number of resettled or cast off houses, land use pattern and distance of the expressway in accordance with DSD or GND. Applying the Random sampling technique, fifty five affected families which was 15% from two GN Divisions out of thirty eight GN Divisions in Welipitiya DSD were selected for the study. A questionnaire survey was employed to identify frequent impact and semi-structured interviews were conducted to collect data regarding the nature and effects of variations. Data were gathered by using primary data sources such as formal discussions, observation and also secondary data such as institutional reports. The findings of this research revealed that there are many impact of southern expressway in the study area which can be illustrated through Economic, Physical, Social, Cultural and other impact. Loss of land properties, dust, dryness, landslides, arisen and loss of occupations, infrastructure facilities, land use pattern what changed within 10 years are examples for the findings. Some people are totally agreed with this development project and others are not. Based on the findings, suitable recommendations were made. Among them, the use of forums that bring together government officials in charge of road constructions, contractors and the road users such as investors and households to iron out issues that may affect the relationships of the users and construction plans.

***Keywords**: Expressways, Impact, Development projects, Rural Community*

MARRIAGE CANNOT BE SLAVERY: AN ANALYSIS ON FORCED MARRIAGES AND GROUNDS FOR NULLITY IN SRI LANKAN CONTEXT

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Abstract

The divorce and nullity procedures in Sri Lanka are very rigid and cannot be changed easily. As a grave loophole in law there are no direct provisions for the forced marriages as well. According to our law there are only three grounds to get a divorce in the General Law and as per the Section 19 (2) of the Marriage Registration Ordinance such as malicious desertion, adultery and incurable impotence at the time of the marriage. In contrary, in England more flexible grounds for divorces can be observed as unreasonable behavior, adultery, desertion, two years separation with consent and five years separation without consent which may lead to divorce and forced marriages can involve a range of criminal offences as well. Therefore the research problem here is to determine whether the grounds for nullity of marriages, divorces in Sri Lanka are adequate and whether they provide necessary provisions covering all the aspects including the forced marriages as well. The main objective is to review the existing grounds for divorce and the nullity of Sri Lanka, locus standi of the parties and to propose the new grounds for a divorce and the nullity of a marriage along with the remedies for forced marriages. In this research, the doctrinal legal research methodology is used as this topic is based on the various legal propositions and legal principles regarding the nullity of marriage. The research is qualitative in nature where the researcher has used some conventional legal sources The researcher has used one of the unique cases in Sri Lanka, Harin Hugh Dias v. Ambagahage Tekla Fernando (DDV 00889/15) as a primary legal source which provides inferences for nullity, forced marriages and locus standi. Apart from that researcher has used a theoretical framework consisted of various jurisprudence schools such as positivism, social contract theory, American realism etc. followed by a contextual analysis. As per the research results the researcher could find that there is also another aspect which has limited the functionality of the divorces in Sri Lanka, the deep rooted ethics, culture and social morals where the aggrieved parties are discouraged to file a divorce no matter how much they are suffered from their forced marriage because of the fear to the society and due to the harm that causes to their dignity. And also more flexible grounds for marriage should be declared such as the mere mismatch of the couples and locus standi to declare the marriages null and void should be provided to the external parties other than the contracted parties to the marriage. As per the conclusion since there are no statutes or laws covering this area as per now, the act of forcing to marry must be criminalize and should be included into the Penal Code of Sri Lanka as a separate offence directly and the severe punishments too should be included. And it is high time that the attention of the relevant law making authorities turned towards this lacuna in the law.

Keywords: *Nullity, Forced Marriages, Locus Standi, Penal Code, Jurisprudence*

THE IMPACTS OF USING E-BOOKS IN SRI LANKAN HIGHER EDUCATION

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Abstract

E-books are a type of a digital resource which is popular among young adults and according to recent studies, the consummation of e-books has rapidly grown since 2006. Among many e-book consumers, the students who engage in higher studies are popular. Moreover, it is a known factor that many undergraduates using e-books for study purposes. Thus, this study investigates the impact of using e-books in Sri Lankan higher education by taking University of Kelaniya as the study base. From the entire population of university of Kelaniya, 50 students are selected from the five faculties as to contain 10 by each faculty by using convenience sampling method which comes under the category of non- probability sampling. Data was gathered from the sample by using a questionnaire which is complied with open ended and close ended questions. The data analysis answers the research question, "what are the impacts of using e-books in higher education?" demonstrating many positive impacts such as easy access, easy maintenance, portability and sustainability. Further the research study depicts the negative impacts come along with the excessive usage of e-books, such as health issues. Moreover, the research study portrays that many students face difficulties when it comes to retrieving and using e-books, by not being able to access network or electronic devices needed. Concluding, the study recommends Safety precautions to be taken while using e-books over electronic devices. (Ex: eye protectors and correct postures) and further it is recommended that, higher educational institutes should provide free access to e-books in library laboratories: so that every student can use them.

Keywords: *e-books, Electronic devices, Higher education, Universities, Young adults*

සිනමා ප්‍රචාරණය කෙරෙහි ඩිජිටල් තාක්ෂණයේ බලපෑම පිළිබඳ අධ්‍යයනයක්

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සංක්ෂිප්තය

සිනමාව කලාවක් වශයෙන් ද කර්මාන්තයක් වශයෙන් ද වර්ධිත විනෝදාස්වාද මාධ්‍යයකි. මෙය ආරම්භයේ සිට විවිධ විපර්යාස වලට ලක් වෙමින් වර්ධනය වී ඇති ආකාරය පෙනේ. සිනමාවේ ඩිජිටල්කරණය මෙහි නවතම ප්‍රවණතාවය යි. මේ ප්‍රවණතාවය සිනමාවේ සියලු පාර්ශව කෙරෙහි විවිධාකාරයෙන් බලපෑම් කර තිබෙන අයුරු දැකිය හැක. සිනමාව හා ප්‍රේක්ෂකයා යා කරනු ලබන ක්‍රියාදාමය ප්‍රචාරණය ලෙස සැලකේ. කර්මාන්තමය කලාවක් වන සිනමාවේ මූලිකම පරමාර්ථයක් වන්නේ ලාභ ඉපයීමයි. එනයින් ගත් කළ සිනමාව යනු වෙළඳ භාණ්ඩයකි. ඒ අනුව මෙම අධ්‍යයනයේ දී අවධානය යොමු වන්නේ සිනමාවේ ඩිජිටල්කරණය ප්‍රචාරණය කෙරෙහි බලපා ඇත්තේ කවරාකාරයෙන් ද යන්න අධ්‍යයනය සඳහා ය. ඩිජිටල් ප්‍රචාරණය සිනමා ප්‍රේක්ෂකයා වෙත කරන බලපෑම පිළිබඳ අධ්‍යයනය මෙම පර්යේෂණයේ අරමුණ යි. එසේම ප්‍රේක්ෂකත්වය මුල් කොට ගනිමින් සිදු කෙරෙන ක්ෂේත්‍ර අධ්‍යයනයක් මගින් ද අපේක්ෂිත බලපෑම කවරාකාරයකින් සිදු වී ඇති ද යන්න අධ්‍යයනයට බඳුන් කොට ඇත. ඒ අනුව මෙහිදී ඩිජිටල් ප්‍රචාරණයත් සමඟ සිනමා ශාලා ආශ්‍රිත නව සංස්කෘතියක් ගොඩනැගී ඇති අකාරයත් සිනමාව වටා නව ප්‍රේක්ෂකත්වයක් වර්ධනය වී ඇති ආකාරයත් මෙම අධ්‍යයනයේ දී හඳුනා ගත හැකි විය.

ප්‍රමුඛ පද: *සිනමාව, සිනමා කර්මාන්තය, ප්‍රචාරණය, ඩිජිටල්කරණය, ප්‍රේක්ෂකත්වය*

තෘතීය සමාජානුයෝජන කාරකයක් ලෙස ජනමාධ්‍ය පුද්ගල පෞරුෂය කෙරෙහි බලපෑම (රූපවාහිනී මාධ්‍ය ඇසුරින්)

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කැලණිය විශ්ව විද්‍යාලය, කැලණිය, ශ්‍රී ලංකාව
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තෘතීය සමාජානුයෝජන කාරකයක් ලෙස සලකන ජනමාධ්‍ය තුළ ප්‍රබලව පවතින ශ්‍රව්‍ය දෘශ්‍ය සම්ප්‍රේෂණය කළ හැකි මාධ්‍යයක් ලෙස රූපවාහිනිය සමාජ ජීවිතයේ සියලුම ක්ෂේත්‍රවලින් වියුක්ත කරගත නොහැකි අවිච්ඡින්න සබඳතාවයක් පවතින සන්නිවේදන මාධ්‍යයක් වේ. රූපවාහිනිය පුද්ගල පෞරුෂය සකස් වීම කෙරෙහි බලපාන්නේ ද? යන ගැටලුව කේන්ද්‍ර කර ගනිමින් සිදු කරන ලද මෙම අධ්‍යයනයෙහි උපන්‍යාසය වූයේ පුද්ගල පෞරුෂත්වය සකස්වීම කෙරෙහි රූපවාහිනිය බලපෑම් කරයි යන්නයි. රූපවාහිනිය පුද්ගල පෞරුෂත්වය සකස් වීම කෙරෙහි බලපාන්නේ කෙසේ ද? යන්න සංස්ලේෂී පර්යාලෝකයක් ආනුභවිකව මතුකර ගැනීම මෙම අධ්‍යයනයේ මුඛ්‍ය පරමාර්ථය විය. පුද්ගල ගති ලක්ෂණ සංවිධානය වීමේ දී රූපවාහිනිය බලපාන්නේ ද? පුද්ගල දැනුම සංවිධානය වීමේ දී රූපවාහිනිය බලපාන්නේ ද? පුද්ගල ආකල්ප සංවිධානය වීමේ දී රූපවාහිනිය බලපාන්නේ ද යන්න සොයා බැලීම අධ්‍යයනයෙහි සෙසු සුවිශේෂී අරමුණු විය. ලංකාවේ තෝරාගත් ප්‍රධාන නගර 05 ක් හා ඊට ආසන්න ග්‍රාමීය ප්‍රදේශ 05 ක් අධ්‍යයන ක්ෂේත්‍රය වූ අතර ස්ත්‍රී පුරුෂ බව, ග්‍රාමීය නාගරික බව සමානුපාතික වන ලෙස වයස අවුරුදු 16 ත් 25 ත් අතර තරුණ ප්‍රජාවෙන් 100 දෙනෙකු සාර්ථ නියැදි ප්‍රභේදය යටතේ තෝරා ගනු ලැබිණ. ප්‍රාථමික දත්ත හා ද්විතියික දත්ත පර්යේෂණයේදී යොදාගනු ලැබිණ. සමීක්ෂණ ක්‍රමවේදය යටතේ සිදු කරන ලද මෙම අධ්‍යයනයේදී සම්මුඛ සාකච්ඡා හා ප්‍රශ්නාවලී ප්‍රධාන ශිල්ප ක්‍රම ලෙස යොදාගනු ලැබූ අතර ඊට අතිරේකව නිරීක්ෂණය යොදගනු ලැබිණ. පර්යේෂණ අණාවරණයන්ට අනුව නිගමනය කල හැකි වූයේ පුද්ගල පෞරුෂයෙහි, පුද්ගල ගතිලක්ෂණ, දැනුම, මානසික සාධක සංවිධානය සඳහා රූපවාහිනිය බලපා ඇති බවත් පුද්ගල ආකල්ප, සමාජ සාධක, යහපත් භාවය සංවිධානය උදෙසා රූපවාහිනය සාපේක්ෂව අඩු බලපෑමක් සිදු කර ඇති බවත්ය. ප්‍රවෘත්ති හා වාර්තාමය වැඩසටහන්, දෛනික ජීවන දැනුම උදෙසා සහ මානසික සාධක උදෙසා ප්‍රතිජනනාත්මක ලෙසින් රූපවාහිනිය පෞරුෂය කෙරෙහි බලපා ඇති බවත් අධ්‍යාපන, සෞඛ්‍ය , ආගමික, දේශපාලන වැඩසටහන් ද නවීන සමාජ ආකල්ප සඳහා සහ පුද්ගලයාගේ සමාජ පදනම සකස්වීම සඳහා රූපවාහිනිය පුද්ගල පෞරුෂය කෙරෙහි නිශේධනාත්මකව බලපා ඇති බවත් නිගමනය කළ හැකි විය.

ප්‍රමුඛ පද: *ජනමාධ්‍ය, රූපවාහිනිය, සමාජානුයෝජනය, පෞරුෂය, සමාජ සාධක*

STUDY ON HISTORICAL BACKGROUND AND EVALUATION OF DEPENDENT CO-ORIGINATION IN BUDDHISM

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Abstract

This research depending on the historical point of view of Dependent Origination and how it can evaluate until present. In Hinduism etc, are mostly pointed out on regarding this matter but they were unable to clarify what is the truth of it. The supreme Buddha attained Buddha-hood and realized what it is. Dependent origination meant that everything has the cause which cause for its origin. Dependent origination is used as refining of the cause of everything in the world, in Science, Religion, and philosophy. This concept is drag for long discussion as metaphysics and invisible, inexpression. On the other hand it cause to re-originate quite number of debates among the people. In Buddhism there are exponent on regarding this concept in various aspects. It mainly, paid its heed on regarding the Suffering '*dukkha*' in there, contemporary religious and philosophical teachers were confused by lack of understanding of the cause of suffering. And they had tried to resolve that problems during long time but it would not be success. Hear my objective is to give clear understanding on Dependent Origination and its evaluation with comparatively. And i used source study to that as well as the result of this research is that can be identify real history and evaluation of it. The dependent origination was started long time ago without correct way and the Buddhism gave real meaning for it.

Keywords: *Dependent origination, pubbekatahetuwada, adiccasamuppannavada, Buddhism, Suffering*

A STUDY OF PSYCHOSOCIAL PROBLEMS ARISING FROM THE USE OF MOBILE PHONES

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Abstract

The mobile phone can define as an essential need. The reports clearly show that 4.7 billions of mobile phone users encompass the whole world. Every person has their own style to use mobile phone. The impact of mobile phone is relevant to both social and mental sections and it is based on the using pattern, individual's personality, and mentality. Deferent social, mental problems are emerging on the basis of desires and drives. Mobile phones make many changes in person's life and they make bad mental conditions. Most of the mobile phone users are young. They often tend to engage in antisocial activities over the mobile phone. According to our research young people attract to expensive mobile phones with internet facility download facilities, audio visual equipment, photos, videos and recording facilities. However the unnecessary conception of these facilities with time and money is problematic. The mobile phones should not be rejected because it gives us several advantages .We should effectively and socially adapt it. The mobile phone has be able to exert the influence over social tensions or arbitrary. However the benefits and facilities of the mobile phones are not cheap. We should try to focus on social and psychological conditions and also urging them to take and optimal and practical process.

Keywords: *Mobile phones, Use, People, Mentality, Social*

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රණසිංහ ජේ.ඒ.ඩී.එස්.යූ.

භාෂා, සංස්කෘතික අධ්‍යයන සහ ප්‍රාසංගික කලා අධ්‍යයනාංශය
ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය, ගංගොඩවිල, නුගේගොඩ, ශ්‍රී ලංකාව
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නවකතාව යනු මානව ජීවිතය විවරණය කෙරෙන ගද්‍යමය කල්පිත ආඛ්‍යානයකි. සැබෑ මිනිස් ජීවිතයෙහි යථාර්ථය ප්‍රතිනිර්මාණය කිරීම නවකතාකරුවාගේ ප්‍රමුඛතම පරමාර්ථය වේ. ඉහත කී සමාජ යථාර්ථය නිරූපණය කිරීම තම පරමාර්ථය කරගත් අග්‍රගණ්‍ය ලේඛකයකු ලෙස හින්දී නවකතා ක්ෂේත්‍රයෙහි අගරජුන් ලෙස සැලකෙන ප්‍රේම්චන්ද් (1880-1936) හැඳින්වීම නිවැරදිය. ප්‍රේම්චන්ද් සිය සානුකම්පිත දෘෂ්ටිය යොමු කළ දුගී දුප්පත් ගොවි කම්කරු හා හීන කුල ජනතාව වැනි සමාජයෙහි පීඩිත ජන කොට්ඨාස අතර පීඩිත භාරතීය කාන්තාවට හිමිවූයේ සුවිශේෂිත ස්ථානයකි. ඔහුගේ සම්පූර්ණ නවකතාවලිය-වර්දාන්, ප්‍රතිග්‍යා, සේවාසදන්, ප්‍රේමාශ්‍රම්, නිර්මලා, කර්මභූමි, රංග්භූමි, ගබන්, කායාකල්ප් හා ගෝදාන් අධ්‍යයනය කිරීමේදී ගම්‍ය වන්නේ ඔහු විසින් නිරතුරුවම උත්තර භාරතීය පීඩිත කාන්තාව හා බැඳි කතා පුවත් හා ස්ත්‍රී ගැටලු නිරූපණය කර ඇති බවය. ප්‍රේම්චන්ද්ගේ නවකතාවලින් බොහෝ ලෙස මෙලෙස පීඩනයට පත් කාන්තාව නිරූපණය වීම මෙම පර්යේෂණ ක්ෂේත්‍රයෙහි ගැටලුව වන අතර මෙහි මූලික අරමුණ වන්නේ ඊට මුල් වූ හේතු කාරණා අනාවරණය කිරීමය. ඒ සඳහා ප්‍රාථමික ද්විතියික මූලාශ්‍ර භාවිතයට ගැනිණි. ඔහුගේ කෘති, ජීවිතය, යුග පසුබිම, අතීතයේ සිට කාන්තාවට හිමිව තිබූ ස්ථානය සම්බන්ධව ලියැවී ඇති පොත්පත්, ලිපි-සඟරා ආදිය ද්විතියික මූලාශ්‍රය ලෙස භාවිත කෙරිණි. ප්‍රාථමික දත්ත ඒකරාශීකරණයේදී වෛදික ග්‍රන්ථාවලිය, මනුස්මෘතිය වැනි ස්මෘති ග්‍රන්ථයන් අධ්‍යයනය සහ ඉන්දියානු විද්වතුන් සමඟ සම්මුඛ සාකච්ඡා පවත්වන ලදී. ප්‍රේම්චන්ද්ගේ උපත සිදුවන්නේ ග්‍රාමීය දුගී දුප්පත් පීඩිත පන්තියෙහිය. එබැවින් ඔහු සිය ජීවිතයේදී ආර්ථික, සාමාජික හා ධාර්මික වශයෙන් කාන්තාව පීඩා විඳි ආකාරය සැබැවින් අත් දුටුවේය. එනිසාම ඔහු විධවා විවාහ තහනම බණ්ඩනය කරමින් බාල වැන්දඹුවක හා විවාහ වූයේය. එමෙන්ම ඔහු පෙර සිට පැවත ආ බ්‍රාහ්මණ නීති රීති දැඩි ලෙස හෙළා දුටුවේය. ඔහු සාහිත්‍යකරණයට එළැඹුණු යුග වකවානුව වූයේද ගාන්ධි, නේහ්රු වැනි ජනනායකයින් බාල-වයෝවෘද්ධ විවාහ, වැන්දඹු විවාහ තහනම, දැවැදි-වේශ්‍යා ගැටලුව සහ ස්ත්‍රියට අධ්‍යාපනය ලැබීමේ තහනම ආදි කාන්තා ගැටලුවලට එරෙහිව අරගල කළ සමය විය. එමෙන්ම ඔහු වැඩි ප්‍රියතාවයකින් ඇසුරු කළේ දුක්ඛිත කාන්තාවගේ වේදනාව ප්‍රතිනිර්මාණය කළ ශරත්චන්ද්‍ර, රවීන්ද්‍රනාථ ටැගෝර්, මැක්සිම් ගෝර්කි, රතන්නාථ සර්ශාර්, මිර්සා හාදි රුස්වා වැනි ලේඛකයින්ගේ කෘතීන්ය. මෙම අධ්‍යයනයේදී විශේෂයෙන්ම පැහැදිලි වූයේ ප්‍රේම්චන්ද්ගෙන් පීඩිත භාරතීය කාන්තාව ප්‍රතීයමාන වීමට ඔහුගේ ජීවිතය, යුග පසුබිම, බ්‍රාහ්මහ නීති රීති හා ඔහු ඇසුරු කළ අනෙකුත් නවකතාකරුවන්ගේ කෘතීන්හී ආභාසය ඔහුහට මූලිකව බලපා ඇති බවය.

ප්‍රමුඛ පද: *ප්‍රේම්චන්ද්, හින්දී, නවකතාව, උත්තර භාරතීය, පීඩිත කාන්තාව*

A COMPREHENSIVE ANALYSIS OF STRESS MANAGEMENT AMONG IT EMPLOYEES (ABC Company)

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Abstract

Stress is always closely related to everyone's life and will stay here anytime, anywhere. However, stress is not always bad. Some stresses motivated and they stimulate us to achieve targets. Stress is a fact of every human life and mostly experienced by the employees in the field of "Information Technology" (IT), and it has become a major issue of concern to the above organization. The individuals working in the IT field face more stress due to various reasons. Major reasons for stress are: too many demands at one time, deadline pressures, uncertainty etc. At workplace IT employees face a huge amount of work and a pressing deadline. Stress can also cause ill-health; hence relaxation is a valuable method in stress management. Typical stress management programs are relaxation technique, exercises, entertainment program, time management and therapy.

The researchers analyze current stress management methods among IT employees at ABC Company. Introduce a new method of art therapy to employees. Researchers measure IT employees stress is higher or not afterwards find the most pertaining factor affecting to employees stress. To prove the research problem use two hypothesis, Stress is higher and Management methods are inadequate. Two variables also use for test the hypothesis and known as workload and ergonomics. It based on 50 employees according to organization hierarchy. The data will be gathered through a structured questionnaire analyzed by descriptive statistics. This research paper, understands the research gap in stress management methods and IT employees. Based on the results, IT employees stress is higher and Sixty six percent (66%) respond that workload is the main reason for stress. The company already use methods are: a person there for get advice (a mentor) and other entrainment programs but these are not enough to minimize the IT employees' stress. Therefore, the management of IT organization needs to measure the negative impact of stress on employees and relieve stress through new stress management methods.

Keywords: *IT employees, stress, stress management, workload, ergonomics*

TECHNICAL SESSIONS
ON
MANAGEMENT, COMMERCE & INDUSTRY DEVELOPMENT

STATISTICAL ANALYSIS ON CONCUMER'S SHOPPING BEHAVIOUR TOWARDS INTERIOR ENVIRONMENT: THE CASE OF MULTI BRAND APPAREL RETAIL STORE IN COLOMBO

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Abstract

There are plenty of multi - brand retail apparel stores in Sri Lanka. They struggle to achieve competitive advantage by various means. Additional to price and quality, they also concern about the store environment in order to clutch consumers' attraction. It is a way of nonverbal communication between consumers and retailer. This study explores how combinations of specific store environment settings influence consumers' perception and examine the extent to which consumers are stimuli such for environment cues. Famous multi – brand apparel retail store in Colombo was selected to gather data. Base on the purpose of the study purposive random sampling method was employed and structured questionnaire was used to obtain 300 of sample. The population of study refers to customers of different socioeconomic classes. Factor analysis was used to analyze the collected data in order to underline the latent factors. According to the results 4 latent factors were identified which affect consumers' perception: human variable, general interior variables, store layout, amenity and multiplicity, trendy. The results confirmed that the customers observe the interior environment of the store which influence their attitude and make them feel happy. Furthermore, the merchandising could often bring unique and convenient sensitivity to the customers. Results implied that factors such as design factors and social factors are ultimately influenced to customer perception and promote the customers' purchase intention. Since, store stimulus latent factors effect on customer perception the retailers must design different kinds strategic designs after identifying consumer insights. However, this study underline store stimulus latent factors which effect on customer perception among customers of varied socioeconomic classes who visit the multi brand apparel retail store in Colombo. Future studies should magnify and validate the cultural impact on the store interior environmental cues and merchandise cues as well as customers' perceived quality using more heterogeneous consumer samples.

Keywords: *factor analysis, interior environmental cues, merchandise, multi-brand, retail apparel store*

TYPES OF INVESTMENT AND CONDITIONAL ACCOUNTING CONSERVATISM IN SRI LANKA

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Abstract

The purpose of this study is to investigate the effect of types of investment on conditional accounting conservatism in Sri Lanka. Accounting data were obtained from all public listed companies other than financial companies in Sri Lanka for 2006 through 2015. The panel generalized method of moments (GMM) method was used. In this study, the relationship between types of investment and conditional accounting conservatism in Sri Lanka is examined by using the model developed by Basu (1997) and modified by Ball and Shivakumar (2005) and Hämäläinen and Martikainen (2015). The results indicate that there is a more demand for high conservative financial statements to attract foreign portfolio investment than to attract foreign direct investment in Sri Lanka. In domestic investment, as predictive variable is not statistically significant, one can argue that there is no relationship between domestic investment and conditional accounting conservatism in Sri Lanka. This study has two implications. First is theory implication; this study shows new evidence to Sri Lankan literature on showing a more demand for high conservative financial statements to attract foreign portfolio investment than foreign direct investment. Second is policy implication; the result of this study will be useful to policy makers and authoritative accounting bodies in Sri Lanka because the study demonstrates that highly conservative financial reporting is needed to attract foreign direct investment and foreign portfolio investment. Therefore, policy makers could motivate to provide high conservative financial statements and ultimately it can be useful to attract more foreign investments to Sri Lankan economy.

Keywords: *Accounting quality, foreign investment, emerging economies, conservatism, South Asia*

THE FACTORS AFFECTING TO BUILD TEAM WORK: EVIDENCE FROM TRAVELLING FIRM IN SRI LANKA

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Abstract

Teamwork in organizational settings is an important aspect of creating a well-functioning engine to accomplish tasks and projects. A team often has a team leader that directs all members to the company's expectations. Without having successful teams organization achievements are not a reality. Therefore the study analyses the factors affecting on the team work at "XYZ Company".

The main objectives of the study are to identify the factors affecting to team work. Since there are many factors effects on team work researcher selected four factors in order to find out the relationship between these factors. Those 4 factors are such as communication, cohesiveness, supervisor relationship and stress management. The literature review has been used to identify when selecting these factors and through a preliminary investigation of the XYZ Company. The mix methodology has been used for the purpose of this study. Sample size is 50 executives which are taken from the overall population of the company as well as researcher used the simple random sampling method in order to take the sample from whole population of the organization. A semi structured questionnaire was designed and used to collect data from the employees. This study is used the correlation and coefficient analysis as well as multiple regression analysis in order to analyze the data. Based on the results recommendations were given by the researcher. Stress management is the major factor which was influenced on team work and the recommendations were given based on the findings of this research.

Keywords: *Team work, communication, stress management, cohesiveness, supervisor relationship*

FORECASTING DOMESTIC GUEST NIGHTS IN HILL COUNTRY OF SRI LANKA

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Abstract

The increasing of domestic traveling shows significant improvements. The Hill Country becomes one of the highest occupied regions by the domestic tourist in Sri Lanka. Domestic travelers may travel to Hill Country not only the leisure; there could be many more purposes. The study was focused on forecasting occupancy guest nights of domestic tourist in Hill Country. Monthly data of domestic guest nights for the period of January 2008 to December 2016 were obtained from annual reports of 2008 -2016 published by Sri Lanka Tourism Development Authority (SLTDA). The Seasonal Autoregressive Integrated Moving Average (SARIMA) models were tested for forecasting. The Anderson–Darling test, Auto-Correlation Function (ACF) and Ljung-Box Q (LBQ)-test were used to test the validation criterion and fit the model. Forecasting ability of the models was assessed by relative and absolute measurements of errors. The results of the study revealed that ARIMA $(1,0,0)(0,1,1)_6$ model satisfied all validation criterion. The measurements of errors are very low in validation and verification. The results of the study concluded that the ARIMA $(1,0,0)(0,1,1)_6$ model is suitable for forecasting occupancy guest nights. Therefore, future night occupancy can be forecasted by past night occupancy, past errors and seasonal components. The results can be used for strategy development to maximize the benefits of the tourism industry in Hill Country. New product development and increasing the volume of products can be decided by forecasting occupancy guest nights. The results will be useful for financial managers to estimate cash/ credit flow, multiple expenses that will be generated in different departments such as food and beverages, laundry, transport, and rooms. High occupancy increase higher volume of garbage. Therefore, authorities should plan for efficient and effective solid management practices. In addition, they have to work out safety, security and traffic control measures during high occupancy period to protect tourist from various forms of threats and minimize the traffic congestions. The data series of this study shows a wave-like pattern. Therefore, it is recommended to test the Sama Circular Model (SCM), in order to see whether the forecasting ability improves.

Keywords: *Occupancy guest nights, Residuals, SARIMA*

STOCK MARKET REACTION TO IMPAIRMENT ANNOUNCEMENT OF LISTED MANUFACTURING COMPANIES IN SRI LANKA

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Abstract

This study investigates the market efficiency and market reaction to announcement of impairment loss write down in Colombo Stock Exchange (CSE) from 2008 to 2014. Sixty-two events of twenty listed manufacturing companies in CSEs' have identified in this research. The existent study used the standard event study approach to find the results. The operational hypotheses were formulated and results discovered that 55% of Average Abnormal Return (AAR) are positive and 45% of AARs are negative on the occasion day "0" (event day). The results revealed negative AARs of -0.37% and negative significant impact on Share Price (SP) (t= -1.6682) at 10% level which were incurred on the impairment loss announcement date. This results show that impairment loss write down events indicate significant negative information to the CSE. End of the window period abnormal returns have gained by market as positive return of Cumulative Average Abnormal Return (CAAR) of 9.15% during the window period of 61days. It reveals that CSE has not supported to the semi strong form market efficiency, which has run on publicly available information on CSE. Study focused that the CSE was not semi strong efficient market. The outcome of the research will help identify the market efficiency of CSE and do the necessary action by the Sri Lankan government and CSE to protect the investors and support economic growth of the country.

Keywords*: Colombo Stock Exchange (CSE), Impairment of non-current assets, Impairment Loss, Semi strong form market and Share Prices*

ANALYSIS OF JOB SATISFACTION OF NON-COMMISSIONED OFFICERS: A CASE STUDY OF SRI LANKA MILITARY ACADEMY

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Abstract

Job satisfaction plays a significiant role to maintain and retain an effective employee. Satisfied employees are committed towards their work which lead to improve their performance. The success of an organisation depends on the performance of the employees. Military service is one of the most stressful jobs which needs to perform duty at any time and at any risk situation based on the demand. Consequently, retaining productive officers in long term is one of the main challenges faced by many military organisations. Premature retirement among Non - Commissioned Officers (NCOs) in Sri Lankan Army (SLA) is high, although SLA invests huge money for recruitment, induction, training, career development, maintenance and retention of those officers and that effect to the operational effectiveness in the field. The purpose of the study is to investigate the factors which affect job satisfaction and to measure the level of job satisfaction among the NCOs in Sri Lanka Military Academy (SLMA). 320 Non - Commissioned Officers were selected as sample of the study. Questionnaires were distributed in Sinhala language among the selected participants as a primary data collection of the study. A multiple linear regression analysis was carried out to analyse the collected data. The findings of the study reveal that pay, benefits, relationship with supervisor, communication are significant, where p values are less than 0.05. Further, respondents were dissatisfied on pay and relationship with supervisors. Management should give more attention on the factors such as pay, benefits, relationship with supervisor, over workload, work pressure and operating procedures in order to increase job satisfaction level of NCOs which lead to reduce turnover and absenteeism.

Keywords: *Job satisfaction, Military personnel, Non - Commissioned Officers (NCOs) and Premature retirement*

PERSONAL FACTORS AFFECTING CAREER ADVANCEMENT OF WOMEN IN LOCAL BANKS IN COLOMBO DISTRICT

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Abstract

The objective of this study is to examine the impact of personal factors on middle level women career advancement in local banks in Colombo District, which refers, and it is a way of capturing things that one needs to do in order to grow in a current role or a new one. The data were selected from the total sample of 24 Commercial Banks and out of these total banks 12 local Commercial Banks were selected randomly and those are Peoples' bank, Bank of Ceylon, Commercial bank, Development Finance Corporation of Ceylon Vardhana Bank, National Development Bank, Nations Trust Bank, Pan Asia Bank, and Union Bank, Hatton National Bank, Sampath Bank, Seylan Bank, and Amana Bank. Merely this study has been completed by issuing the structured questionnaire to 120 Middle level women which derived from proportional random sampling. Because of the nature of the ordered variable, ordered probit model is more applicable and hence this model was applied in analysing the data. This study carried out different econometrics techniques such as reliability test, descriptive statistics, chi-square test, ordered probit model, and marginal effects were used to analyse the data. To identify the impact of the above independent variable such as personal factor, on the career focused ordered probit model was selected. Results of the chi - square test shows that out of demographic and job characteristics only age of the middle level women workers have statistically significance association with the levels of career focused in the banking sector and based on the ordered probit revealed that personal factors significantly affect for the middle level women career advancement in state banks only. Similarly, results of the marginal effects summarized in terms of probability personal factors, have more chance to support middle level women workers who are working in state banks. Finally, the overall findings of this study will help to banking sector and women who are working in state and private banks to enhance the women career and become highest position in above banks in Sri Lanka.

Keywords: *Women's career advancement, Personal factors, Career focus, Banking Industry, Local Banks*

IMPACT OF INFORMATION TECHNOLOGY ON CONSUMER BUYING BEHAVIOUR; A CASE STUDY ON "KAPRUKA.COM"

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Abstract

The main objective of conducting this research is to analyse the impact of information technology on the consumer buying behaviour. In addition, this helps in answering the research questions such as; what is known as consumer buying behaviour?, how does information technology influence the decision to buying a product?, what are the factors that influence the buying behaviour of customers that purchase using the internet?, what role does demographics play in buying behaviours?, how does the internet help in understanding consumer buying behaviour?. Subsequently, by means of the conceptual framework the independent (Social network awareness, price, information search, consumer trust and online shopping experience) and the dependent variable (Consumer buying behaviour) were identified. The author has used 125 questionnaires that has been distributed in the western province to obtain the quantitative data needed to conduct the research. Furthermore, snowballing technique under the non-probability sampling was used. This research conducted to carrying out to the leading online service provider "Kapruka.com" and in terms of qualitative research, the author conducted interviews on 3 consumers. Furthermore, the author has used the IBM Statistical Package for Social Science (SPSS). Using the SPSS Software an analysis of the sample profile, validity, reliability analysis using Cronbach alpha, test for normality, linearity, correlation and regression were developed. Moreover, the Cronbach's alpha test resulted in a value of 0.903 and as a reliability analysis conducted for the 125 respondents. Consequently, the correlation values between the independent and dependent variables were analysed resulting in 0.622 for social network awareness, 0.611 for price, 0.476 for information search, 0.611 for consumer trust, 0.518 for online shopping experience. Therefore, all the hypothesis has been analysed and has been accepted.

Keywords: *Information Technology, Consumer buying behaviour, Kapruka.com, Independent variable, dependent variable*

A STUDY OF TRANSFORMATIONAL LEADERSHIP AND JOB SATISFACTION AMONG TEACHERS IN PRIVATE TERTIARY EDUCATION INSTITUITIONS IN SRI LANKA

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Abstract

This research empirically examined the association between transformational leadership style and job satisfaction of teachers in private tertiary education institutions in Sri Lanka. Motivation for the research originates from having a lack of research for understanding the employee outcomes in tertiary education as a result of adopting transformational leadership strategies. To facilitate this purpose, the study was fundamentally focused on identifying the relationship between transformational leadership style and job satisfaction of lecturers in private tertiary education institutions in Sri Lanka. Job satisfaction plays a critical role driving an organization towards its success. Job satisfaction can be linked with factors such as accomplishment, appreciation, development, responsibilities, personal relationships, procedures, remuneration, safety, management, and the ability of the superior. Further, studies suggest that there is a direct relationship between employee performance, self-esteem, and job satisfaction with transformational leadership. The goal of this research is establishing a relationship between the transformational leadership style, and job satisfaction by means of a positivistic approach using Pearson correlation analysis. Multifactor Leadership Questionnaire (MLQ) is employed to assess the independent variables of the transformational leadership style while Minnesota Satisfaction Questionnaire (MSQ) was used to measure the job satisfaction of the academics. For this research, a total of 80 responses were selected after 215 emails were circulated among academics, and the questionnaire responses were filtered based on the percentage of completion. The research concludes that there is a moderately high positive relationship between charisma, individualized consideration and intellectual stimulation with transformational leadership. Based on the study several recommendations such as providing workshops, creating a friendly work environment, and encouraging teachers to contribute on decision making are outlined to develop transformational leadership skills among the department heads in tertiary educational institutions to enhance job satisfaction.

Keywords: *leadership, transformational, charisma, job satisfaction, individualized consideration*

MANAGING THYSELF TO BE A PRODUCTIVE MANAGER: INSIGHTS FROM BHAGAVAD GITA

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Abstract

Bhagavad Gita; the divine song of the God, is not only a spiritual text, but also a guide book to develop productive managers and people at work in the modern dynamic environment. To develop a productive manager one should manage thyself first, which is considered the foundation stone of any people management practice. The current study attempts to review and report the insights manifested among the teachings of God Krishna, in Bhagavad Gita, to be applied in managing thyself to be a productive manager. A narrative literature review of Bhagavad Gita, and key articles on this theme known to the authors was conducted. It is found in Bhagavad Gita that, managing thyself starts from mental peace and internal consistency. For that, one should free from the feelings of greed, envy, egotism, suspicion and anguish. Moreover, the ability to create and follow a realistic vision for the life, and perceive the holistic view of the things better manage thyself with the proper understanding of the causes and consequences of the practices in management ultimately.

Keywords: *Bhagavad Gita, Managing Thyself, Manager, Management*

IMPACT OF COMPLIANCE WITH PRINCIPLES ON BOARD OF DIRECTORS AND CORPORATE PERFORMANCE: EMPIRICAL EVIDENCE FROM SRI LANKAN LISTED COMPANIES

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Abstract

Board of directors in corporate governance connotes the ability of a firm to constrain and direct corporate power so that it efficiently creates economic value and equitably distributes economic wealth. Accordingly, this study examines the relationship between the level of compliance with the principles pertaining to board of directors and corporate performance of listed firms in Sri Lanka using secondary data related to 133 listed companies for the period 2009 and 2016. A Board Governance Index (*BGI*) that captures the overall monitoring capacity of the board was constructed based on key board principles that were derived from different corporate governance codes. Using a quantitative approach, this study employs correlation analysis and a panel regression model to examine the relationship between the Board Governance Index (*BGI*) and corporate performance (i.e., captured using Return on Assets, Return on Equity, and Tobin's Q). The correlation and panel regression results (after controlling for fixed effects) suggest that *BGI* is positively associated with firm financial performance (i.e., with Return on Assets and Return on Equity), which is also consistent with prior studies and provides empirical support for the agency perspective. This paper provides new evidence on this dimension pertaining to the Sri Lankan context, and is expected to have significant policy implications.

Keywords: *Agency Perspective, Board of Directors, Corporate Governance*

THE IMPACT OF WOMEN ENTREPRENEURSHIP DEVELOPMENT: A CASE STUDY OF VIDATHA PROGRAMME, SRI LANKA

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Abstract

Every aspect of the world is changing rapidly; political and economic transformations seem to arise every nock and corner in the world. Countries tend to demand their economies; dictatorships convert into democracy while creating new institutions and agencies. Due to the changes in economic pathways for women, those who intend to start and operate their own businesses. When women gradually start their own businesses with a view to contribute a large portion in national economy, the unique skills of women entrepreneurs are yet to recognize. In this context, this research examined women's entrepreneurial characteristics in Sri Lanka mainly based on the environmental factors. The case study focused the VIDATHA program which initiated by the Ministry of Science, Technology and Research in mid-2000. This study aimed to investigate the effect of environmental factors on women entrepreneurial characteristics in Western Province, Sri Lanka. A regression model was developed to identify the relationship between entrepreneurial traits and environmental factors in terms of Women Entrepreneurship Development. The questionnaire was use to collect the primary data. A survey carried out among women entrepreneurs in VIDATHA program, Ministry of Science Technology and Research in 2015. The result of this analytical study indicated that there are similarities and differences in experiences of women entrepreneurs in Sri Lanka and women entrepreneurs were able to run their businesses and reached successes, despite the work-family conflicts. The outcome of the women's engagement in business proved that the support for service of the companies and competitiveness are significantly correlated with the environmental factor which main source for availability of funding for development of women entrepreneurship. The factors influence women to be at risks of businesses could easily be improved through the activities of business support services, followed by independence, self-confidence and internal locus of control. The business support service is the main factor influenced the development of female entrepreneurship. Competitiveness and government policies were given a negative impact on developments of women entrepreneurship.

Keywords: *Women Entrepreneurs, Entrepreneurial Traits, Environmental Factors, Women's Entrepreneurial Characteristics, VIDATHA Project*

ANALYSIS OF KNOWLEDGE SHARING BARRIERS IN SRI LANKAN SOFTWARE COMPANIES

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Abstract

Knowledge sharing is a cornerstone for software companies as they are knowledge intensive organizations and expertized knowledge generates key to success of these companies. This study is a survey-based empirical investigation which conducted to identify current status and the existing knowledge sharing barriers in software companies in the context of Sri Lanka. In order to provide a more comprehensive and complete description to the related study, quantitative research method is used to conduct the survey with staff of the development teams in selected software companies. The Theory of Planned Behavior is applied as the basis of this study in order to create the relationship between knowledge sharing behavior, intention and attitude for knowledge sharing. Questionnaire was designed considering individual, organizational and technical factors based on previous literature covering dependent variable; attitude for knowledge sharing; and independent variables; motivation and willingness, trust, time, power relationships, expected reciprocity, communication skills, organizational culture and structure, leadership, reward systems, and technology. Five-point Likert-type scale was used as the scaling method in order to scale responses which provided by the respondents. Structural equation modelling is used to analyze data, in order to assess both measurement model and structural model. According to findings, hypothesized associations with motivation and willingness, time, power relationships, expected reciprocity, communication skills, organizational culture and structure, and leadership were identified to have a significant impact on knowledge sharing attitude while, trust, reward systems, and technology depict no significant relationship. Findings further emphasize lack of time, improper organizational structures, power relationship and language as the main barriers in software companies. Based on the result, this study proposes a model representing barriers that affect knowledge sharing attitude in software companies in the context of Sri Lanka.

Keywords: *Knowledge sharing attitude, Quantitative research method, Software Company, Structural equation modelling, Theory of Planned Behavior*

INNOVATIVE BEHAVIOR OF EMPLOYEES IN SRI LANKAN SOFTWARE COMPANIES

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Abstract

Along with the advancement of the technology, software companies have to face a huge competition in the global and local market. To face this competition innovations can be used as a strategic weapon. As employees are the main driving forces of innovation, their behavior can be a crucial factor in boosting innovation. Innovative behavior is referred as the introduction and application of new ideas, products, processes, and procedures to a person's work role or an organization. This behavior directly affects innovation performance of an organization. The main aim of this study is to investigate the effect of the factors that affect employee innovative behavior in Sri Lankan software companies using a quantitative methodology. Apart from that this study provides a conclusive summary of the current status of the innovative behavior of employees. Factors that have been proved by previously done research were used. So nine factors were considered to cover a broad area of innovative behavior. A model was constructed while considering the above factors to get a clear idea about the study. Findings of the study emphasizes that both individual and organizational factors affect innovative behavior. Results have proven that psychological capital, organizational support, rewards, resource availability, leadership and social capital have a significant impact on employee innovative behavior while organizational structure, organizational commitment and work characteristics haven't any impact. Proposed model was reconstructed according to the results and areas that should be improved were identified.

Keywords: *Innovation, Innovation performance, Quantitative methodology, Individual factors, Organizational factors*

THE IMPACT OF SOCIAL MEDIA MARKETING ON CONSUMER BUYING BEHAVIOR; A CASE STUDY ON "THE BODY SHOP"

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Abstract

The main objective of conducting this research is to analyse the impact of social media marketing on consumer buying behaviour. Also, the research helps in answering the research questions which are; "How many different forms of social media marketing are there?", "How does different forms of social media marketing affect consumer buying behaviour?", "Why do people get influenced by social media marketing?" and "How often do people buy from social media sites and how does social media sites improve consumers' confidence on online purchases?". With the help of the conceptual framework that had been constructed, the author identified the dependent variable (Consumer buying behaviour) and the independent variables (subjective norms, Impulsivity, purchase intention, internet exposure, experience as online shopper). Furthermore, the author has distributed hundred and seventy-nine questionnaires and carried out three interviews in the western province reference to a large cosmetics company called "The Body Shop" to obtain the quantitative and qualitative data needed to conduct the research. The author has also used the IBM Statistical Package for Social Science (SPSS) to get an analysis of the sample profile, validity, reliability analysis using Cronbach alpha, test for normality, linearity, correlation and regression. The Cronbach's Alpha value was identified to be 0.896 according to the statistics that was obtained to analyse the reliability of the research. Subsequently, the correlation values of the dependent variable and independent variables resulted in 0.655 for subjective norms, 0.506 for impulsivity, 0.698 for purchase intention, 0.611 for internet exposure and 0.517 for experience as online shopper. In addition, the hypothesis has also been analysed which showed that all the hypothesis has been accepted.

Keywords: *Social media marketing, Consumer buying behaviour, dependent variable, independent variable, The Body Shop*

TECHNICAL SESSIONS
ON
NATURAL & LIFE SCIENCES

NPC3 AND *NPC4* OF PHOSPHATIDYLCHOLINE-HYDROLYZING PHOSPHOLIPASE C GENE FAMILY OF *ARABIDOPSIS* EXHIBIT HIGH DEGREE OF EXPRESSION SIMILARITIES DURING DEVELOPMENT AND IN RESPONSE TO AUXIN

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Abstract

Phosphatidylcholine specific phospholipase C (PC-PLC) catalyzes the hydrolysis of the most abundant membrane phospholipid phosphatidylcholine. Based on amino acid sequence similarity to bacterial PC-PLC, six putative *PC-PLC* genes (*NPC1* to *NPC6*) were identified in the *Arabidopsis* genome. Experimental evidence on the presence, regulation and functions of the plant *PC-PLC* is limited. The objective of the study was to investigate transcription regulation of the gene family especially of *NPC3* and *NPC4* during plant growth and development and in response to various environmental stimuli to elucidate the potential functions of the genes. Expression of *NPC3* and *NPC4* genes was investigated by semi-quantitative RT-PCR and by producing promoter:*GUS* fusion plants. RT-PCR analysis revealed that *NPC3* and *NPC4* were expressed in roots, stems, leaves, flowers and siliques while enhanced levels of expression was detected in roots. Promoter:*GUS* fusion plants of *NPC3* (PNPC3) and *NPC4* (PNPC4) exhibited high degree of expression similarity across the entire developmental cycle. Constitutive expression of PNPC3 and PNPC4 was observed in the meristematic regions of the primary and lateral root tips. Over the development, *GUS* activity was observed in the cotyledons, rosette and cauline leaves, in the pollen sac tissues and in developing seeds. RT-PCR analysis showed an auxin-mediated increase in *NPC3* and *NPC4* transcription levels relative to the control seedlings. Auxin-mediated expression in PNPC3 and PNPC4 was dramatic in the entire root system and shoots. RT-PCR and organ specific expression pattern of PNPC3 and PNPC4 and strong auxin-mediated *GUS* expression resembling *DR5:GUS* expression pattern suggest possible participation of the *NPC3* and *NPC4* in auxin related functions during growth and development.

Keywords: *Arabidopsis, auxin, plant development, phosphatidylcholine specific phospholipase C, gene regulation*

EFFECT OF AIR PRESSURE IN DEVELOPING POROUS-CRUMB STRUCTURE OF DOUGH DURING FERMENTATION AND GELATINIZATION

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Abstract

Quality parameters of leavened baked products are related to crumb's mechanical and sensorial properties which can be strongly affected by the micro structural features of the crumb. Development of porous-crumb structure is mainly depends on dough ingredients and processing conditions. Objective of this study was to evaluate the porous-crumb structure of wheat based crumb samples developed under slightly high air pressure conditions during dough fermentation and gelatinization. Two batches of crumb samples were prepared by pressurizing one dough sample in a fermentation chamber and the other was keeping at the normal ambient conditions during fermentation and gelatinization. Mechanical properties (Volume, Specific volume, Moisture content, Hardness) and cellular structure of developed crumb structures were analyzed. Results reviled that the pressurized sample had a significantly higher hardness, specific volume and lower product volume ($P \leq 0.05$) compared to the unpressurized sample. However, according to image analysis, pressurized sample had an improved crumb cellular structure with more fine, stable and uniform crumb cells with a significantly higher ($P \leq 0.05$) cell density. And also pressurized sample had significantly lower porosity along with a significantly lower average cell area ($P \leq 0.05$). Hence, the application of slightly high air pressure during fermentation and gelatinization can have a significant effect on porous-crumb structure development of leavened food products.

Keywords: *Porous-crumb structure, Pressure, Fermentation, Mechanical properties, Cellular structure*

In vitro PRO-INFLAMMATORY ENZYME INHIBITORY ACTIVITIES OF *Artocarpus heterophyllus*

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Abstract

Pro-inflammatory enzymes including arachidonate 5-lipoxygenase (A5-LOX), xanthine oxidase (XO) and hyaluronidase (HYL) produce inflammatory mediators and free radicals, which can provoke several inflammatory diseases including bronchial asthma, allergic rhinitis, cardiovascular diseases, rheumatoid arthritis and cancer.The inhibitors of these enzymes have therefore gained a high therapeutic potential in the treatment of inflammatory mediated diseases. Medicinal plants still remain as potent sources of new enzyme inhibitors. *Artocarpus heterophyllus* (Moracea) has been used in traditional folk medicine against many diseases including inflammation and malarial fever. Hence the present study was aimed to evaluate A5-LOX, XO and HYL inhibitory activities of ethanol extract of *A. heterophyllus* barks and leaves. Ethanol extracts of air-dried powdered bark, leaves and fruits of *A. heterophyllus* were evaluated for A5-LOX, XO and HYL inhibitory activities following standard protocols. Ethanol extract of *A. heterophyllus* bark showed good A5-LOX inhibitory activity with IC_{50} value of 97.15±6.17µg/mL with compare to leaf extract (118.19±1.66 µg/mL). However the activity was less than the positive control baicalein (IC_{50} 1.76 ± 0.15 µg/mL). *Artocarpus heterophyllus* bark (11.38±0.96%) and leaves extracts (6.80±0.81%) exhibited low XO inhibitory activity 500 µg/mL compared to the positive control allopurinol (99.87±1.44% at 500 µg/mL). Bark extracts exhibited good HYL inhibitory activity having 52.68% inhibition at 500 µg/mL compared to tanic acid (90.25% at 500 µg/mL). Thus the present study provides impetus to search for novel anti-inflammatory compounds from *A. heterophyllus* which deserves further investigations and supports the traditional claims of *A. heterophyllus*.

Keywords: *Arachidonate 5-lipoxygenase, Xanthine oxidase, hyaluronidase, anti-inflammatory, Artocarpus heterophyllus*

PROXIMATE ANALYSIS AND PHYSICAL CHARACTERISTICS OF A NOVEL VEGETARIAN RICE BASED CEREAL PRODUCT FROM KALU HEENATI AND POKKALI RICE VARIETIES

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Abstract

Sri Lankan traditional rice varieties (STRV) grown under organic farming are becoming popular due to their high nutritional and medicinal values compared to that of improved rice varieties. This study was conducted to develop novel, ready – to – eat, fully vegetarian, rice based cereal bars (RCB) from traditional rice varieties**,** Kalu heenati (KH) and Pokkali (PK) as the main ingredients, followed by proximate analysis and determination of physical measurements. Also, *Neolitsea cassia* (L.) Kosterm gel was used as a novel vegetarian egg replacer. The study reveals that RCB are rich in crude protein content **(**4.7 ± 0.1%**),** crude fiber content (1.8 ± 0.1%) and ash content **(**1.8 ± 0.1%) compared to that of cereal bars manufactured using wheat flour. (WF (control)) Also, the traditional cereal bars showed low moisture content **(**5.3 ± 0.1%) and low fat content **(**1.2 ± 0.1%**),** and are suitable for daily consumption. Additionally, RBC aids to maintain the recommended daily intake of iron (3.1 ± 0.2 mg/100 g), potassium (121.7 ± 0.2 mg/100 g), sodium (536.7± 0.2 mg/100 g), magnesium (38.2 ± 0.1 mg/100 g), calcium (18.4 ± 0.3 mg/100 g), zinc (0.7 ± 0.1 mg/100 g) and manganese (0.5 ± 0.3 mg/100 g). Furthermore, the consumption of RCB will not cause any toxic effects due to heavy metals, Pb, As, Cd, Hg and Cu. Moreover, a significant difference from WF was observed for KH and PK from physical measurements analysed using a texture analyzer. RBC show high hardness (3761 ± 64 g), low adhesiveness, (7.18 ± 0.41 mJ), low gumminess (279.5 ± 6.5 g), low chewiness (10.79 ± 0.54 mJ) and low cohesiveness (0.05 ± 0.02).

Keywords: *Kalu Heenati, Pokkali, Rice based cereal bars, Sri Lanka, Traditional rice varieties*

COMPARISON OF FERMENTATIVE PROPERTIES IN RAW AND BOILED LEGUMES AFTER *In vitro* DIGESTION

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Abstract

Legumes are commonly consumed all over the world due its healthy nutritional profile and beneficial health properties.Legumes are identified as potential prebiotics that stimulate the growth of certain gastrointestinal microbes such as *Bifidobacteria* and *Lactobacilli*, which leads to the formation of (Short chain fatty acids) SCFAs. Processing and digestion are found to alter many functional properties of food. The main objective of this study is to find the fermentative properties of both raw and boiled legumes before and after the *in vitro* digestion.The raw and boiled Mung,Waruni,Dhawala ,Chickpea and Horse gram were subjected to *in vitro* digestion using swine gastric juice and intestinal juice. The digested and undigested legume samples were fermented using swine ceacal microbes. Growth of *Bifidobacterium, Lactobacillus* and Coliform were analyzed as average log CFU/ml value and recorded .Short chain fatty acid production was quantitatively analyzed as mmol/L using Gas Chromatography. Both data were recorded and analyzed using three factor factorial model. According to the results it shows that the method of processing and digestion has different impacts on the microbial growth and butyric acid concentration. Among the five tested legumes chickpea was shown to enhance the growth of *Bifidobacterium (>1.24× 10^8*CFU/ml), *Lactobacillus (2.4× 10^8*CFU/ml), and reduce the growth of Coliform (9.8 × 16^8CFU/ml). In addition there was an inverse correlation between the *in vitro* digestion and growth of microbes. However it was found that boiling and digestion have increased the butyric acid concentration in four fermented legumes except horse gram. The highest butyric acid concentration was found in boiled Mung and Dawala after *in vitro* digestion and fermentation (3533.86 mmol/L, 3855.12 mmol/L). Hence, the study reveals that method of processing and simulated digestion modulates the fermentative properties of above five selected legumes.

Keywords: *Legumes, In vitro Digestion, Fermentation, Gastrointestinal Microbes, Butyric acid*

SOLVENT-FREE MICROWAVE EXTRACTION OF ESSENTIAL OIL FROM LEAVES OF *Ocimum tenuiflorum*

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Abstract

Ocimum tenuiflorum (synonym *O. sanctum*) belongs to Lamiaceae family and known as "Maduruthala" in Sinhala. Solvent Free Microwave Extraction (SFME) is a modern technique to extract essential oils from aromatic and medicinal plants using microwaves. The aim of this study was to extract the essential oil from leaves of *O. tenuiflorum* using SFME technique to characterize the *O. tenuiflorum* oil using Gas Chromatography (GC) and Gas Chromatography-Mass Spectrometry (GC-MS) and to compare the oils obtained from SFME and hydro distillation (HD) techniques. The fresh leaves of *O. tenuiflorum* were subjected to SFME (Microwave power: 700 W for 5 min. and 500 W for 55 min.) and HD to extract the essential oil. The essential oils were analyzed using GC and GC-MS. The extraction time for SFME was found to be less (1.0 h) in comparison to that of HD method (5.0 h) to obtain comparable yield of oil from both methods (SFME: 0.35% and HD: 0.45%). The GC-MS analysis enabled the identification of 49 compounds from essential oil of leaves of *O. tenuiflorum* extracted using both techniques. GC-MS profile indicated 15 major compounds including 01 monoterpene (β-Ocimene), 13 sesquiterpenes (β-Selinene, α-Guaiene, δ-Cadinene, Eudesm-7(11)-en-4-ol, α-Copaene, (-)-β-Bourbonene, β-Cubebene, β-Elemene, Caryophyllene, Humulene, Germacrene D, Hedycaryol, 8-Isopropenyl-1,5-dimethyl-cyclodeca-1,5-diene) and 01 phenylpropanoid (Eugenol) in the essential oil of leaves of *O. tenuiflorum*. Eugenol, the predominant compound was detected higher in the oil obtained from SFME (47.30 ± 0.39%) over that of, HD (44.76 ± 0.14%). The percentage of monoterpenes was found to be lower than that of sesquiterpenes of the essential oils extracted from both methods. This is the first study of extraction of essential oil from leaves of the Sri Lankan variety of *O. tenuiflorum* using SFME and identifying the volatile compounds by GC-MS. The results indicate that SFME is an efficient method for extraction of essential oils over HD in terms of yield, extraction time and eugenol content.

Keywords: *Ocimum tenuiflorum, Essential oil, Hydro-distillation, Solvent free microwave extraction, Gas-chromatography*

BIO-FUNCTIONAL CHARACTERIZATION OF SOME PROBIOTIC LACTIC ACID BACTERIA ISOLATED FROM FERMENTED FLOUR OF SELECTED FINGER MILLET VARIETIES GROWN IN SRI LANKA

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Abstract

Due to proven health benefits, food containing probiotic lactic acid bacteria (LAB) have gained high market revenue and expected to reach 64.02 billion USD by 2022. Majority of probiotic food are of dairy origin, considering several health risks associated with consumption of dairy based probiotic foods, i.e intolerance to milk sugar lactose, allergy to milk proteins, high fat and cholesterol content in the milk have led scientists to pursuit alternative substrates to produce non-dairy probiotic food. Finger millet (*Elucine coracana*) is abundant, low-cost, highly nutritive ingredient; rich in prebiotics is an ideal substrate for non-dairy probiotic food. This study aims to evaluate the *in vitro* bio-functional characteristics of probiotic LAB previously isolated from fermented flour of selected finger millet varieties, *ravi*, *raavana* and *oshadha* grown in Sri Lanka. Selected LAB was investigated for their anti-bacterial activity against both drug sensitive and multi drug resistant human pathogens using agar well diffusion method. The intracellular cell free extract (ICCE) of LAB was evaluated for anti cancer activity using MTT assay in colon carcinoma cell lines. The LAB ICCE was investigated for their anti-oxidant potential by DPPH free radical scavenging activity. Further their ability to assimilate water soluble cholesterol was evaluated. Five isolates including two isolates, *Lactobacillus plantarum* MF405176.1 and *Lactobacillus fermentum* MF033346.1 isolated from *ravi*, two isolates, *Lactococcus lactis* MF480428.1 and *Enterococcus faecium* MF480431.1 isolated from *raavana* and *Pediococcus acidilactici* MF480434.1 isolated from *oshadha* varieties respectively, exhibited *in vitro* bactericidal activity against both drug sensitive and multi drug resistant pathogens. *P. acidilactici* demonstrated the lowest IC_{50} values against cell lines. Significant differences ($P < 0.05$) in DPPH free radical scavenging activity was observed in the ICCE of LAB isolates at 500 μg/ml concentration. Isolate *L. lactis* exhibited the highest DPPH free radical scavenging activity of 54.33 ± 0.88%. None of the LAB isolates could assimilate > 10% cholesterol *in vitro.*

Keywords: *Bio-functional characteristics, Finger millet flour, Lactic Acid Bacteria, Probiotics*

In vitro ANTIOXIDANT ACTIVITIES OF DIETARY SUPPLEMENT CONTAINING *Curcuma longa* AND *Piper nigrum*

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Abstract

Reactive oxygen species (ROS) and free transition metal ions cause oxidative damage to important bio-molecules resulting various diseases including cancer, neurological diseases, metabolic syndrome and accelerate aging. Medicinal plant extracts are rich in antioxidants that can protect human body from oxidative damage by scavenging ROS. *Curcuma longa* and *Piper nigrum* are well known medicinal plants used in various medicinal preparations in Ayurveda and traditional systems of medicine to improve complexion and digestion, reduce obesity, cholesterol and blood glucose levels, treat of hypertension, and as immunity and memory boosters . The objective of this study is to evaluate the anti-oxidant properties of dietary supplement containing rhizomes of *C. longa* and fruit of *P. nigrum*. Powder of dietary supplement prepared with *C. longa* and *P. nigrum* was extracted with ethanol following a cold extraction protocol. Ethanol extract was evaluated *in vitro* antioxidant activities by DPPH (1, 1-diphenyl-2-picrylhydrazyl) free radical scavenging, Oxygen Radical Absorbance Capacity (ORAC) assays, and for Total Phenolic Content (TPC), Total Flavonoid content (TFC) following standard protocols. Ethanolic extract of dietary supplement containing mixture of *C. longa* and *P. nigrum* exhibited high DPPH free radical scavenging activity having IC_{50} value of 37.98 ± 1.13 µg/mL, but less than the positive control trolox (5.29±0.09 µg/mL). Extract showed an ORAC value of 164.94 ± 1.80 mg TE/g extract, which was less than the green tea extract (1662.21±0.02 mg TE/g extract). Furthermore extract showed moderate TPC (92.40 ± 1.80 mg GAE/g) and low TFC (3.73 ± 0.12 mg QE/g extract). The present study confirms the dietary supplement contains phenolic antioxidants that may have good therapeutic potential.

Keywords: *Curcuma longa, Piper nigrum, antioxidant, dietary supplement*

EFFECT OF SELECTED PLANT GROWTH REGULATORS ON *In vitro* SHOOT MULTIPLICATION OF LOCAL HYBRID PAPAYA (*Carica papaya* L.) VARIETY 'HORANA PAPAYA HYBRID 01'

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Abstract

Papaya (*Carica papaya* L.) is a renowned tropical fruit crop with high nutritional and medicinal value. Conventional seed propagation causes variability in papaya due to inherent heterozygosity and dioecious nature. Thus, imported hybrid (F1) seeds which offer heterosis, higher yield and many other favorable agronomic traits are preferred. However, maintaining pure parental inbred lines for hybrid seed production involves time, space and labor. Nevertheless, F1 traits are unstable beyond first generation. Thus, micropropagation is a promising alternative to get true-to type plants from F1 seedlings of papaya. Horana Papaya Hybrid 01 is the first local papaya hybrid developed in Sri Lanka. The present study evaluates the effect of 6-Benzylaminopurine (BAP) and 1-Naphthalene Acetic Acid (NAA) on *in vitro* multiplication of its shoot tip explants. Lateral and apical shoots excised from six week old greenhouse raised seedlings were surface sterilized with 20% Sodium Hypochlorite (Clorox®) for 20 min and established in twelve treatments of Murashige and Scoog (MS) basal medium carrying different concentrations of BAP (0.0,0.5,1.0,1.5 mgL^{-1}) in combination with NAA (0.0,0.1,0.5 mgL^{-1}). The number of shoots produced per explant, presence/absence of calli and the nature of shoots produced were monitored over a 60 day incubation period while transferring into fresh media on fourth and seventh week respectively. The ANOVA results indicated that BAP has a significant effect ($p<0.05$) on shoot multiplication. However, interactions between BAP and NAA were not significant. Among the tested twelve treatments, 1.0 mgL^{-1} BAP was the best treatment for direct organogenesis. Mean number of shoots per explant was low when used NAA only. *In vitro* rooting occurred in the treatment supplemented with 0.1 mgL^{-1}NAA. The medium supplemented with BAP and NAA at a concentration of 0.5 mgL^{-1} each, gave rise to the greatest callusing frequency. Higher BAP levels (1.0 and 1.5 mgL^{-1}) along with 0.5 mgL^{-1} NAA gave bushy, compact shoot clusters that require an elongation phase. Findings of the present study can be incorporated to develop a suitable *in vitro* micropropagation protocol that would facilitate commercial propagation of this papaya variety.

Keywords: *Micropropagation, Horana Papaya Hybrid 01, BAP, NAA, Direct organogenesis*

In vitro ANTIMICROBIAL EFFICACY OF FIVE *Centella asiatica* (L.) MORPHOTYPES IN SRI LANKA

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Abstract

Centella asiatica (L.) is a herb with pharmacological activities that are associated with the secondary metabolites like triterpenes; asiaticoside, madecassoside, asiatic acid and madecassic acid. It also possesses antimicrobial activity due to presence of tannins, flavonoids, saponins and essential oils. Although Antimicrobial potential of *C. asiatica* is well known the antimicrobial activity of different varieties of the species is not documented. Therefore, three morphotypes (G3, G8, G12) identified in Sri Lanka and two previously unreported morphotypes (designated as G13 and G14) grown under homogeneous conditions were evaluated for their antimicrobial efficacy by Kirby Bauer method. Sequential extracts of Hexane (HE) and Methanol (ME) of shoots were evaluated against eight selected human pathogens; four bacteria and four *Candida* spp. There was no observable variation of antimicrobial activity of HE extracts among the detected morphotypes. ME fraction of G8 inhibited the growth of both Gram positive (*Staphylococcus aureus,* ATCC25923), *Bacillus cereus,* ATCC11778) and Gram-negative (*Escherichia coli,* ATCC25922) bacteria while that of the rest inhibited only the growth of Gram positive bacteria tested. Additionally, the ME fraction of G8 also showed a significantly higher ($p<0.05$) anti-microbial activity against a selected pathogen, *S. aureus;* compared to that of other morphotypes as assessed by the diameter of zone of inhibition (1.4833 ± 0.0753 cm). According to CLSI (Clinical and Laboratory Standard Institute) interpretive standards *S. aureus* displayed a moderate susceptibility to crude ME of G8 compared to positive control; chloramphenicol. Extractable yield of ME of G8, however was lower compared to that of several other morphotypes. The contrasting and consistent variation in the antimicrobial efficacy of ME of G8 could probably due to the differences in metabolites composition, thus identified as a superior morphotype in this regard.

Keywords: *antimicrobial activity, C. asiatica, extractable yield, morphotypes, Kirby Bauer test*

DETERMINATION OF MULTIPLE ANTIBIOTIC RESISTANCE (MAR) AND MAR INDEX IN BACTERIA ISOLATED FROM AQUACULTURE FARMS

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Abstract

Concurrent resistance to antibiotics of different structural classes has arisen in a multitude of bacterial species and cause complicating the therapeutic management for both human and animal. The objectives of the study were isolation and characterization of antibiotic resistance bacteria from Nile Thialapia (*O. niloticus*) and determined MAR index of isolated resistance bacteria against Tetracycline (TET), Amphicillin (AMP), Amoxicillin (AMX), Sulfamethaxasol (SMX), Erythromycin (ERM), Cloxacillin (CLOX), Azythromycin (AZY) and Ciprofloxacin (CIP). In the present study 165 antibiotic resistant bacteria were isolated from intestines and gills in nile thilapia. Antibiotic-resistant bacteria were identified to genus level using 16s rRNA sequencing and the Minimum Inhibition Concentration (MIC) was determined using agar dilution method. Multiple Antibiotic Resistance (MAR) was determined using 96 well plate method in order to calculate the MARindex. Overall, the bacterial isolates showed the highest resistance against TET (44%), AMX (21%), AMP (17%), SUF (9%) and ERM (9%). However, resistance against AMX, AMP, SUF, TET and ERM were higher (9% -44%) compared with the other tested antibiotics; CIP, CLOX and AZY (1%-2%). Most frequently recorded intestinal bacteria genus was *Bacillus* (40%) followed by *Enterobacter* (23%), *Lactobacillus*. (12), *E.coli* (10%), *Streptococcus* (8%), *Vibrio* (6%) and *Klebsiella* (1%) respectively. Among the isolated bacteria from gills *Aeromonas* sp. (30%), *E. coli* (20%), *Streptococcus* sp. (18%), *Pasteurella* sp. (10%), *Streptococcu*s sp. (9%), *Lactobacillus* sp. (6%) and *Moraxella* sp. (3%), were detected in high frequency. More than 50% of the total resistant isolates showed their MIC more than 420 ppm for each tested antibiotics except CIP (2%), CLOX (8%) and AZY (6%). In the present study, MAR index ranged was calculated from 0.11 to 0.58 for the isolated bacteria species. The results of the present study suggests that nile thilapia (*O. niloticus*) might play a role as a reservoir of antibiotic resistant bacteria and that creating a health risk for the fish consumers.

Keywords: *Nile Thilapia (O. niloticus), Antibiotics resistance, Minimum Inhibition Concentration (MIC), Multiple Antibiotic Resistance (MAR)*

CYANOBACTERIAL CYANOTOXINS AND WATER QUALITY IN WELL WATER AT CKDU ENDEMIC GIRANDURUKOTTE AND DEHIATHTHAKANDIYA, SRI LANKA

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Abstract

Global occurrences of cyanobacterial blooms in aquatic systems have increased over recent decades due to anthropogenic eutrophication. Many of the blooms are highly toxic, presenting a serious hazard to human and animal health. The most commonly occurring toxins are the hepatotoxins (Microcystin-LR (MC-LR) and Cylindrospermopsin (CYN)) which are produced by many species of cyanobacteria. Recent studies have revealed the contamination of drinking dug wells by toxin producing cyanobacteria in the North Central, Uva and Eastern provinces. The increasing occurrence of toxigenic cyanobacterial densities, along with the increasing cases of CKDu, with no associated risk factor, therefore there is a need to investigate any correlation between cyanotoxins in CKDu prevalence areas. The present study records the presence of MC-LR and CYN producing cyanobacteria and cyanotoxins with reference to some important water quality parameters of well water in Girandurukotte and Dehiaththakandiya. The study was carried out for both dry and wet seasons. Water samples were collected from 32 ground water wells within the area. Water temperature, pH, conductivity, Dissolved Oxygen (DO) were measured at the site itself using standard methods. $N\text{-}NO_3^-$, $N\text{-}NO_2^-$, $N\text{-}NH_3$, Total Phosphorous and Total Hardness were measured by standard spectrophotometric and titrimetric methods. Water samples were subjected to quantify CYN and MC-LR using ELISA detection kits (minimum detection limit 0.1 ppb). Identification and enumeration of cyanobacteria were carried out under the light microscope (×400). Water temperature of the wells varied between 26.7 to 29.5℃ during dry season and from 25.6 to 29.2℃ during wet season. The pH values of water fluctuated from 6.08 to 7.89 during dry season and from 5.37 to 7.69 during wet season. DO ranged from 2.05 to 7.21 mg/l in both season. EC (90.7 – 596 μS/cm and 87.6 – 478 μS/cm), total hardness (28 to 142 mg/l and 37 – 98 mg/l) were within the range of drinking water standards in both seasons. The $N\text{-}NO_3^-$, $N\text{-}NO_2^-$, $N\text{-}NH_3$ and total phosphorous were recorded less than 0.01 mg/L in both seasons. All the tested general water quality parameters were within the SLSI standard given for drinking water. *Cylindrospermopsis* sp. was the dominant cyanobacteria during both seasons in all tested ground water wells. Mean cell densities of *Microcystis* sp. during dry (23 ± 0.03 cellmL^{-1} - 57 ± 0.09 cellmL^{-1}) and wet (16 ± 0.09 cellmL^{-1} - 80 ± 1.73 cellmL^{-1}) seasons. However, MC-LR was not detected. Mean cell densities of *Cylindrospermopsis* sp. during dry and wet season were 67 ± 0.04 cellmL^{-1} - 998 ± 1.29 cellmL^{-1} and 72 ± 0.19 cellmL^{-1} – 678 ± 1.78 cellmL^{-1} respectively, where as the mean concentrations of CYN during dry and wet season was ranged between 0.3 ± 0.01 µgl^{-1} – 3.6 ± 0.08 µgl^{-1} and 0.67 ± 0.04 µgl^{-1} – 2.99 ± 0.06 µgl^{-1}. The CYN concentration in five sampling sites in well water in Dehiaththakandiya and three sampling sites in well water in Girandurukotte were exceeded WHO maximum permissible level (2 µgl^{-1}). Interestingly, relationship was found between CYN detected wells and CKDu patients who consume water from the wells ($0.05 > p$). Thus, the results of the present study showed a relationship between cyanobacteria, cyanotoxins and CKDu records in the study area. Accordingly, further comprehensive research studies are being carried out to confirm the relationship between CYN and CKDu in Sri Lanka.

Keywords: *Microcystin –LR (MC-LR), Cylindrospermopsin (CYN), Cylindrospermopsis sp., Microcystis sp., Chronic Kidney Disease (CKD)*

CONTAMINATION STATUS OF GEOSMIN AND 2- MIB IN DRINKING WATER SOURCES IN NORTH CENTRAL AND EASTERN PROVINCES IN SRI LANKA IN DRY SEASON

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Abstract

Geosmin (*trans*-1, 10-dimethyl-*trans*-9-decalol) and 2- MIB (2- Methyl isoborneol) are key compounds, which are known to cause off flavors in water. Despite no recorded health hazards, water consumers reject the drinking water contaminated with geosmin and 2- MIB due to their unpleasant earthy and musty taste and odour. The aim of the present study was to quantify geosmin and 2- MIB contamination in some selected drinking water sources in North Central (Pollonnaruwa) and Eastern provinces (Ampara, Batticaloe and Trincomalee) in Sri Lanka. Sampling was carried out in dry season during September and October 2017. Triplicate water samples were collected from each location and solid-phase micro extraction (SPME) was employed to extract geosmin and 2- MIB. Quantification was done by using Gas Chromatography–Mass Spectrometry (GC-MS). In addition, some taste and odour producing cyanobacteria and algae were identified and enumerated in the same water bodies. The results showed that the level of geosmin in water bodies was ranging from 7.8 to 34.6 ng/L whereas level of 2- MIB was ranging from 7.6 to 96.3 ng/L. Among the selected water bodies; the highest level of geosmin was recorded in Sagama tank (34.6 ng/L) while the lowest was detected in Parakrama Samudraya reservoir (7.8 ng/L). Kawdulla wewa recorded the highest 2- MIB level (96.3 ng/L) and Minneriya wewa recorded the lowest (7.6 ng/L) 2- MIB levels. Different concentrations of geosmin and 2- MIB were recorded in Jayanthi wewa (20 ng/L geosmin, 73.8 ng/L 2- MIB), Sagama tank (34.6 ng/L geosmin, 2- MIB not detected) and Kondawatuwana tank (12.4 ng/L geosmin, 14 ng/L 2- MIB) respectively. Unnichchi tank recorded 8.3 ng/L geosmin and 2- MIB was not detected at the sampling time. In Kantale tank 80.5 ng/L 2- MIB was recorded where geosmin was not detected during the sampling time. Furthermore different concentrations of geosmin and 2- MIB were recorded in Parakrama Samudraya (7.8 ng/L geosmin, 10.5 ng/L 2- MIB), Kawdulla wewa (geosmin not detected, 96.3 ng/L 2- MIB) and Minneriya wewa (23.6 ng/L geosmin, 7.6 ng/L 2- MIB) respectively. Odour and taste forming cyanobacteria and other algae were recorded as *Oscillatoria* sp., *Anabaena* sp., *Cylindrospermopsis* sp., *Microcystis* sp., *Scenedesmus* sp. and *Melosira* sp. According to Water Research Foundation, a range of 5 to 10 ng/L is considered to be the general public's odour threshold concentration (OTC) of geosmin and 2- MIB in room temperature. The results of the present study showed that 75% of the sampling locations covering 4 districts (Pollonnaruwa district, Ampara district, Batticcaloe district and Trincomalee district) exceeded the threshold level for both geosmin and 2- MIB. Therefore, the current findings highlight the importance of removing geosmin and 2- MIB from drinking water to maintain the desirable taste and odour for consumption.

Keywords: *Geosmin, 2- MIB, off flavors in water, cyanobacteria, algae*

ASSESSMENT OF AMPHIBIAN POLYMORPHISM WITHIN THE HORTON PLAINS NATIONAL PARK

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Abstract

Amphibian body coloration and pigment patterns play a vital role in their survival in the environment. Anuran polymorphism were studied in and around the three lentic water bodies of the Horton Plains National Park (HPNP) from January 2017 to November 2017 on three consecutive days per month. A total number of 511 amphibians, belonging to 3 families and 7 species were recorded during the study. All polymorphic amphibians examined during the study were categorized under either color polymorphism or pattern polymorphism. Pattern polymorphism consisted of body shape variations or presence or absence of the dorsal spots or stripes. Color polymorphism were recorded only in *Taruga eques* and in this species six dorsal colors were recorded within the HPNP. The most prevalent dorsal coloration of *Taruga eques* was Greenish (93.08%). Percentages of Purple colored (0.58%) and Cream colored (0.29%) *Taruga eques* were very low. Yellow, Dark brown and Dark orange dorsal colorations accounted for 02.01%, 02.31% and 01.73% respectively. Five different pattern polymorphism were recorded in *Taruga eques.* Distinct hour glass pattern was the highest prevalent pattern polymorphism of *Taruga eques* species (77.52%). Moreover this includes, Aberrant hour glass pattern (09.80%), Without hour glass pattern / the absence of the hour glass pattern (10.95%), Yellow line encircled hour glass pattern (01.73%) and Dorsal spots (02.59%).Three different dorsal patterns were recorded in *Fejervarya greenii*. The highest frequency of pattern polymorphism in *Fejervarya greenii* was Distinct vertebral line (82.23%). However, Deformed vertebral line and Without vertebral line pattern polymorphism in *Fejervarya greenii* were 13.33% and 04.44% respectively. The present study indicated that endemic *Taruga eques* possess diverse color and pattern polymorphism as other tree frogs in the world. Most of the recorded polymorphism in the present study were not previously recorded in *Taruga eques* and *Fejervarya greenii*. Presence of dorsal pigment patterns may be a selective advantage for amphibians, specifically for tree frogs and may disrupt the expression of bright dorsal coloration for visually oriented predators. However, further field studies are warranted to understand the selective advantages of polymorphism in amphibians.

Keywords: *Polymorphism, Taruga eques, Fejervarya greenii, Horton Plains National Park*

NEST MICROCLIMATE CONDITIONS OF TROPICAL MONTANE CAVITY NESTING FLYCATCHER *Eumyias sordidus* DURING INCUBATION AT HORTON PLAINS CLOUD FORESTS

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Abstract

Cavities have long been known to provide energetic benefits to birds. Studies of microclimate in natural cavity nests of secondary-cavity-nesting birds are lacking, therefore, microclimate conditions during the incubation period of endemic Dusky-blue flycatcher (*Eumyias sordidus*) were investigated in the Cloud forest habitats between 2100m-2300m elevation range during the breeding seasons from June 2015 to May 2018 in Horton Plains National Park, Sri Lanka. When an active nest locates with eggs, each nest was visited within four-day intervals till the hatching. Initial weights of the eggs were measured using Pesola digital pocket scale. Surface temperatures of eggs were measured using EXTECH Infrared thermometer initially after incubation adults left the nest. Microclimate conditions in the nest cavity and the surrounding environment was measured using Krestral weather tracker. Total of 32 active nests were located in the tree holes. Micro climatic characteristics such as internal tree hole temperature, $22.45^{o}C \pm 2.94^{0}C$ (Mean ± Standard Deviation) was significantly different from the ambient temperature, $16.34^{o}C \pm 3.07^{0}C$ (M ± SD) (One way ANOVA, p=0.01). Relative humidity in the nest cavity , 75.83%±12.93% (M ± SD) did not significantly different from the ambient relative humidity 79.94%±13.57%(M ± SD) (One way ANOVA, p=0.152), But Relative humidity was comparatively low in the nest cavities compare to the surrounding environment (different was 4.11% ± 3.02% (M ± SD)). Clutch size of the *E. sordidus* was 1.92 ± 0.28 (M ± SD)(1-3eggs), Egg weight was 2.93g±0.08g (M ± SD) and Water vapor flux resulted in an average egg-weight loss of 0.023g ± 0.007g(M ± SD) each day, culminating in a 0.32g±0.12g(M ± SD) reduction(10.81%) over the entire 14 days incubation period. The mean egg temperature under the parental incubation ($34.89^{o}C \pm 2.16^{0}C$ (M ± SD) is significantly different from that of the absence of parental incubation ($18.17^{o}C \pm 2.54^{0}C$ (M ± SD))(One way ANOVA, $p<0.01$). During the study, 92.16 % nests (n=31) were successful. About 7.84% nests (n=1) were unsuccessful due to predator attack. Present study revealed that available nesting habitats are more important for the secondary-cavity-nesting species like *E. sordidus* for fulfill their breeding requirements. Therefore Conservation of breeding habitats is recommended to protect this species.

Keywords: *Tropical Montane, Cavity-nesting birds, incubation, Nest microclimate, conservation*

INTERACTIONS OF SRI LANKA YELLOW-EARED BULBUL (*Pycnonotus penicillatus*) IN THE MIXED-SPECIES FEEDING FLOCKS AT TROPICAL MONTANE CLOUD FORESTS OF HORTON PLAINS

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Abstract

Interactions of Sri Lanka Yellow-eared Bulbul (*Pycnonotus penicillatus*) in the Mixed-Species Feeding Flocks (MSFF) at Horton Plains National Park (HPNP) was studied from September 2015 to May 2018. *P. penicillatus* is an endemic threatened bird, assessed under IUCN global conservation status of Near Threatened (NT) and the national conservation status of Vulnerable (VU) categories. The objective of this study was to fulfil the research gaps about the interactions of *P. penicillatus* in MSFF. When a flock was encountered composition of the MSFF was studied. Vertical and horizontal distribution of each species within the MSFF was recorded. Feeding sites and feeding methods were observed. Roles of the species were classified according to their occurrence. Flocking frequency, flocking propensity, crossing score, correlation of occurrence of species, cluster analysis, Cole's coefficient of association and niche breadth of *P.penicillatus* was appraised. *P. penicillatus* was participated in 84.52 %(n=213) of the MSFFs. Twenty bird species and two mammal species were associated with *P. penicillatus*. Flock propensity was 64 % and they were a core species in the MSFFs. There were 4.42± 2.17 individuals participated per MSFF. Vertical distribution of *P.penicillatus* was 5.60± 1.13m and horizontal distance between individuals was 12m. There was a positive correlation between number of species in the MSFF and total number of individuals (Spearman rho = 0.691, P-Value < 0.05). Furthermore, there was a positive correlation between number of species in the MSFF and number of individuals of *P. penicillatus* (Spearman rho = 0.215, P-Value < 0.05). Moreover, there was a positive correlation between total number of individuals and number of individuals of *P. penicillatus* (Spearman rho = 0.461, P-Value < 0.05). They highly utilized the canopy layer of the forest (45%) and the niche breath of the foraging height was 0.739. Twigs and small branches were their main foraging substrate (42%) and niche breath of foraging substrate was 0.701. Gleaning was their major foraging method (86%) and niche breath of foraging method was 0.377. They usually crossed in the middle position of the MSFFs. There were ten species with significant associations with *P. penicillatus* in the MSFFs. The dendrogram has confirmed that the Great Tit (*Parus cinereus*), Dark-fronted Babbler (*Rhopocichla atriceps*) and Pale-billed Flowerpecker (*Dicaeum erythrorhynchos*) are the close associates with *P. penicillatus*. Conclusively, the present study affirmed the *P. penicillatus* is a core species with enormous interactions in the MSFFs. Hence habitat protection is the major enforcement to warrant the protection of *P. penicillatus* for the future. To achieve that, the remnants of Tropical Montane Cloud Forests need to be protected. Therefore, this research will guide the management approaches to keep mixed-forest zones as forest belts in the surrounding forest plantations to make passages to move between feeding habitats. Moreover, this will encourage to practice mixed tree plantations techniques to authenticate habitat protection of MSFFs correspondingly.

Keywords: *Sri Lanka Yellow-eared Bulbul (Pycnonotus penicillatus), Mixed-Species Feeding Flocks, Horton Plains, Endemic Birds, Tropical Montane Cloud Forests*

A COMPARATIVE STUDY ON *In vitro* ANTIMICROBIAL POTENTIAL OF DIFFERENT PARTS OF THE MEDICINAL PLANT, *WATTAKAKA VOLUBILIS* (L.F.) STAPF

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Abstract

The medicinal plant *Wattakaka volubilis* has been used as a folk medicine for the treatment of fissures in the feet and rheumatic pain. The traditional medicinal practitioners have been prepared ointments by using various parts of the plant to treat wounds, tinea pedis, scabies and plantar psoriasis. The current study was designed to compare the anti-bacterial potential of different parts of the plant against *Escherichia coli* (ATCC 25922) and *Staphylococcus aureus* (ATCC 25923). The dried plant materials were extracted in distilled water and absolute methanol by cold maceration. Agar well diffusion method and the macro-broth dilution assay were performed to determine the antibacterial potential of each extract. Gentamycin was used as the positive control, while the respective solvent used as the negative control. The zone of inhibition of each extract was compared with positive and negative controls. The minimum inhibitory concentration (MIC) was used to confirm the results obtained by agar diffusion method. Among the various parts of the plant, the highest zone of inhibition was shown by methanolic flower extract. Comparatively, flower extracts exerted a higher inhibition against *S. aureus* than *E. coli*, while all the other test extracts showed a higher inhibition against *E. coli* than *S. aureus*. The MIC against *S. aureus* for methanolic flower extract was 125 mg/ml, while the value against *E. coli* was 250 mg/ml. The aqueous flower extract showed 125 mg/ml value against *S. aureus* and 500 mg/ml against *E. coli*. The observed MIC value against *S. aureus* for all the other test extracts was higher than the value against *E. coli*. The results of the current study suggest further studies on the flower extract may lead to discovery of novel anti-bacterial agents active against more virulent pathogenic strains of *S. aureus.*

Keywords: *antibacterial potential, Wattakaka volubilis, folk medicine, agar well diffusion*

POPULATION DENSITY ASSESSMENT OF THREE THREATENED AGAMID SPECIES IN HORTON PLAINS NATIONAL PARK, SRI LANKA

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Abstract

Horton Plains National Park (HPNP) is home to three endemic and threatened agamid species in Sri Lanka; *Ceratophora stoddartii, Cophotis ceylanica and Calotes nigrilabris*. This study was carried out from January 2016 to November 2017 in selected months to estimate the population densities of these 3 lizard species within HPNP. The area of the park was divided into 1 km^2 plots (using a grid in Arc GIS 10.4) and line transect surveys were carried out following the "Distance" method to obtain population counts. A total of 27 plots were marked within the park area and 24 plots were surveyed. In each sampling plot, three line transects were marked and traversed to identify and count the lizards on either side of the line. The perpendicular distance to each lizard sighted was recorded. A total of 144 transects were surveyed in two different time periods of each year (Dry months - 56.8 mm mean rainfall - ; January, February, March and Wet months – 125.9 mm mean rainfall; September, October, November). The program "Distance 7.1" was used to calculate the densities of the three lizard species. The highest population density was recorded for *C. stoddartii* in the wet months of 2016 and 2017 (32.91 ind/ha, n=77; 26.70 ind/ha, n=66). However, *C. stoddartii* density was relatively lower in the dry months of both years (2016: 19.79 ind/ha, n=58; 2017: 17.18 ind/ha, n=55). The lowest population density was recorded for *C. nigrilabris* in the wet months of 2017 (7.80 ind/ha, n=38) which was drastically lower than the densities in rest of the sampling periods. The population density of *C. ceylanica* did not show much fluctuations throughout all four sampling periods (lowest: 9.71 ind/ha, n=26; highest: 11.20 ind/ha, n=25). However, the density of *C. ceylanica* was relatively low when compared with other two species. These results indicate that more conservation focus is required to protect these threatened agamid species with low population densities.

Keywords: *Threatened lizards, Population density, Cloud Forests, Conservation*

ISOLATION OF EFFECTIVE BACTERIA FROM KARADIYANA DUMPING LEACHATE FOR BIOLOGICAL TREATMENT TO MINIMIZE ENVIRONMENTAL EFFECTS

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Abstract

Landfilling of municipal waste is still a very important issue of the waste management system in Sri Lanka and the rest of the world. The generation of contaminated leachate remains an inevitable consequence of the existing waste disposal practice and the future landfills. The leachates are a mixture of high concentration of organic and inorganic contaminants and currently biodegradability of leachate can be taken as a very first step of an environmental risk assessment. The present study was to analyze water quality in leachate by means of physico-chemical parameters (BOD, COD, DO, pH, Temperature, Salinity, Conductivity, Nitrate-N, Orthophosphate, TDS) and isolation of bacteria for reduction of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) using standard methods. In the study period mean temperature (28.33 ^{o}C-32.50 ^{o}C), pH (7.08-8.01), salinity (7.92-9.70), conductivity (11 854.67 µS/cm- 12 034.67 µS/cm), N-nitrate (0.81 mg/l -1.58 mg/l), Ortho phosphate (3.02 mg/l -9.11 mg/l), TDS (5245.16-10 627.50), DO (0.14 mg/l -0.67 mg/l), BOD (147 mg/l -166.4 mg/l) and COD (1630 mg/l -5800 mg/l) variation were recorded. Morphologically 10 different bacteria were isolated from the leachate samples and effectiveness of the bacteria in BOD and COD reduction were studied under different environmental conditions. Initial BOD and COD values in leachate samples were varied between 147.82 -166.40 mg/l and 1630.00 -5800.00 mg/l respectively. All the isolates were able to utilize DO as BOD more than 90% of initial value while only 5 isolates were able to reduce more than 50% of COD at 3 day of incubation. C7 bacterium stain show as the highest efficiency of oxygen utilization as BOD and COD reduction. High reduction ability of the bacterium in the leachate sample was obtained in the sample which placed in the natural environment without autoclave. Thus the result of the present study reveals that bacteria as an environmental friendly green solution for degrading organic content in the leachate sample to reduce BOD and COD in leachate effluent.

Keywords: *Leachate, BOD, COD, Bacteria, Bioremediation*

MACROZOOBENTHOS DIVERSITY AND THEIR DISTRIBUTION IN PANAMA LAGOON, SRI L ANKA

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Abstract

Benthic communities consist of structurally, anatomically, and functionally diverse organisms including phytobenthos and zoobenthos of different levels of food web. The composition of benthic communities depend on structure of benthic bioclimatic region, specific habitats in which the organism live, sediment texture, physical and chemical properties of water column and sediments. This study aims to investigate diversity and distribution of macrozoobenthic community in Panama lagoon. The Van Veen grabs (250 cm^2) was used to collect benthos; 100 random sampling locations were selected and samples were wet sieved on – board through a sieve having mesh size of 0.5mm to separate the benthic fauna. Isolated fauna were immediately fixed using 4% formalin with Rose Bengal. Analyzed macrozoobenthic sample consisted of total 16 families, which included 20 species, Among them; 5 species of polychaetes, 1 species of gastropods, 3 species of bivalves and 11 species of crustaceans were recorded under the following orders; 8 decapods, 3 species Amphipods. Shannon's diversity index value (H') found to be higher (1.7490) during North East monsoon, whereas during South West monsoon it was recorded as 1.5607. The dominance value was found higher at SW monsoon (0.3672) and lower at NE monsoon period as 0.2548. Species richness values revealed that it has high value in NE monsoon period (1.9894) than SW monsoon period (1.8209). Evenness J was higher in NE monsoon (0.7038) period followed by SE monsoon (0.6085). Crustaceans were recorded as dominant species; accounting more than 50% relative abundance. During the North east and south west monsoon period polychaeta contribution was 21% and 35% respectively. Amphipoda were recorded higher values in shallow areas; which places had high production potential of shrimps. The mollusc abundance was less during the south west monsoon period; the reduction of diversity reveals that, mixing may not enough since sand bar formed across the lagoon mouth; which has limited the mixing with ocean.

Keywords: *Macrozoobenthose, abundance, Shannon's diversity index, species richness, Evenness*

INVESTIGATION OF ANTHROPOGENIC FACTORS CONTRIBUTING TO ELEPHANT DEATHS IN SRI LANKA

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Abstract

As an endangered species, Sri Lankan elephant (*Elephas maximus maximus*) receives special attention on conservation. Acceleration of Human Elephant Conflict (HEC) consider as the major reason of wild elephant deaths in Sri Lanka. Hakkapattas/Jaw blowers, Gunshots and Electrocution are the most prominent mode of wild elephant killing, while natural factors, such as competition, disease, and natural disasters remain relatively low (4:1). For successful in-situ conservation of an endangered species, well understanding of population dynamics such as mortality, age structure and sex ratio are critically important. Among estimated 5879 elephants in the country, 460 elephants were deceased within 24 months of 2016-2017. Analysed elephant mortality data shows: anthropogenic impact (57%), natural deaths (15%), and unspecified reason (28%). Therefore, this study analysed, elephant mortalities (*n*=206) due to three most influenced anthropogenic activities. Age classes and sex category comparisons were conducted among elephant deaths. An average, lifespan of a wild elephant is about 60-70 years. According to the study, significant death specific age class for Hakkapattas was 5-15 yr. (49%), Gunshots 15-25 yr (42%), and electrocution 15-20yr and 25-30yr (50%). Average highest mortality indicated in age class of 15-25yr. Both male and female showed greater mortalities at early to middle Ages. Mortalities showed that male elephants were significantly more likely be killed than females through anthropogenic activities. Male to female Mortality ratio: Hakkapattas 2:1, Gunshot 2:1 and Electrocution 4:1. Age and sex depended elephant behaviours allied with most vulnerable age group and sex category for each killing mode. Better understanding of causes that influence on population dynamic changes and taking necessary actions to reduce the number of elephant deaths by policy implementation on elephant habitat disruption, bear arms, and other killing modes can led to successful long-term elephant conservation in Sri Lanka.

Keywords: *Conservation, HEC, Population Dynamics, Elephant Mortality, behaviour*

ANTIOXIDANT, ANTI-INFLAMMATORY ACTIVITIES AND NUTRIENT CONTENT OF FOUR CYANOBACTERIA SPECIES

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Abstract

Cyanobacteria are considered as a rich source of bioactive compounds as they are able to produce a great variety of secondary metabolites characterized by a broad spectrum of biological activities including antiviral, antibacterial, anti-inflammatory, anticancer and antioxidant activities. In the present study, *Oscillatoria* sp., *Lyngbya* sp. *Chroococcus* sp. and *Nostoc* sp. were screened to find their antioxidant, anti-inflammatory activity and nutrient content. Antioxidant activity in the crude extract was evaluated using DPPH scavenging test, ABTS assay, phosphomolybdenum reduction assay. Total Phenolic Content (TPC), Total Flavonoid Content (TFC), protein inhibition reducing assay, Total Soluble Protein (TSP), Total Lipid Content (TLC), and phycobiline protein of cyanobacterium extract were evaluated. Among the tested cyanobacteria the highest DPPH activity (IC_{50} 53.34±1 mg L^{-1}) was found in *Oscillatoria* sp. methanol crude extract whereas lowest activity (IC_{50} 170.47±1 mg L^{-1}) recorded in the methanol extract of *Lyngbya* sp. ABTS activity of the cyanobacterial extracts were ranged from IC_{50} 45.21±1.25 mg L^{-1} (*Chrococcus* sp.) to IC_{50} 74.24±1 mg L^{-1} (*Lyngbya* sp.). The total antioxidant capacity of the *Oscillatoria* sp. crude extract was found as 13.24 ± 1.21 mg GAE g^{-1} at 1000 mg L^{-1}. High quantity of TPC was recorded in *Oscillatoria* sp. (212.23 ± 2.15 mg GAE g^{-1}) whereas *Lyngbya* sp. and *Chroococcus* sp. recorded as 147.15±1.34 mg GAE g^{-1} and 52.07± 1 mg GAE g^{-1} respectively. The highest TFC was found in *Oscillatoria* sp. 496.34±1.73 µg QE g^{-1}).

All the tested cyanobacteria contained high amount of allophycocyanine compared to the other phycobiline protein present in cyanobacteria. Maximum content of total lipid (28.15±0.21 mg g^{-1} fresh wt) and total protein (0.011 mg L^{-1} fresh wt) was recorded from *Chroococcus* sp. and *Oscillatoria* sp. Considering the anti-inflammatory activity of the cyanobacteria extracts highest activity was found in *Oscillatoria* sp. (IC 50 124.24±1.34 mg L^{-1}). The results revealed that the cyanobacteria rich with antioxidant, anti-inflammatory activity and nutrient properties. Therefore the tested organisms can be used as potential candidate to produce pharmaceutical and food supplement.

Keyword: *Antioxidant, Anti-inflammatory, Total soluable protein, Total fatty acid*

COMPARISSON OF NEST AND HATCHING SUCCESS OF TWO ALLOPATRIC AGAMID LIZARD SPECIES IN SRI LANKA

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Abstract

Calotes nigrilabris and *Calotes versicolor* are two allopatric lizard species of the genus *Calotes*. *C. nigrilabris* is restricted to montane habitats over 1000 m a.s.l. while *C. versicolor* is more widely distributed and occurs below 1000 m a.s.l. Due to this elevation difference in distribution, significant differences can be observed in the habitat and environmental variables of their naturally occurring sites. One major variation is the temperature, which is <20 ºC above 1000 m and > 20 ºC below 1000 m on average. This study was carried out obtaining representative samples from sites located within these two regions (Horton Plains; 10 nest sites, Home gardens/ forest patches of Western and Southern Provinces; 11 nest sites). Nest sites were located by focal sampling gravid female lizards. They were not disturbed during oviposition. When egg laying was over, each nest site was examined. Nest microhabitat conditions and nest hole characteristics were recorded. Egg diameter, egg width and egg temperature were measured. Eggs were deposited back in the original nest after the measurements. Nests were re-examined once in two days for possible hatching after 50 days of natural incubation. Naturally hatched eggs were identified by the presence of openings in the shell where hatchlings emerged and were assumed successes. Dull colored and shrunk eggs without openings in the shell were categorized as unsuccessful. There was a significant difference (*Mann-Whitney U-test, $p<0.05$*) in the egg size of the two species considered. Eggs of *C. nigrilabris* (length; 17.98 ± 1.04 mm, width; 10.36 ± 0.72 mm) were significantly larger when compared to *C. versicolor* eggs (length; 13.84 ± 0.73 mm, width; 9.28 ± 0.73 mm). However, the clutch size of *C. nigrilabris* did not exceed 4 (3.9 ± 0.32) whereas, clutch sizes of 6-17 (12.1 ± 3.56) were recorded for *C. versicolor*. Despite the close morphometric similarity between these two species, both the egg size and clutch size showed significant differences (*Mann-Whitney U-test, $p<0.05$*) implying that they have adapted differently to thrive in the two geographical areas considered. *C. nigrilabris* which inhabit thermally challenging colder montane habitats relies more on the quality of the eggs rather than the number. Therefore, they produce a fewer number of eggs with possibly high yolk levels to generate stronger offspring with better survival probability (hatching success rate 97.3 %). *C. versicolor* which lives in more stable and relatively higher temperatures produce a higher number of eggs with smaller size and possibly low yolk levels. Decrease in the size of the egg and increase in the clutch size has resulted in reduced hatching success rates (40.3 %) for *C. versicolor.*

Keywords: *Egg morphometry, Hatching success, Clutch size, Breeding strategies*

BIOLOGICAL EVALUATION OF PLATINUM SULFONAMIDO COMPLEXES: SYNTHESIS, CHARACTERIZATION, CYTOTOXICITY AND BIOLOGICAL IMAGING

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Abstract

Conjugated azobenzene appended dipicolylamine ligand, N(SO_2azobenz)dpa and its corresponding novel platinum complex, $PtCl_2$N(SO_2azobenz)dpa were synthesized in 98%, 80% yields respectively and characterized by using X-ray crystal data, ^{1}H-NMR, UV-Visible and IR spectroscopic methods. We report the structural data which provide indisputable evidence of the coordination between azobenzene sulfonylchloride and dipicolylamine in the formation of the ligand. Characteristic bands appear at 891 cm^{-1} and 1602 cm^{-1} due to stretching vibrations of S—N bond and asymmetric stretching vibration of N=N bonds, respectively in FTIR spectrum of N(SO_2azobenz)dpa.A singlet (4.81 ppm) obtained for methylene CH_2 protons in a ^{1}H NMR spectrum of the free ligand, appears as two doublets (5.39, 6.01 ppm) in the metal complex suggesting magnetically inequivalent protons upon ligand coordination to Pt. The absorption bands around 190 nm – 500 nm in UV-Visible spectra can be assigned to intra-ligand $\pi\rightarrow\pi^*$ and $n\rightarrow\pi^*$ transitions. Both ligand and the complex display intense fluorescence. Stained *Allium cepa* cells were incubated in maximum tolerable concentration(1 mg ml^{-1})of ligand, N(SO_2azobenz)dpa and complex $PtCl_2$N(SO_2azobenz)dpa and observed under epifluorescence microscope. The ligand and metal complex prominently stain the cell wall and the nuclei after incubation of the compound. Significantly low IC_{50} values in NCI-H292 human lung cancer cells were obtained for both ligand (13.95µg ml^{-1}) and the complex (12.31µg ml^{-1}) which suggest possible use as anticancer agents.

Keywords: *N(SO_2azobenz)dpa, $PtCl_2$N(SO_2azobenz)dpa, ^{1}H NMR, Fluorescence, Cytotoxicity*

SYNTHESIS, STRUCTURAL AND PHOTOPHYSICAL PROPERTIES OF PLATINUM (II) SULFONAMIDO COMPLEXES OF DI-(2-PICOLYL)AMINE

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Abstract

Development of effective and powerful metallopharmaceuticals as diagnostic agents and therapeutic agents is a growing body of research. In this study, two novel platinum(II) complexes [Pt(*N*(SO_2dan)dpa)Cl_2] (C1) and [Pt(*N*(SO_2bip)dpa)Cl_2] (C2) of two ligands *N*(SO_2dan)dpa (L1) and *N*(SO_2bip)dpa (L2) were synthesized in good yield and high purity. The (L2) ligand is new while (L1) ligand was previously reported but its photophysical properties and the potential of the ligand to be used as an imaging agent had not been extensively studied. The four compounds were characterized by ^{1}H NMR, FT-IR, UV-Vis and fluorescence spectroscopies. In ^{1}H NMR spectra recorded in DMSO-d_6, signals for the methylene protons in the free *N*(SO_2R)dpa ligands (R = dan, bip) were observed as singlets, while they appeared as two doublets in each spectrum of the metal complexes. The ^{1}H NMR signals obtained for the *N*(SO_2dan)dpa ligand were supported by the 2D NMR study of the ligand. Structral analysis revealed that the (L2) and (C2) compounds recrystallized in a triclinic system. The crystal structure of (C2) revealed that the ligand (L2) acts as a bidentate ligand. Upon complexation, the absorption peaks of the ligands around 260 cm^{-1} due to pyridine-localized $\pi \rightarrow \pi^*$ transitions have shifted towards shorter wavelength in the spectrum of [Pt(*N*(SO_2dan)dpa)Cl_2], while the peaks have red shifted in the spectrum of the [Pt(*N*(SO_2bip)dpa)Cl_2] complex. The emission spectra of the compounds obtained in methanol showed high fluorescent intensities for the compounds (L1) and (C1) even at very low concentrations. At higher concentrations of (L1), a drop in the fluorescence intensity could be observed possibly due to inner filter effect of the fluorophore. With the promising results obtained in fluorescence spectroscopy studies, the compounds are currently being investigated for the potential applications as cell imaging agents.

Keywords: *Platinum(II) compounds, sulfonamide complexes, cell imaging agents, fluorescence studies*

FIRST EVIDENCE OF MICROPLASTICS IN BEACH SAND FROM NEGOMBO, SRI LANKA AND THE POTENTIAL ACCUMULATION IN MARINE FISH

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Abstract

Prevalence of microplastics in the marine environment has been a growing problem as they can impose deleterious impacts on marine biota. Though the issue has a global concern, it has not been taken up in Sri Lanka. The present study is the first attempt to study the occurrence of microplastics in beach sand in Sri Lanka from three study sites namely, Pitipana, Catamaran, and Dūwana beaches in Negombo along the western coastline. Samples were collected bi-monthly between March and November 2017. Microplastics were separated using density separation with the aid of vacuum filtration and categorized into two size classes (1-5 mm and <1mm). Identification of the 1-5 mm category as fiber, foam, fragment, and pellet was conducted visually using a stereo microscope and enumerated. Polymer types of the microplastics less than 1mm were determined by analyzing the FTIR spectrum. In addition, the gut contents of *Sardinella* sp. caught from Pitipana was analyzed for microplastic ingestion by visual observation as well as identification of the polymer. Results showed that the Catamaran and Dūwana beaches were contaminated with microplastic fragments (25 and 13 items per m3 respectively) followed by fiber (2 and 1 items per m3 respectively). At Pitipana beach, significantly high number (36 items per m3) of foam plastics were recorded. However, pellets that are used for plastic manufacturing were not recorded in any of the sites. In Pitipana beach, only polyvinyl chloride was found whereas in Dūwana and Catamaran beaches only polyester as polymer type. The FTIR analysis of gut content of the *Sardinella* sp revealed that contamination of polyethylene suggesting the presence of microplastics in sea water and potential for accumulation in marine biota. Further it was found that all the microplastics were secondary origin through the breakdown of larger plastics into smaller particles.

Keywords: *Microplastics, beach sand, Sri Lanka, fish ingestion*

QUANTITATIVE MORPHOLOGICAL MARKER BASED GENETIC VARIABILITY OF SORGHUM (*SORGHUM BICOLOR*) GERMPLASM ACCESSIONS

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Abstract

Sorghum (*Sorghum bicolor* (L.) Moench) which is belonging to the family Poaceae is considered as the fifth most important cereal crop in the world in terms of production and area planted. Out of all currently cultivated cereals, this can be considered as one of cereals with the best drought tolerance. This study was carried out to assess the genetic diversity of twenty six *ex-situ* conserved sorghum (*Sorghum bicolor*(L.)) germplasm accessions using morphological markers developed for sorghum outlined by the International Plant Genetic Resources Institute (IPGRI). There were significant correlations between pairs of studied quantitative morphological traits including both positive and negative correlations. There was a highly significant, positive correlation between days to flowering and plant height (r= 0.906). Three pairs of traits as days to flowering and 100 seed – weight (r= -0.653), plant height and 100 seed – weight (r= -0.616) and days to flowering and No. of flowering stems (r= -0.516) showed significantly high negative correlations. Cluster analysis based on the studied quantitative traits generated five major clusters. Cluster 'I' comprised five Sri Lankan accessions. Cluster 'II' comprised two Italian accessions and two French accessions. Cluster 'III' composed of one Ethiopian accession and three Sri Lankan accessions. Cluster 'IV' consisted of seven accessions including two accessions with unknown origins, four Italian accessions and one Sri Lankan accession. The remaining six Sri Lankan accessions have been grouped together in Cluster 'V' at the beginning of clustering. As there is a considerable genetic diversity among the studied germplasm accessions of sorghum, the information obtained from this study will help the breeders in future sorghum breeding programs.

Keywords: *Sorghum bicolor, germplasm accessions, characterization, genetic diversity, quantitative traits*

BIO-REFINING OF UNDER-UTILIZED *SARGASSUM SPP.* (PHAEOPHYTA) AVAILABLE IN SRI LANKA FOR NUTRACEUTICAL AND FUNCTIONAL FOOD APPLICATIONS

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Abstract

Study was conducted to examine the nutritional composition of under-utilized *Sargassum* species and the seasonal variations of the nutritive compositions. Incorporation of the nutritional components into foods for human consumption purposes was also studied along with the changes in sensory and physio-chemical properties from such inclusions. Live specimens were collected from Hikkaduwa, Sri Lanka (Latitude: 6.1313°, Longitude: 80.1007°) and the cleaned samples were oven dried and grounded into powder. Proximate analysis was carried out accordingly. The samples were collected at two different seasons and the analysis were repeated respectively to identify the seasonal variations if any. Along with this study, sea weed powder was incorporated to cookies at 0%, 2.5%, 5% and 10% and the proximate analysis, physio-chemical properties and sensory analysis and shelf life studies were extended. Moisture content (13.5±0.1%, 12.9±0.05%) crude protein content (43.3±3.2%, 35.3±1.4), fat content (1±0.2%, 1.4±0.1%), ash content (21.5±0.3% , 21.4±0.7%) in Sargassum Giganteifolium & Sargassum Wightii were recorded. When incorporated all into cookies, moisture increased with increasing seaweed powder concentration. It was found that acidity in cookies did not change with species and seaweed concentration. However, physical properties have shown a difference in two varieties. In colorimetry, in L* (lightness) was highest in 0% incorporation (59.1±3.1) and reduces with the increment of the seaweed percentage. Also, *Sargassum giganteifolium* has the higher L* than *Sargassum wightii*. a* (redness to greenness) and b* (yellowness to blueness), chroma C^*_{ab} (saturation) has also reduced with the incorporation of sea weeds from 11.4±2, 26.4±1.6 and 28.7±2 respectively. In sensory attribute study, the most preferred variety was *Sargassum giganteifolium* and shelf life studies proved to have most preferred characteristics in *Sargassum giganteifolium*, after eight weeks' time. Therefore, the study concludes that the underutilized Sargassum can be used to increase the nutrient content and therefore can be used to develop novel food products with high nutritive value in Sri Lankan context

Keywords: *Sargassum, Sea weeds, Seasonal variations, Cookies, Sensory properties*

COMPARATIVE STUDY OF PHYSIOCHEMICAL PROPERTIES OF LOCALLY AVAILABLE MUCILAGINOUS MATERIALS IN SRI LANKA

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Abstract

Although Sri Lanka has several hydrocolloid gums and mucilaginous materials, still imports a substantial amount of hydrocolloid gums. *Neolitsea cassia*, *Cinnamomum verum* and *Terminalia arjuna* leaves, and *Dillenia retusa* fruits are some of the common materials used for extraction of mucilage in Sri Lankan food industry. However, these mucilage materials are not commonly used in food products due to lack of information on the physicochemical properties of the mucilage and the extraction process. Hence identification of potential local sources to extract mucilaginous materials is important to promote local raw materials among the people. Therein mucilaginous materials were extracted, precipitated and dried in hot air oven as the procedure descried by kasunmala *et al* (2017). Organoleptic properties, solubility profile and physiochemical properties of dried mucilaginous materials were analyzed and compared. Dried mucilaginous material obtains from the *Neolitsea cassia* shows the best organoleptic properties over other precipitated dried mucilaginous materials. All the precipitated mucilaginous materials showed same pattern of solubility which is dissolved in hot water and insoluble in organic solvents. They had a good swelling index, high swelling index reported in *Neolitsea cassia* (27.8%) and all mucilaginous materials had acidic nature. The results of the aforementioned properties showed that *Neolitsea cassia* has relatively high physiochemical properties, but all the precipitated mucilaginous materials have acceptable physiochemical properties and can be used as a several food applications.

Keywords: *mucilaginous materials, extraction, comparison, physiochemical properties food industry*

CONJUGATIVE PLASMID TRANSFER BETWEEN INSECTICIDAL STRAINS OF *Bacillus thuringiensis:* USE OF ANTIBIOTIC RESISTANCE TRAITS TO DETECT TRANSCONJUGANTS

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Abstract

Conjugative plasmid transfer is a way of horizontal gene spread in *Bacillus thuringiensis* (*Bt*); a gram-positive bacterium which consists of plasmids carrying insecticidal *cry* genes. These '*Cry* plasmids' could be transferred to recipient strains by a mating process known as 'conjugation' to form transconjugants. Since *cry* genes often coexist with antibiotic resistance plasmids; antibiotic resistance traits of mating pairs act as simple markers to detect transconjugants. This study aimed to determine suitable mating pairs of *Bt*. As a first step antibiotic susceptibility tests were done using Kirby–Bauer disc diffusion method for *Bt* isolates available in the culture collection. Then broth mating protocol was followed for six mating pairs and transconjugant colonies were observed in double selective antibiotic - Luria Bertani (LB) agar medium. According to the results of the conjugation experiments, colonies of *Bt* mating pairs; AB15+AB49, AB1+AB110 and AB110+AB142 were observed. However, due to growth in the negative controls, these colonies were not confirmed as transconjugants. Thus, further molecular studies on *cry* gene transfer are recommended to confirm the above colonies as transconjugants. Furthermore, results showed mating pairs: AB1+AB20, AB7+AB15 and AB2+AB8 were incompatible for mating since tranconjugant colonies were not observed during conjugation experiments. In conclusion, this study is a preliminary study to identify suitable mating pairs for future studies thus, pairs AB15+AB49, AB1+AB110 and AB110+AB142 could be considered for future studies.

Keywords: *Bacillus thuringiensis (Bt), Plasmid, Conjugation, Transconjugant, cry genes*

ANTI-α-AMYLASE, ANTI-α-GLUCOSIDASE, ANTIGLYCATION AND GLYCATION REVERSING POTENTIAL OF SRI LANKAN FINGER MILLET (*Eleusine coracana*) VARIETIES

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Abstract

Finger millet has been known as a therapeutic food for diabetes mellitus since ancient times. However, there is a lack of scientific evidences on antidiabetic potential of finger millet varieties (FMV) which are commonly cultivated and consumed in Sri Lanka. The objective of this study was to evaluate anti-α-amylase, anti-α-glucosidase, antiglycation and glycation reversing properties of locally grown FMV. Flours of whole grains of Sri Lankan FMV, Ravi, Rawana and Oshadha, were extracted with ethanol and methanol separately and abilities of the extracts to inhibit the catalytic actions of α-amylase and α-glucosidase enzymes as well as inhibit and reverse the protein glycation process were evaluated. Data of each experiment were statistically analysed. All extracts showed dose dependent anti-α-amylase, anti-α-glucosidase, antiglycation and glycation reversing activities. Among the three varieties, Oshadha showed the highest anti-α-amylase activity and Ravi showed the highest anti-α-glucosidase activity. Among the six extracts, ethanolic extract of Oshadha indicated the highest anti-α-amylase activity (IC_{50} value: 1.62 ± 0.04 mg/ml) and methanolic extract of Ravi indicated the highest anti-α-glucosidase activity (IC_{50} value: 47.96 ± 0.79 µg/ml). However, all extracts showed significantly low ($p < 0.05$) anti-α-amylase and anti-α-glucosidase activities when compared to the standard, Acarbose. Among the varieties, Oshadha showed the highest antiglycation and glycation reversing activities. Among the six extracts, methanolic extract of Oshadha indicated the highest antiglycation (IC_{50} value: 79.42 ± 4.46 µg/ml) and glycation reversing (EC_{50} value: 411.76 ± 5.91 µg/ml) activities. However, all extracts showed significantly low ($p < 0.05$) antiglycation activity when compared to the standard, Rutin. The correlations between total phenolic contents and IC_{50} values indicated the involvement of phenolic compounds, which are present in finger millet extracts, in inhibiting the catalytic actions of α-amylase and α-glucosidase enzymes as well as formation of advanced glycation end products (AGEs) and reversing the already formed AGEs.

Keywords: *α-Amylase, Diabetes mellitus, Finger millet, α-Glucosidase, Glycation*

Acknowledgement: Financial assistance granted by the Sri Lankan Treasury (TG 16/122) is gratefully acknowledged.

EFFECT OF DIFFERENT LEVELS OF POTASSIUM ON SOIL AND PLANT NUTRIENT STATUS OF IMMATURE OIL PALM IN DEVITURAI ESTATE SRI LANKA

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Abstract

Initial growth of oil palm in the field highly depends on quality of the planting materials, management practices and availability of macro and micro nutrients. Failure in supply of these nutrients badly affects initially the vegetative growth performance and finally the yield. This research was conducted at Devitura estate of Elpitiya Plantations PLC. The study was designed with RCBD design and there are six treatments with four replicates. Fertilizer treatments were with different initial levels of Potassium (K) (T1=0, T2 =60, T3 =90, T4 =120, T5 =150, T6 = 180 of K2O/Kg/Ha/Yr) and constant levels with Nitrogen, Phosphorus, Magnesium and Boron. Each plot consists with eight Oil Palm plants. Soil and Leaf sampling was carried out 3 months after the treatment application. Trial was carried out starting from October, 2016 to October, 2017.The main objective of this study is to evaluate the application of different level of K fertilizer on soil and plant nutrient status of Immature Oil Palm in Deviturai Estate Sri Lanka. The significant differences in soil available K contents were observed among treatments in soil due to application of different levels of K fertilizer. Higher available K contents were observed in K applied plots than zero K applied plots. Significance difference was observed in plant K concentration among treatments. The higher K contents were observed in K applied plots than zero K applied plots.

Keywords: *Oil palm, K fertilizer, available nutrient content, Plant nutrient content, Sri Lanka*

DEVELOPMENT OF FROZEN HASH BROWN CASSAVA FROM RAW CASSAVA ROOTS

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Abstract

Cassava (*Manihot esculanta Crantz*) is nutritionally strategic under-utilized famine reserve crop with very limited post-harvest life. The purpose of this study was to investigate the possibility of developing a convenient breakfast side dish namely frozen hash brown cassava in order to increase the consumption of cassava. Mature undamaged fresh cassava roots of cultivar 'MU 51' were cleaned, peeled and cut in to longitudinal cubes (5cm×3cm×3cm). The cubes were boiled and mixed with wheat flour, vegetable fat and whole egg in a ratio of 10:2:1:1. Hash browns were prepared by sheeting the prepared dough, cutting in to oval shapes, and blast freezing (-20^0C) for 3 hours. Then they were packed in 300 gauge low-density polyethylene pouches and stored finally in a frozen storage (-18^0C). The sensory profile and nutritional profile of the developed product was analysed and shelf life studies were conducted over twelve weeks in frozen storage (-18^0C± 1^0C). The experiment revealed that hash brown cassava made with 20 minutes boiled cassava cubes had the best sensory profile and most similar profile to the hash brown potatoes. The frozen Hash brown cassava samples were containing 53.54±1.27% moisture, 1.33±0.11% mineral ash, 0.22±0.07% fat, 5.31±0.15% protein, 0.16±0.04% crude fibre and 39.60±0.96% carbohydrate from its fresh weight. The cyanide content was 3.05±0.26 ppm wet basis. According to the microbiological and chemical testing results, cassava frozen fries were safe for consumption up to 3 months at frozen storage.

Keywords: *Cassava, hash brown, sensory profile, nutritional profile, storage life*

FORMULATING A READY TO DRINK SOUP MIX INCORPORATED WITH SEA CUCUMBER FLOUR PREPARED BY *Bohadschia vitenesis*

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Abstract

Production of value-added products from sea cucumbers helps to increase the market value and use of excess catches effectively. Therefore, this study was carried out to produce soup mix incorporated with *Bohadschia vitenesis* which fetch very low value in the international markets. Samples were collected from major landing sites of northwest coast of Sri Lanka. Samples were brought to the laboratory of the University of Sri Jayewardenepura and sea cucumber flour was prepared after drying and grinding. Three compositions (20%, 40% and 60%) of sea cucumber flour incorporated soup mixtures were prepared. Sensory test using five-point hedonic scale was done with 30-member semi-trained panel at the University of Sri Jayewardenepura to select the best formula. The results were confirmed with 20 untrained Chinese people at Coal power plant, Norochcholai, Sri Lanka. Proximate composition of moisture, ash, fat, protein, carbohydrate and fiber percentages along with peroxide values, microbial counts and cost of production of selected soup mix were analyzed. The shelf life of soup mix packed in different packaging materials (Polyester-Aluminum-PE, Polyester-Metalized polyester PE and Nylon-LDPE) were determined in order to select the best packaging option for the selected soup mix. Changes in moisture %, peroxide value, microbial counts and organoleptic properties were measured in every two weeks interval throughout the storage period. Soup mix with 40% sea cucumber flour was selected as the best product as it covers a larger area in the web diagram. This selection was confirmed by significantly higher organoleptic scores obtained by 40% mix (Wilcoxon, Bonferroni Correction, $p<0.016$) and 73.91% taste preference given by Chinese people. The moisture and fat contents of organoleptically best soup mix were 7.07±0.01% and 3.47±0.23% respectively and it was rich in protein and carbohydrate (31.86±1.21% and 46.82±0.83% respectively) with 321.48 Kcal/100g calorie value. Total plate count and yeast and mold count ($1.9x10^2$ and $0.7x10^2$ CFU/g respectively) were within safer limits ($1x10^4$ and $1x10^3$ respectively, SLS 516). Further, coliforms and *Staphylococcus aureus* colonies were absent in soup mix. The total cost of production for 20g was Rs.75.00. Shelf life studies indicates that the soup mix can be stored in Polyester-Aluminum-PE packages maximum up to 6 weeks at room temperature without affecting the organoleptic and microbial parameters.

Keywords: *value addition, sea cucumber, soup mix, bêche-de-mer*

SALINITY TOLERANCE OF WILD *POECILIA RETICULATA* (GUPPY) UNDER LABORATORY CONDITIONS

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Abstract

Fresh water fish Poecilia reticulata (guppy), widely used as a bio-control agent to control mosquito larvae occurring in freshwater habitats also demonstrated to survive in seawater which differs among strains. This makes it a potential candidate to control mosquito species such as Aedes aegypti and Ae. albopictus which have been recently shown to oviposit and undergo natural pre-imaginal development in brackishwater (0.5-30 ppt) collections. The present study was carried out to investigate the salinity tolerance of P. reticulata occurring in Sri Jayewardenepura canal system, in order to assess its suitability to control brackishwater breeding Aedes species.

Guppy was exposed to different salinity levels directly and gradually under laboratory conditions in glass tanks (size 60 cm x 30 cm x 30 cm). To test the direct effect of salinity, 9 different salinities (ranging from 0 as a control -35ppt) prepared in three replicates, each stocked with 10 fish were kept for a period of 3 months. To test the effect of gradual increase of salinity, three tanks containing freshwater were stocked with 10 fish in each and a gradual increase of salinity (by 5ppt once in 2 weeks upto 38ppt) was done. All fish samples used were random wild samples consisting of 5 males and 5 females. Mortality rates, growth (total length) and the breeding of fish were recorded in both experiments at regular time intervals.

When the fish were exposed to different salinities directly, fish started dying at 10 ppt (10% mortality) after the fourth day of exposure and this mortality rate was observed from 10-20ppt salinity range within the three months (exactly 0% mortality was recorded in control tank). 50% survival was shown at 28ppt salinity level at the end of the third month. Beyond 28ppt, there was 100% mortality. Fish showed an average of about 5-7 mm growth in salinities upto 28ppt but they were not significantly different ($p=0.886$). Breeding was seen in salinities upto 20ppt producing 7-15 fry/female and the fry also could tolerate the salinities they were bred into with a mortality level of 3% within the study period. Contrast to the above results, the fish when exposed to gradual increasing of salinities could survive upto 38ppt with only a 20% mortality rate. They showed a length increase between 1-5mm, in all salinities but they were not significantly different ($p=0.330$). In gradually increasing salinities, fish were seen breeding even at 35 ppt levels (7-10 fry/female) with a 3% mortality rate.

The present study demonstrates high salinity tolerance of *P. reticulata* and their successful growth and propagation in saline conditions. It is revealed that guppy can tolerate and survive in salinities upto 28ppt, when they are directly introduced from the wild and they can tolerate upto a level of 38ppt salinity if the salinities increase gradually. They can grow under saline conditions and breed successfully and the fry can survive well in the saline environment. This makes *P. reticulata* a potential candidate that can be used as a bio-control agent in the control of *Aedes* mosquito larvae that breed in brackish water environments.

Keywords: *Guppy, Salinity, Aedes, Bio-control*

A PRELIMINARY INVESTIGATION ON INDIGENOUS KNOWLEDGE OF TRADITIONAL KITHUL (*CARYOTA URENS L.*) INDUSTRY

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Abstract

Kithul or *Caryota urens L.* (Family Arecaceae) is one of the most beneficial palm tree to Sri Lankans. Jaggery and treacle are the best –known products from the sap of Kithul inflorescence. In Sri Lanka, there is a long history for Kithul as an industry. Therefore Sri Lankan Kithul industry is very rich with indigenous knowledge. The main objective of the proposed study is to investigate the indigenous knowledge of traditional Kithul industry. Ratnapura district was selected as the research area for this study. The research method was based on field observations and discussions with randomly selected sixty traditional Kithul tappers. Also published books and journals were used. According to the findings, traditional Kithul tappers used their indigenous knowledge for various steps of the Kithul industry. As some of examples, they apply this knowledge to seasoning the different types of Kithul inflorescences, to enhance the yield of Kithul sap and its concentration, to prevent the over maturation of inflorescence, to reduce the browning effect of tapping the surface of inflorescence and etc. For that eco-friendly measures such as performing kems, ritual or a religious rite and use of plants or plant extracts were used. This indigenous knowledge usually transmitted from generation to generation through their experiences and demonstrations. But currently, this knowledge is gradually died down due to various reasons. So immediate actions are needed to conserve this indigenous knowledge and this can be applied to develop the sustainable agriculture system in Sri Lanka.

Keywords: *Indigenous knowledge, Industry, Inflorescences, Kithul, Tappers*

CHEMICAL COMPOSITION OF *CITRUS NOBILIS* AND *CITRUS MEDICA* FRUIT PEELS AND THEIR REPELLENT ACTIVITY AGAINST *CALLOSOBRUCHUS MACULATUS* (F.) (COLEOPTERA; BRUCHIDAE)

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Abstract

Cowpea, *Vigna unguiculata* (L.) is a popular food crop grown in Sri Lanka which is also considered as a rich source of protein. In storage, cowpea seeds are attacked by a number of insect pests and among them cowpea bruchid (*Callosobruchus maculatus* (Fab.)) is the most destructive pest. As several Citrus species have been documented as a source of botanical insecticides to control *C. maculatus*, the present study was carried out with the view of investigating the repellent activity and chemical composition of fruit peels of *Citrus nobilis* and *Citrus medica*. Repellent effect was assessed under laboratory conditions (28±2°C and 84±2% RH) by using a dual-choice olfactometer. Three doses of fruit peel (1, 4, 7g) were tested after 15, 30 and 60 mins of exposure to adult beetles. Volatile fraction of fruit peel of both species was separately extracted by HS-SPME (medium polar fiber) technique combined with GC-MS for the identification of chemical constituents. With both Citrus species, insect repellency increased with the increase of the dose and time of exposure. At the highest dose after 60 mins of exposure, *C. nobilis* elicited 95% repellent effect whereas *C. medica* showed only 65% effect. All three doses of the two Citrus species produced more than 50% insect repellency even after 30 minutes of exposure. A total of 37 and 26 volatile components were identified in *C. nobilis* and *C. medica* fruit peels respectively. D-Limonene was the major constituent of both *C. nobilis* (45.3%) and *C. medica* (68.3%). p-Mentha-4,8-diene (3.7%) and α-Terpinolene (3.0%) in *C. nobilis* and β-Myrcene (7.5%) and Linalool (4.7%) in *C. medica* fruit peel were also identified. The results suggest that both Citrus species, especially *C. nobilis* have potential to be developed as natural repellents to minimize damage caused by *Callosobruchus maculatus.*

Keywords*: Citrus nobilis, Citrus medica, Callosobruchus maculatus, Repellency*

THE MOVE TOWARDS SUSTAINABILITY; A CRITICAL REVIEW OF ENVIRONMENTAL IMPACT OF FDI IN SRI LANKA

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Abstract

Sri Lanka's journey towards becoming the wonder of Asia remains one of the major promises of the Sri Lankan governments over the past decade and in this regard, Foreign Direct Investment can be considered as an essential pillar of success. However, attracting more FDI is nevertheless a proper indication of the development benefits gained by those investments. In order to access the true gain, Environmental impact has to be carefully considered and mitigated. Achieving sustainable development through FDI can easily be a dream left, unless strategic ways to mitigate environmental impacts are properly implemented. The jurisprudence relating to International Investment Law consists of number of incidents where environmental issues were disputed and decided by courts and arbitral tribunals in which the utmost duty of human kind towards protection of the environment was highly considered in balancing the interests of all stakeholders. This paper intends to analyse the Sri Lankan backdrop with a special reference to environmental impacts of FDI. The paper utilizes a critical approach to examine the existing legal framework and to identify its lacunas through a qualitative research. The legal frameworks of Australia and United States of America were critically examined through an comparative approach in bringing in recommendations to the research problem. The paper ultimately suggests that Sri Lanka still follows traditional framework of attracting and regulating foreign direct investment and it is high time for the country to formulate an overarching updated policy framework to address the possible environmental impacts of FDI.

Keywords: *environmental protection, FDI, investor, investment, expropriation*

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