RJM

Ruhuna Journal of Medicine

Proceedings of the Faculty of Medicine Academic Sessions (FMAS) 2020, University of Ruhuna

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Cover story: Be Kind to Your Mind

D M A H S Suriyaarachchi, who won the competition for the cover page for the Ruhuna Journal of Medicine 2020, is a 4th year medical undergraduate at the Faculty of Medicine, University of Ruhuna. He is also a freelancing graphic designer, photographer, guitarist and a badminton player. He hails from Bandarawela and has studied at Bandarawela Central College. He recently passed the 3rd MBBS part II examination with a second class lower division.

According to Heshan Sudeepa Suriyaarachchi, being an unstressed person is difficult and COVID-19 is making it even harder. With closure of workplaces, cancelled events and gatherings, many people are missing out on some of the important moments of their lives. People who live with these anxious, isolated and disappointed feelings have to get through life somehow because we still can't see the end of this pandemic. What is the best way to deal with this disappointment? Let yourself feel it. Have you ever wanted to learn or do something new, start a new hobby or spend time practicing a musical instrument? Now is the time to do that. Focusing on yourself and finding ways to use your new-found time is a productive way to look after your mental health and yourself. Be kind to your mind!!!

RJM

Ruhuna Journal of Medicine

Contents

The Ruhuna Journal of Medicine (RJM) is published by the Faculty of Medicine, University of Ruhuna. The journal publishes original research articles, reviews and case reports.

Types of articles

Original articles

The text of original article encounting up to 2000 words (excluding abstract, references and tables) should be divided into sections with the headings; Abstract (unstructured max 250 words), Key-words, Introduction, Material and Methods, Results, Discussion References, Tables and Figure legends.

Review articles

It is expected that these articles would be written by individuals who have done substantial work on the subject or are considered experts in the field. The prescribed word count is up to 4000 words excluding abstract, tables and references. The manuscript should have an unstructured Abstract (max 250 words) representing an accurate summary of the article.

Case reports

These communications could be of up to 1000 words (excluding abstract and references) and should have the following headings; Abstract (unstructured max 150 words), Key - words (max 5), Introduction, Case Report, Discussion, Reference, Tables and Figure legends.

References

Personal communications and unpublished works should only be mentioned in the text. Reference citations in the text should be identified by numbers in brackets (eg. (1, 2)) before the punctuation marks. References should be numbered consecutively in the order in which they are first mentioned in the text. List all authors when three or less; when four or more, list only first three and add et al. Examples;

Articles in Journals: Rechel B, Ahmedov M, Akkazieva B, et al. Lessons from two decades of health reform in Central Asia. Health Policy Plan 2012; 27(1): 281-287. (eg. BMJ type)

Books: Aminoff MJ. Electrodiagnosis in clinical neurology. 2005; Elsevier, USA.

Books chapters: Kumar P, Clark M. Cardiovascular disease: Camm AJ, Bunce NH, editors. Clinical Medicine. USA: Elsevier; 2005; 725-872.

Tables

Tables should be self-explanatory and should not duplicate textual material. Number tables, in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.

Illustrations (Figures)

Figures should be numbered consecutively according to the order in which they have been first cited in the text.

Authorship Criteria

Authorship credit should be based only on substantial contributions to each of the three components mentioned below.
1. Concept and design of the study or acquisition of data or analysis and interpretation of data;
2. Drafting the article or revising it critically for important intellectual content; and
3. Final approval of the version to be published.

Foreword

It is with great pleasure I send this message on behalf of the organizing committee of the Faculty of Medicine Academic Sessions, FMAS-2020. Since the beginning of year 2020, the whole world has been challenged with the viral pandemic "COVID-19", taking the lives of nearly two million humans. The world has come to a standstill; losing freedom, movements, work and even lives. Does this mark a turning point in human advancement?

The theme of the conference "Viral Pandemics: A New Beginning" focuses on how we get into the new normalcy. The symposium entitled "Life in the time of COVID: Winning battles and forging ahead" will further enlighten the theme. We are privileged to have a chief guest and resource persons who are key experts in the country and show the way to bring the nation to a new direction out of the fire "COVID". I am thankful to the chief guest and resource persons for their invaluable and unwavering contribution.

I am extremely grateful to the orator, all academics and students who present their valuable research findings to make this event colorful. Finally I express my sincere gratitude to the Vice Chancellor, University of Ruhuna, Dean, Faculty of Medicine and the FMAS 2020 committee members for their untiring support extended to make this event a success.

Professor R S Janaka Lenora
Chairperson, FMAS-2020

Message from the Vice Chancellor

It is a great pleasure to write this message as the Vice-Chancellor of University of Ruhuna to the Ruhuna Journal of Medicine (RJM). This is the official journal of the Faculty of Medicine, University of Ruhuna, which is published annually in parallel to the Faculty of Medicine Academic Sessions (FMAS). The theme of the FMAS 2020 "Viral Pandemics: A new beginning", is a very interesting and timely concept for the Annual Academic Session.

COVID-19 pandemic has caused perhaps the largest socio economic disruption in the recent history. The crisis has highlighted issues entrenched in our global economic, social and educational systems. This is the best time to rethink about all the aspects of the world economic, social and educational systems and identify the weaknesses and opportunities inherent to those systems. As we all believe, in every crisis lies an opportunity. Therefore, addressing the emerging opportunities and directions of the global academic arena by this annual Academic Sessions 2020 should be profoundly appreciated. The academic session and parallelly published journal will be a great scientific platform to discuss and explore the new insights and prospects associated with the pandemic.

On the other hand, scientific journals and conferences play a significant role in disseminating research findings, latest discoveries and developments and future research prospects to the peer-researchers, policy makers, and the general public. However, predatory or fake journals, publishers and even fake scientific conferences have mushroomed all over the world as a profit oriented business rather than scholarly purposes. Those fake journals are featured with lack of rigid scope, very short peer reviewing process, falsely claimed scholarly indexes etc. Unfortunately, both young scientists and senior scholars are the victims of this predatory industry. This issue should be deeply addressed within the global academia. As a primary solution, local, regional, institutional peer reviewed journals should be promoted among the scientific communities. The quality and the standard of institutional journals should be uplifted up to the level of top ranks of the well-recognized, global scholarly indeces at the same time. I firmly believe that Ruhuna Journal of Medicine has a significant potential to serve as one of the best medical science journals in the country.

I appreciate the hard work of the organizing committee and editorial board in organizing the major annual academic event and publishing the journal of the Faculty of Medicine for 8th consecutive year under the COVID 19 constraints. I extend my sincere gratitude to the Chairperson, organizing committee and editorial staff for their invaluable commitment.

With great pleasure, I congratulate FMAS 2020.
I look forward for a very successful session.
Best Wishes.

Senior Professor Sujeewa Amarasena
Vice-Chancellor, University of Ruhuna
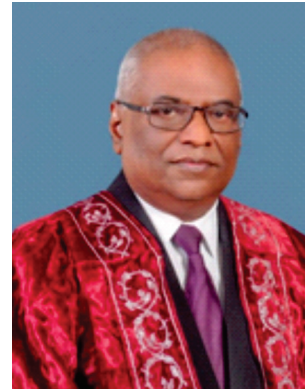
Message from the Dean

It is with a sense of satisfaction I send this message to the Faculty of Medicine Academic day which is held on the 3rd of February 2021. I would like to express my sincere gratitude to the Chairperson and the FMAS Committee for organizing this under the new normal condition while the COVID 19 pandemic is still active. The COVID epidemic has dramatically changed purview of the world since March 2019. As a Faculty we had to adapt to the new situations created by COVID 19 endemic without compromising our commitments to academic activities.

FMAS is the major academic event of the Faculty of Medicine. I am thankful to the Chairperson and the FMAS Committee for organizing the sessions without diluting its academic importance. Even with crowd restrictions I am sure that there will be a wider participation than in the previous occasions as it will be freely available for online participation. I am confident that the FMAS will be a huge success.

Professor Vasantha Devasiri
Dean, Faculty of Medicine,
University of Ruhuna

Faculty of Medicine Academic Sessions (FMAS) - 2020
University of Ruhuna

Wednesday 3rd February 2021
T. W. Wi kramanayake Auditorium, Faculty of Medicine, University of Ruhuna

Theme: "Viral Pandemics: A New Beginning"

0745-0800 hrs   Guests to be seated

0800-0810 hrs   Ceremonial procession

0810-0815 hrs   Faculty & University songs

0815-0820 hrs   Lighting of the oil lamp

0820-0825 hrs   Welcome speech
Professor R S J Lenora
Chairperson, FMAS - 2020

0825-0830 hrs   Address by the Dean, Faculty of Medicine, University of Ruhuna
Professor Vasantha Devasiri

0830-0840 hrs   Address by the Chief Guest, Vice Chancellor, University of Ruhuna
Senior Professor Sujeewa Amarasena

0840-0910 hrs   Keynote address
Hopes with COVID-19 crisis. Are there any?
Dr Ananda Wijewickrama,
Consultant Physician, National Institute of Infectious Disease

0910-0925 hrs   Dean's awards - 2020

0925-0930 hrs   Vote of thanks
Dr Pushpika Jayawardana
Secretary, FMAS 2020

0930-1010 hrs   FMAS- Oration 2020
Institutionalization of postpartum intrauterine device service : A story of successful implementation
Dr Lanka Dassanayake
Senior Lecturer in Obstetrics & Gynaecology, Department of Obstetrics & Gynaecology, Faculty of Medicine, University of Ruhuna

1010-1015 hrs   National anthem - Closing ceremony

1015-1040 hrs   Tea and Poster session I

| 1040-1220 hrs | Symposium FMAS 2020 |
| | " Life in the time of COVID: Winning battles and forging ahead" |

Fresh insights and new directions in university education
Senior Professor Sujeewa Amarasena

Role of viral diagnostics in living with the pandemic
Dr Nayomi Danthanarayana

Transforming the ETU: Leading the way in making hospital safe for all
Dr Ganaka Senaratne

Forging ahead with COVID-19
Dr Lasantha Malavige

| 1220-1320 hrs | Postgraduate research presentations |

Surgical site infections following coronary artery bypass grafting at the Teaching Hospital, Karapitiya
Dr SS Wickramasinghe, Department of Microbiology, Faculty of Medicine, University of Ruhuna

Past illicit drug use among incarcerated males in prison, Galle: A descriptive cross sectional study on Sri Lankan experience.
Dr I L A N Darshana, Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Immunohistochemical assessment of PTEN expression and its association with tamoxifen resistance in ER positive breast cancers.
Dr T W Wijesiri, Department of Pathology, Faculty of Medicine, University of Ruhuna

Demographic details, clinical characteristics, complications, burden and outcome of patients with acute febrile illnesses in Southern Sri Lanka.
Dr D R Palangasinghe, Department of Medicine, Faculty of Medicine, University of Ruhuna

1320-1400 hrs	Lunch & Poster session II
1400-1500 hrs	Free paper session, Open category
1500-1600 hrs	Free paper session, Undergraduate category
1600-1630 hrs	Awards Ceremony
1600-1645 hrs	Tea

Hopes with COVID-19 crisis: Are there any?

Dr Ananda Wijewickrama,
MBBS, MD, MRCP, FCCP
Consultant Physician,
National Institute of Infectious Diseases

From the beginning itself, COVID-19 created a panic because of the associated high mortality rates. Initial estimates from China showed a mortality rate of around 3-6%, but the case fatality rate of hospital admitted patients was much higher. Subsequently, though it was understood majority would get asymptomatic or mild illness, data from Europe and Americas too showed high case fatality rates in hospitalised patients.

Un-precedent number of clinical trials followed seeking a treatment. Yet, it became difficult as the pathogenesis of the illness was poorly understood. Many products, including antivirals, antibacterials, immune-modulators, and traditional medical products are being tested. However, no drug is found to be a definitive treatment yet. Evidence on Hydroxychloroquine was conflicting. Remdesivir showed only a marginal benefit. Neither Tociluzomab nor convalescent plasma showed any benefit. Only dexamethasone, showed a significant mortality reduction though its effect may be in a subgroup and not in all.

Lack of a definitive treatment together with the high requirement of ICU care resulted in a panic production of ICU ventilators. Yet, number of deaths continues to rise in the West. Many areas, sometimes countries are in lock-down. Economies are crumbling.

Is there a hope in this crisis?

Several vaccines are given emergency approval and are already in use. Only the time will tell how long the protective effect of these lasts. In addition, already problems have arisen in the production and distribution of vaccines. It is quite apparent that we will have to live with COVID-19 for at least a year if not more.

Individuals, families and institutions in addition to governments have a huge role in working positively in this crisis. Some institutions have already performed exemplarily. Many programs have been developed to help families to look after their children. Number of individuals have come up with new inventions. These need to be encouraged and streamlined.

This being primarily a health related issue; doctors have many important roles to play. Advocacy, giving leadership to institutions and programs and doing research are some of those. It is important to have an inclusive method of positively working in this crisis. Then only we can survive and win.

Fresh insights and new directions in University education

Senior Professor Sujeewa Amarasena
MBBS(Ruh)MD(Paed- Col), DCH (Col),DCH(Sydney), FSLCPaed
Vice Chancellor
University of Ruhuna

Sri Lankan Universities were very traditional before the COVID 19 pandemic with reluctance to change and slow to adopt new approaches to resolve issues in higher education. The crippling effect of the pandemic forced the academics and administration to rethink this approach. The traditional model had to change overnight to a virtual University and sustain education to all undergraduates. The administrative functions had to maintain all the activities disregarding the pandemic. This was successfully done within the University of Ruhuna.

The Council, Senate and all the other statutory meetings shifted to virtual mode immediately. Almost all the functions of administration such as recruitments, promotions, capital work, procurement, salaries, financial management, were easily shifted to virtual mode.

Teaching shifted to online mode very quickly conducting all class room based lectures, tutorials, discussions on line with some components of the examinations like viva, presentations, assignments. Yet paper based assessments could not be done online except mock examinations. The online access issues were resolved for a majority while those in need were clearly identified for subsequent interventions. Adjustment and adoption were not difficult while monitoring teaching learning activities was very accurate. Adjustment challenges were seen in practical / field work, clinical training and laboratory based learning.

New initiatives to keep student determination intact with the pandemic such as cultural activities, new languages, motivation speeches, career guidance were commenced. Employability issues and readiness for jobs were discussed along with the impact of COVID-19 on the job market.

The research moved into impact of COVID 19 assessment on every sector. Mobilizing the university into community for a needs based service was accepted by academics willingly. The services covered students, temporary staff, and poor communities. Research covered media culture and impact on economy covering every sector. Majority showed drop in income while it increased in 1% of the survey sample with the pandemic. Technological support for COVID 19, scholarships, laptops, funding were other developments.

The pandemic challenged an ailing education system and provided opportunities for a rapid transformation. Addressing equity gaps in education became extremely important and showed the vulnerability of an old model in education. New initiatives if successful could have a lasting impact to the work force making them technically competent with leadership skills to help Sri Lanka emerge as a new fast developing country in the region.

A new era in sustainable blended education is on the way.

Role of viral diagnostics in living with the pandemic

Dr. Nayomi Danthanarayana
MBBS, Dip (Medical Microbiol), MD (Medical Virology)
Consultant Virologist
Teaching Hospital, Karapitiya

Out of the many natural challenges we have faced, COVID-19 stands out to be the most devastating biological hazard in the 21st century due to the accelerated contagiousness of the virus.

Diagnostic testing has provided a tremendous contribution in mitigating the pandemic supporting etiological diagnosis, patient monitoring, as well as epidemiologic surveillance. Molecular tests are the basis for confirmation of COVID-19, but serological tests are being recognized to play an increasingly important role in understanding the epidemiology of the virus and in identifying populations at higher risk for infection. Improved point- of-care tests will have the advantage of rapid, accurate, portable, low cost and non-specific device requirements, which provide great help for disease diagnosis and detection in resource limited settings and also in mass scale. In addition to the available diagnostic methods, there is a sudden surge for development of various novel methods and platforms to diagnose the COVID-19 which are under evaluation. These available diagnostic methods have their own limitations and should be interpreted with caution.

Testing laboratories are facing substantial hurdles in providing timely and efficient diagnostics, which basically include inadequate infrastructure and supplies and shortage of technical and human resources to cater the enhanced volume of tests.

Transforming the ETU: Leading the way in making hospital safe for all

Dr Ganaka Senaratne
MBBS, MD, MRCP (UK), MRCP (London), FRCP (London), FCCP
Consultant Physician
Teaching Hospital, Karapitiya

Our lives, both as individuals and those serving institutions have been forced to change by COVID. The ETU THK was no different and had to face up to this universal phenomenon.

Our work at ETU comprises of arranging care for all unbooked admissions, all booked admissions, all unstable patients, all out of hospital arrested patients and all out of hospital deaths brought to us. This means that we have to equally cater to patients whose risk can be assessed verbally before starting clinical management and whose risk cannot be assessed before commencing emergency lifesaving clinical management. The diversity among our patients is parallel to the complexity of the services they are getting; ranging from admitting to clerking to resuscitation to intensive care to discharge to ward or home, during a short period of time.

Providing the best possible care for all our patients has been our vision and mission right through. But doing it to the whole spectrum of patients during the time of COVID was a major battle we faced due to suboptimal infrastructure, staff stigma, 'phobia' and stress.

We spent time as a team discussing, arguing, synthesizing, rehearsing de novo systems of offering best care for patients and putting them into practice whilst preventing transmission of COVID infection to staff. All those systems were reassessed and modified in the best possible way. "All for one and one for all" culture was adopted to ensure each member is cared for and attended to. This helped the ETU team to prosper as a family and to get over the stigma, 'phobia' and stress and to build up confidence and commitment. At the same time we were voluntarily supported by our relatives, neighbours and friends in and around the hospital to build our infrastructure.

As of today we as the ETU family were able to win the battle against the 'phobia', stigma. stress and suboptimal infrastructure to streamline state of art systems of delivering complex bundles of care for such a diversified population of patients. We are now forging ahead to mitigate the effects of COVID epidemic and ultimately win the battle.

Forging Ahead with COVID-19

Dr. Lasantha Malavige
MBBS, PhD
Consultant in Sexual Medicine &
Chairman, Lassana Group of Companies

COVID-19 has presented us with unprecedented challenges. The ability to evolve fast to changing and challenging situations has been the most important aspect in survival. Furthermore, acute challenges give us an opportunity to re define who we are.

Creativity and positivity are the key elements in adopting and forging ahead with the new challenges. I would like to share Lassana Flora story to the COVID-19 challenge together with seven key strategies to enhance our creativity to forge ahead with vigour.

Past illicit drug use among incarcerated males in prison, Galle: a descriptive cross sectional study on Sri Lankan experience

Darshana ILAN[1], Ruben R[2], Wijesinghe CJ[1]

[1]Department of Community Medicine, Faculty of Medicine, University of Ruhuna

[2]Psychiatry unit, Teaching Hospital, Karapitiya

Abstract

Illicit drug use is a growing problem in Sri Lanka. There is a direct relationship between the illicit drug use and crimes. A significant proportion of prison admissions is illicit drug related in many countries including Sri Lanka. This study aimed to describe the patterns, determinants and associated health and social problems of past illicit drug use among incarcerated males in Prison, Galle. A descriptive, cross-sectional study was conducted among 441 incarcerated males in Prison, Galle, selected using simple random sampling. A pre-tested, interviewer assisted, self-administered questionnaire was used to assess the past history of illicit drug use behavior and presence of known health and social problems related to drug use. Addiction to illicit drugs and problematic levels of drug use were determined using ICD 10 symptom check list and Drug Abuse Screening Test (DAST-20). The judgmental validity of the questionnaires was assessed by expert opinion. Data were analyzed using Statistical Package for Social Sciences (SPSS) software. Ethical approval was obtained from the Ethical Review Committee, Post Graduate Institute of Medicine, University of Colombo. Nearly half of the prison admissions were due to drug related offences (n=216, 48.9%) and among them, majority (n=163, 75.5%) were due to keeping illicit drugs for consumption. Past illicit drug use was reported among 57.6% (n=254) of male prison inmates and 56.7 % of them (n=144) were addicted to illicit drugs. A high level of problematic drug use was reported among 35.4% of the drug users. Cannabis and heroin were the commonest illicit drugs used before imprisonment. Younger age, being unmarried, engaging in manual works and use of alcohol and tobacco were significantly more likely to be associated with past illicit drug use. Younger inmates and those with a history of poly drug use were more likely to be addicted to illicit drugs. Younger ages, history of poly drug use and drug dependence were associated factors for problematic use of illicit drugs among prison inmates. Health and social problems due to past illicit drug use were common among prison inmates and their presence was associated with poly drug use, drug dependence and problematic drug use. In conclusion, past illicit drug use and related health and social problems are common among inmates in Prison, Galle, creating a considerable burden for the prison system of the country. Urgent attention of policy makers is needed to address the prevention of the illicit drug use in the country.

Key words: illicit drug use, drug dependence, incarcerated males, health problems, social problems

Introduction

Psychoactive substances are defined as 'substances that, when taken in or administered into one's system, affect mental processes' (1). Illicit drugs are psychoactive substances that production, sale or use is prohibited (1). Heroin, cannabis, cocaine, crystal meth, hallucinogens and other psychotropic drugs etc. are illicit drugs that are commonly found in Sri Lanka and addiction or usage of these have become a significant problem to the society (2). It hurts not only

the people who take drugs but also the people around them including children, family and extended society (3). Further, it can cause a significant burden to the economy of the country, mainly for health services and rehabilitation programs (2,4).

Illicit drug use can affect people at any age, from any background, rich or poor. It leads to many health and social problems. Respiratory infections including tuberculosis, cardiovascular diseases, stroke, nutritional problems, suicides and deliberate self-harm, accidents, sexually transmitted diseases, blood borne viral infections and mental disorders etc. are the common health problems associated with illicit drug use (5,6). The common social problems linked with illicit drug use are financial problems, trouble at work or losing a employment, academic impairment, child abuse and neglect, driving accidents, conflicts and violence in and outside the home, crime and legal problems and troubles in relationships etc. (5,7). Among these problems, crimes and legal problems should receive more attention because they further account for familial, social and economic consequences at individual, family, community and national levels.

There is a direct relationship between the drug use and crimes (8). It was found that these problems arise mainly due to four reasons (9). According to Collins, illicit drug intoxication can lead to crimes or drug dependence is associated with a high cost that can lead to lucrative crimes. Drug users engage in drug related crimes such as consumption, growing or manufacturing, smuggling, possession and trafficking of illicit drugs as defined by law. Further, the distribution system for illicit drugs can lead to competition and fraud leading to threats and violence.

A significant proportion of prison admissions in many countries, including Sri Lanka is drug related (10). It was reported that there were nearly 80,000 drug related arrests in Sri Lanka in the year 2016 with a prevalence of 390 per 100,000 population (2). Nearly 24000 drug related prison admissions were reported in the same year.

Prison population is considered as one of the most

vulnerable groups among vulnerable populations. Although they deserve to be the focus of some health and social interventions, according to literature, less attention is given to this group across the world (11). Few studies have been carried out to identify patterns and determinants of illicit drug use among drug addicts in Sri Lanka, particularly among prison population (12). However, no studies have been carried out so far to identify patterns and determinants of past illicit drug use and its associated health and social problems among prisoners in Sri Lanka. This lack of data has further impeded the development and implementation of preventive and health promotion activities targeting illicit drug users including prisoners. Therefore, this study was designed to identify the patterns, determinants and associated health and social problems of past illicit drug use among incarcerated males in Prison, Galle, the findings of which may prove useful in planning early prevention and rehabilitation programs.

Materials & Methods

Study setting and participants

A descriptive cross-sectional study was conducted among 449 randomly recruited incarcerated males in Prison, Galle from February 2018 to January 2019. The study sample included adult male prisoners who were convicted, remanded or who had appealed against the conviction and only those admitted within one year prior to data collection were included to minimize recall bias. Prisoners who were diagnosed to have psychiatric illnesses by the prison medical unit and mentally unsound to respond to the study questionnaires and female prisoners were excluded from the study.

Subject recruitment

The pison register was used as the sampling frame and the participants were selected from the register using computer generated random numbers until the required sample size was achieved. After confirming eligibility, each study subject was approached through the prison medical center. The support of the Prison Medical Officer was obtained for subject recruitment. Approval was obtained from the Board

of Study in Community Medicine, Postgraduate Institute of Medicine (PGIM), University of Colombo, Sri Lanka to conduct the study. Permission was obtained from the Commissioner General of Prison, Department of Prison, Ministry of Justice and Prison Reforms, Sri Lanka to recruit the subjects. Ethical approval for the study was obtained from the Ethical Review Committee of the PGIM, University of Colombo, Sri Lanka.

Study instrument

A pretested, interviewer assisted, self-administered questionnaire with closed ended questions was used to assess the socio-demographic information, past history of illicit drug use behavior and associated health and social problems among study participants. The questionnaire consisted of five parts. Part A included personal information including socio-demographic data and other potential correlates of illicit drug use. Part B included past history and patterns of past illicit drug use; which was prepared based on the European Questionnaire on Drug Use among Prisoners (EQDP) (13). Part C included ICD 10 symptom checklist for substance abuse disorders to assess drug dependence. Part D included Drug Abuse Screening Test (DAST)-20 by Harvey A. Skinner (1982) to assess problematic level of drug use (14). Part E included health and social problems known to be associated with illicit drug use. The part A, B and E of the questionnaire were designed based on existing literature, expert opinion and the guidance of the supervisor. The judgmental validity of all five parts of the questionnaire was assessed by a panel of three specialists related to the field of study; namely, a Consultant Psychiatrist, a Consultant Community Physician and a Behavioral Scientist.

Data collection

All data were collected by the principal investigator with informed written consent in a separate room with privacy, where only the principal investigator and the research participant were present. In order to ensure a high response rate and accuracy of data divulged, the participants were assured that the information collected will be used only for research purposes and no personally identifiable information will be collected. The questionnaire was given to the participant for completion except part C. The investigator was available to assist the research participants while completing the questionnaire and provided necessary clarifications during the whole procedure. The principal investigator interviewed research participants in part C of the questionnaire to identify illicit drug addiction disorder before imprisonment. Support from a language translator was obtained when required. Data collection was continued till the required sample size was achieved.

Data Analysis

Data were coded and entered into an Epi-info data sheet and transferred to a data base created using the Statistical Package for Science (SPSS) software (version 20). After cleaning the data set, frequency tables and other descriptive methods were applied to observe the behavior of different variables. Categorical data were analyzed using percentages and quantitative data were summarized as mean, SD, median, mode and range.

In the ICD 10 symptom check list for substance use disorder, if three or more of the symptoms among items 1, 2, 3, 5, 7 and 9 in ICD 10 criteria were present, the participant was classified as having drug dependence syndrome. In the DAST-20, each 'yes' response scored 1 point and 'no' response scored 0 point except for items 4, 5, and 7, which required reverse scoring. According to total marks, 0 marks was taken as no problem reported and a total score of 1-5, 6-10, 11-15, 16-20 were taken as presence of drug abuse in low, moderate, substantial and severe levels respectively. DAST score was compared with the American Society of Addiction Medicine (ASAM) Placement Criteria to assess problematic level of illicit drug use (15). For the purpose of subsequent analysis, drug users with DAST scores compatible with level III and IV of ASAM criteria were considered as having high problematic level and drug users with DAST scores corresponding to level I and II were considered as having low problematic level. Associations between categorical variables were assessed using Chi square test of independence. Level of probability was considered as 0.05.

Table 1: Type of drug related crimes among incarcerated males with drug related prison admissions in Prison, Galle (n=216)

Type of drug related offence	Number	Percentage (%)
Keeping illicit drugs for consumption	163	75.5
Lucrative crime to obtain money or drug	24	11.1
Threats and violence related to illicit drugs distribution	21	9.7
Crime during intoxication	8	3.7

Results

Sample characteristics

A majority of the study subjects were from Galle district (n=419, 95 .0%), Sinhalese (n=415, 94.1%) and Buddhist (n= 411, 93.2%). More than half of the study participants (n= 232, 52.6%) were above 30 years. Three fourth of the sample had an education level below G.C.E O/L (n=334, 75.7%), were manual workers (n=327, 74.1%) and living in a nuclear family setting (n=312, 70.7%). Nearly sixty percent of the study participants were married (n=261, 59.2%). A majority (n=303, 68.7%) had a satisfactory monthly income of over Rs 25000.

Information on imprisonment

A majority (n= 361, 81.9%) of the study subjects were in prison for less than six months. Nearly half of the sample were admitted with drug related offences (n=216, 48.9%) and 48.5% (n=214) were readmissions. Types of drug related offences among male prison inmates is presented in Table 1.

Among drug related offences, majority (n=163, 75.5%) were due to keeping illicit drugs for consumption.

Patterns of past illicit drug use among incarcerated males in Prison, Galle

Past illicit drug use was reported among 57.6% (n=254) of incarcerated males in prison Galle (Figure 1). Among past illicit drug users, 56.7 % (n=144) were addicted to illicit drugs according to the ICD 10 symptom check list for substance use disorder. It was 32.7% of the total study sample.
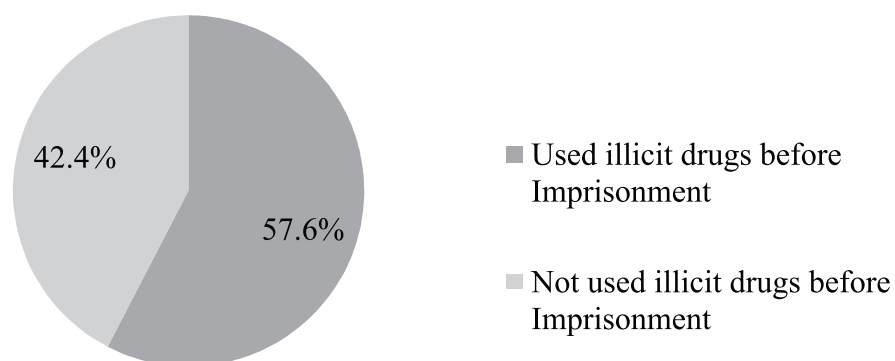
Figure 1: Proportion of past illicit drug users among incarcerated males in Prison, Galle (n=441)

Cannabis (n=204, 80.3%) and heroin (n=148, 58.2%) were the most commonly used illicit drug before imprisonment and on regular basis for a long time. Poly drug use was reported by 36.2% (n=92) of the inmates with a history of drug use and injecting drug practices was reported by 13.7% (n=35). Shared use of illicit drugs was reported by 41.7% (n=106) drug users. Approximately 69% (n=175) had used illicit drugs for more than three years. Fifty-seven (22.4%) illicit drug users spent more than Rs. 2000 per day for illicit drugs and friends helped to purchase drugs for day-to-day consumption for 52.4% (n=133). Approximately 65% of the drug users used to consume illicit drugs at some remote area away from their usual residence. Illicit drugs were introduced to non-users by 9.1% (n=23). Use of alcohol (n=181, 71.3%) and tobacco products (n=229, 90.2%) were reported in a high proportion of prison inmates with a history of past illicit drug use.

Initiation of drug use

A majority (n=102, 40.2%) had initiated their journey of illicit drug use between 19-24 years and had started using illicit drugs as an experiment (n=203, 79.9%). Illicit drugs were introduced by friends for most of the drug users (n= 221, 87.0%) for the first time. Smoking (n=204, 80.3%) acted as the gate way for illicit drug use for a majority of drug users followed by alcohol (n=17, 6.7%) while 13.0 % (n=33) had initiated illicit drugs straight.

Risk behaviors associated with past illicit drug use

High risk behaviors for Sexually Transmitted Diseases (STD) and Blood Borne Viral Infections (BBVIs) were a common finding among the prison inmates with a past history of drug use. Nearly 44% of the drug users reported ever being tattooed or body pierced by someone who was not a professional. Unprotected homosexual behavior, having multiple sexual partners and having sex with commercial sex workers were reported by a considerable proportion of past drug users (n=23, 9.1%; n=101, 39.8% and n=106, 41.7%, respectively). Approximately 76.4%

(n=194) of incarcerated male illicit drug users a history of exposure to at least one of high risk behavior for STD and BBVIs.

Problematic level of drug use among past illicit drug users

According to the scores of DAST-20, only 8.3% (n=21) of the illicit drug users in Prison, Galle had severe problematic level of addiction followed by substantial, moderate and low problematic levels in 27.2% (n=69), 27.2% (n=70) and 37.0% (n=94), respectively.

Of the inmates with past drug use, 35.4% (n=90) required inpatient rehabilitation care while 164 (64.6%) could be managed as outpatient clients according to the American Society of Addiction Medicine Placement Criteria.

Determinants of illicit drug use among incarcerated males in Prison, Galle

Determinants of illicit drug use among incarcerated males in Prison, Galle was assessed under three categories; factors associated with past illicit drug use, factors associated with addiction to illicit drugs and factors associated with problematic use of illicit drugs.

Statistically significant associations for past illicit drug use were identified with age, occupation, marital status, use of alcohol and use of tobacco. The findings are presented in Table 2.

Those who were in younger age groups (χ^2= 15.8, p<0.001), unmarried (χ^2= 14.9, p<0.001), engaged in unskilled manual works (χ^2= 5.8, p=0.015) and who had a history of use of alcohol (χ^2= 4.65, p=0.031), and tobacco (χ^2= 78.27, p<0.001),) were more likely to have used illicit drugs in the past. Educational level ($\chi2$= 0.007, p=0.933), family type ($\chi2$= 1.0, p=0.303) and monthly income ($\chi2$= 2.4, p=0.114) were not statistically significantly associated with past illicit drug use.Statistically significant associations for addiction to illicit drugs were identified with age, a poly drug use and prison readmissions. The findings are presented in Table 3.

Table 2: Association of past illicit drug use and socio demograhic factors (n=441)

Characteristics	Past illicit drug use		Total	Chi value (df = 1)	p value
	Yes(n=254) No (%)	No(n=187) No (%)	No (%)		
Age Category (years)					
19-24[#]	69(71.8)	27(28.2)	96(100.0)	15.83	**<0.001**
25-30[#]	72(63.7)	41(36.3)	113(100.0)		
31-36*	65(67.7)	31(32.3)	96(100.0)		
>36*	48(35.3)	88(64.7)	136(100.0)		
Occupation					
Not employed[♦]	29(58.0)	21(42.0)	50(100.0)	5.86	**0.015**
Professional and semi – professional[♦]	0(0.0)	1(100)	1(100.0)		
Non manual workers[♦]	36(57.1)	27(42.9)	63(100.0)		
Skilled manual workers[♦]	105(65.6)	55(34.4)	160(100.0)		
Unskilled manual workers	84(50.3)	83(49.7)	167(100.0)		
Marital Status					
Married	131(50.2)	130(49.8)	261(100.0)	14.96	**<0.001**
Unmarried[¶]	118(69.8)	51(30.2)	169(100.0)		
Separated [¶]	2(33.3)	4(66.7)	6(100.0)		
Divorced[¶]	3(60.0)	2(40.0)	5(100.0)		
Use of Alcohol					
Yes	181(61.1)	115(38.9)	296(100.0)	4.65	**0.031**
No	73(50.3)	72(49.7)	145(100.0)		
Use of Tobacco products					
Yes	229(69.8)	99(30.2)	328(100.0)	78.27	**<0.001**
No	25(22.1)	88(77.9)	113(100.0)		

♦ amalgamated, # amalgamated, ¶ amalgamated, ¶ amalgamated

Table 3: Association of addiction to illicit drugs and socio demographic factors (n=254)

Characteristics	Addicted to illicit drugs		Total	Chi square value (df = 1)	p value
	Yes(n=144) No (%)	No(n=110) No (%)	No (%)		
Age Category (years)					
19-24[#]	31(44.9)	38(55.1)	69(100.0)	6.41	**0.011**
25-30[#]	39(54.1)	33(45.9)	72(100.0)		
31-36*	45(69.2)	20(30.8)	65(100.0)		
>36*	29(60.4)	19(39.6)	48(100.0)		
Poly drug use					
Yes	79(85.9)	13(14.1)	92(100.0)	50.01	**<0.001**
No	65(40.1)	97(59.9)	162(100.0)		
Readmissions to Prison					
Yes	91(62.8)	54(37.2)	145(100.0)	4.43	**0.035**
No	54(49.5)	55(50.5)	109(100.0)		

amalgamated, # amalgamated

Table 4: Factors associated with problematic level of drug use (n=254)

Characteristics	Problematic level		Total	Chi square value (df =1)	p value
	High (n=90) No (%)	Low (n=164) No (%)	No (%)		
Age Category (years)					
19-24*	15(22.8)	51(77.2)	66(100.0)	6.91	**0.009**
25-30 *	25(33.3)	50(66.7)	75(100.0)		
31-36#	32(49.2)	33(50.8)	65(100.0)		
>36#	18(37.5)	30(62.5)	48(100.0)		
Poly drug use					
Yes	60(65.2)	32(34.8)	92(100.0)	55.93	**<0.001**
No	30(18.5)	132(81.5)	162(100)		
Addicted to illicit drugs					
Yes	82(56.9)	62(43.1)	144(100)	67.25	**<0.001**
No	8(7.2)	102(92.8)	110(100)		

Those who were in younger age groups (χ^2= 6.41, p=0.011), who had history of poly drug use (χ^2= 50.01, p<0.001) and previous prison admissions (χ^2= 4.43, p=0.035) were more likely to have addiction to illicit drugs. Educational level (χ^2= 2.04, p=0.153), occupation (χ^2= 0.02, p=0.867), marital status (χ^2= 0.03, p=0.859), family type (χ^2= 0.15, p=0.695), monthly income (χ^2= 0.15, p=0.698) and having history of use alcohol (χ^2= 0.44, p=0.504) and tobacco (χ^2= 0.85, p=0.356) were not statistically significantly associated with addiction to illicit drugs.

Statistically significant associations for problematic use of illicit drugs were identified with age, with poly drug use and addiction status. Results are presented in Table 4.

Those were in younger age groups (χ^2= 6.91, p=0.009) who had a history of poly drug use (χ^2= 55.9, p<0.001) and had addicted to illicit drugs (χ^2= 67.25, p<0.001), were more likely to have problematic use of illicit drugs. Educational level (χ^2= 3.39, p=0.065), occupation (χ^2= 0.389, p=0.533), marital status (χ^2= 0.060, p=0.806), family type (χ^2= 0.296, p=0.586), monthly income (χ^2= 0.063, p=0.802), having history of use alcohol (χ^2= 1.99, p=0.158) and tobacco (χ^2= 0.004, p=0.950) and prison readmissions (χ^2= 3.77, p=0.051) were not statistically significantly associated with addiction to illicit drugs.

Health and social problems of past illicit drug users in Prison, Galle

Accident and injuries (n=59, 23.2%), dental carries (n=43, 16.9%), skin diseases (n=23, 9.1%), respiratory diseases (n=21, 8.3%) and suicidal attempts (n=13, 5.1%) were reported as common health problems among incarcerated males in Prison, Galle after initiation of illicit drug use. At least one health problem was experienced by 43.7 % (n=111) of these drug users.

Of the social problems, legal problems (n=185, 72.8%), financial problems (n=131, 51.6%), employment problems (n=66, 26.0%), disputes in community (n=60, 23.6%), disrupted family relationships (n=54, 21.3%) and disruption of academic activities/education (n=51, 20.1%) were identified as common problems encountered after initiation of illicit drug use. At least one social problem was reported by 83.0% (n=211) of the drug users.

Associations of presence of health and social problems with drug dependence, problematic use, poly-drug use and prison readmissions were assessed among incarcerated males in Prison, Galle. Results are presented in Table 5 and Table 6.

Table 5: Factors associated with presence of health problems due to past illicit drug use among incarcerated males in Prison, Galle (n=254)

Characteristics	Presence of health problems		Total	p value
	Yes (n=111) No (%)	No (n=143) No (%)	No (%)	
Poly drug use				
Yes	58(63.0)	34(37.0)	92(100.0)	**<0.001** *
No	53(32.7)	109(67.3)	162(100.0)	
Addiction to illicit drugs				
Yes	83(57.6)	61(42.4)	144(100.0.0)	**<0.001** *
No	28(25.4)	82(74.6)	110(100.0)	
Problematic level of use				
Low	53(32.3)	111(67.7)	164(100.0)	**<0.001** *
High	58(64.4)	32(35.6)	90(100.0)	
Readmissions to Prison				
Yes	69(47.6)	76(52.4)	145(100.0)	0.150
No	42(38.5)	67(61.5)	109(100.0)	

 * *Differences are significant at 0.01 level*

Table 6: Factors associated with presence of social problems due to past illicit drug use among incarcerated males in Prison, Galle (n=254)

Characteristics	Presence of social problems		Total No (%)	p value
	Yes (n=211) No (%)	No (n=43) No (%)		
Poly drug use				
Yes	89(96.7)	3(3.3)	92(100.0)	**<0.001** *
No	122(75.3)	40(24.7)	162(100.0)	
Addiction to illicit drugs				
Yes	134(93.1)	10(6.9)	144(100.0)	**<0.001** *
No	77(70.0)	33(30.0)	110(100.0)	
Problematic level of use				
Low	127(77.4)	37(22.6)	164(100.0)	**<0.001** *
High	84(93.3)	6(6.7)	90(100.0)	
Readmissions to Prison				
Yes	124(85.5)	21(14.5)	145(100.0)	0.230
No	87(79.8)	22(20.2)	109(100.0)	

 * *Differences are significant at 0.01 level*

Prison inmates who had history of poly drug use (χ^2= 21.93, p<0.001), were addicted to illicit drugs (χ^2= 26.25, p<0.001) and had a high level of problematic drug use (χ^2= 24.37, p<0.001) were more likely to have health problems after initiation of illicit drug use.

Prison inmates who had a history of poly drug use (χ^2= 19.16, p<0.001), were addicted to illicit drugs (χ^2= 23.57, p<0.001) and had a high level of problematic drug use (χ^2= 10.43, p=0.001) were more likely to have social problems after initiation of illicit drug use.

Previous prison admissions failed to show an association with presence of health problems ($\chi2$= 2.07, p=0.150) and presence of social problems ($\chi2$= 1.43, p=0.230) experienced after the initiation of illicit drug use.

Discussion

This study included 449 prison inmates and nearly 58% of them had reported use of illicit drugs at least once in their life before incarceration. Younger age, being single and engagement in unskilled manual jobs increased the likelihood of drug use in this population. Health and social problems were experienced by 44% and 83% of the drug users respectively, which were significantly associated with poly drug use, being addicted to drugs and a problematic level of drug use.

The study done by Dissabandara et al., (16) and the routine data collected and published by the Department of Prison, National Dangerous Drug Control Board (NDDCB) and Police Narcotic Beureau (PNB) has revealed that nearly 50% of the prison inmates were unmarried and 62.7% were unskilled workers. However, in this study, only 38.3% were unmarried and 37.9% were unskilled workers. The differences in socio-demographic data of the two samples could be due to the difference in the two study populations. The socio-demographic data differs from district to district in Sri Lanka and especially between Colombo and Galle districts (17).

In our study, 48.9% were imprisoned for drug related offences and among them 75.5% were due to keeping illicit drugs for consumption. These data are compatible with national data (18-20). Past illicit drug use was reported among 57.6% prison inmates, of whom 56.7% were drug dependent. No data were available from previous studies regarding proportion of past illicit drug use among prison inmates in Sri Lanka.

We showed a high proportion of drug dependence among male prison inmates in prison, Galle, compared to Dissabandara et al.'s 2009 study. Therefore, this discrepancy could be a true reflection of an increased use of illicit drugs in the population (21). This assumption is further supported by the fact that, some prison inmates (8.6%) who were not arrested for drug related offences, too had a history of past illicit drug use. According to the above facts, a significant burden on the prison system of the country can be noticed due to illicit drug use.

In comparison to our study, the data from Asian region show that 13.8% of prison inmates in India report a history of illicit drug use (22). However, this survey was limited to one state. In Nepal, past illicit drug use was reported among 27% of prison inmates (23). Though both these studies report lower proportions of illicit drug use than the present study, much higher proportions were reported elsewhere in the region. A study done in Iran found past illicit drug use among 79% of prison inmates (24), whereas another study from the same setting reveal a past dug use of 73.2% (25). In Taiwan, illicit drug use among prison inmates were reported as 62.1% among adults (26) and 42.2% in juvenile inmates(27).

Cannabis (80.3%) and heroin (58.2%) were identified as the most commonly used illicit drug before imprisonment among past illicit drug users in Prison, Galle, while poly drug use was reported among 36.2%. According to NDDCB, cannabis is the commonest illicit drug used in Sri Lanka. Cannabis is the only drug that is cultivated in Sri Lanka and it is widely used in Ayurveda medicinal practice since the ancient era. Although authority has been granted to cultivate cannabis in minimum numbers as a requirement of the indigenous medicinal practice, it is cultivated illegally in many parts of the country, especially in the dry zones(19).

Use of alcohol and tobacco products before imprisonment are wide spread among almost all

prison settings in the world (28). Further, cannabis (31.0%), cocaine (20.9%), opiate (10.6%) and injecting drug use practices (7.4%) were identified as common illicit drug practices in general population in low and middle income countries in six WHO regions; Africa, Americas, Eastern Mediterranean, Europe, Southeast Asia, and Western Pacific (28).

Determinants of past illicit drug use among incarcerated males in Prison, Galle

Younger age group, being unmarried, engaging in unskilled manual work, and a history of using other psychoactive substances were identified as determinants of past illicit drug use. Younger age groups are more likely to seek new experiences and this may make them more likely to engage in illicit drug use (29-30). Similarly, many unskilled manual workers are engaged in strenuous jobs, which provide an easy excuse for them to use illicit drugs such as cannabis as a means of alleviating aches and pains (31). Moreover, engaging in unskilled manual works allows them to earn money on a day-to-day basis and it will facilitate purchase of drugs for day-to-day consumption. Similarly, use of other psychoactive substances act as a gateway for illicit drug use and consumption of illicit drugs with alcohol and tobacco products is not uncommon both in local and global context (16, 32, 33).

In this study, younger age and history of poly drug use were identified as determinants for addiction among prison inmates. As younger age groups are more likely to use illicit drugs, they can easily get addicted with continuous exposure within a short time (34). Further, they like to experiment with different types of illicit drugs, usually ending up with poly drug use. Also, younger persons are more likely to attend night clubs and beach parties, which are good platforms for them to experience different types of illicit drugs, leading them to poly drug use (35).

In contrast to above, the educational level of the participants, family type and monthly income did not affect the past illicit drug use under all three categories of usage. Similarly, occupation and marital status were not associated with drug

dependence or problematic level of use among the inmates according to our study. As most of the study subjects had a history of alcohol and tobacco product use, confounding effect of this variable would have been minimal in this study.

Associated health and social problems of past illicit drug use among incarcerated males in Prison, Galle

This study identified accidents and injuries, dental carries, respiratory diseases, skin diseases and significant weight loss as common health problems among prison inmates. Those who had a history of poly drug use, are addicted to illicit drugs and had a high level of problematic drug use were more likely to have health problems related to illicit drug use. However, health problems were not assessed in depth in a descriptive manner and the participants were only asked to select the problems experienced by them from a given problem list that had been prepared according to evidence available in the literature. Although 'other' option was included to record anything other than those in the list, response rate was negligible for that option. Therefore, it could be anticipated that information bias can affect this part of the results. However, a comprehensive list of health problems identified through several sources was included in the questionnaire, minimizing this possibility. Although study subjects were recruited through prison medical center, there was a difficulty in accessing prison medical records for verification of reported health problems due to ethical issues.

Blood borne viral infections were reported by 1.2%. However, there were 41.7% with risky sexual behaviors among past illicit drug users, including 9.1% with homosexual behavior. Further 13.7% reported intravenous drug use. Although STD and blood borne viral infections were reported in lower percentages, considering the high prevalence of risk behaviors it will be worthwhile to screen prison inmates for those problems.

Legal problems, financial problems, employment problems, disputes in community, disrupted family relationships and disruption of academic activities were identified as common social problems and a

minor proportion (4.3%) of drug users had reported of domestic violence. Prison inmates who had a history of poly drug use, are addicted to illicit drugs and had a high level of problematic drug use were more likely to have social problems due to past illicit drug use. According to available evidence in Sri Lanka, disruption of family relationships, employment problems, legal problems, negligence within family and disruption of sexual relationships are common social problems among drug users (36). Interestingly, domestic violence was not reported in their study. In contrast, domestic violence was reported in a similar study conducted in Netherlands in relation to cannabis and cocaine use (37). Moreover, financial problems, legal problems and disruption of family relationships were reported in another study as social problems (38). Most of the drug users try to keep their problems due to illicit drug use under cover due to fear of discrimination. This further affects their problematic level of drug use(39).

To our knowledge this is the first study in Sri Lanka that makes a comprehensive assessment of past drug use among prison population, including patterns of usage, determinants and outcomes. However, there were a few limitations in this study. As prison population is considered 'a vulnerable population' it was necessary to take several precautions during the designing stage of the study. As the research addressed sensitive issues, some questions were omitted to avoid ethical issues, thereby limiting the comprehensiveness of assessment. Furthermore, the study population was limited to the Prison, Galle limiting the generalizability of findings as described elsewhere in this article. The possibility of recall bias and bias due to 'socially desirable responses' cannot be overlooked, although every step has been taken to minimize it.

In summary, this study has identified that a considerable proportion of prison admissions were drug related and illicit drug use was a very common problem among prison inmates in prison, Galle. Patterns and determinants of past illicit drug use among incarcerated males in this study are generally compatible with the research findings at national level despite socio demographic disparities except for a few differences in pattern observed due to geographical variations within country. This geographical heterogeneity is further confirmed when the study findings are compared with regional and global studies. However, determinants of past illicit drug use among prison inmates identified in this research were compatible with other research evidence. It was identified that health problems and social problems due to past illicit drug use among prison inmates were common and the poly drug use, drug dependence and problematic drug use were major associations of such problems.

The findings of this study will be helpful for policy makers and practitioners to identify vulnerable groups and develop preventive strategies to address drug related issues among prison inmates. Identification of prison inmates with past illicit drug use will be required at the time of prison admission, which will enable their early referral for proper rehabilitation care. These measures will be beneficial to reduce burden on prison system of the country from repeated imprisonment due to illicit drug use. Hence findings of this study can be used in national development of the country.

Conclusion

Nearly half of the prison admissions were due to drug related offences and among them, majority was due to keeping illicit drugs for consumption. Past illicit drug use was reported among nearly 58% of the male prison inmates. Of them, 56.7 % were addicted to illicit drugs and 35.4% had a high level of problematic drug use in the past. Cannabis and heroin were the most commonly used illicit drugs in the past and introduction to drugs by the closest friend was common. Past illicit drug use was associated with younger age, being unmarried, engaging in manual works and use of alcohol and tobacco products. Younger age and poly drug use were significantly related to addiction and high problematic use of illicit drugs. Health and social problems after initiation of illicit drug use were common among prison inmates, which were significantly associated with poly drug use, drug dependence and problematic drug use.

Recommendations

Past illicit drug use was a significant problem among male prison inmates in Prison, Galle. Drug related prison admissions, presence of drug dependence, problematic drug use and presence of health and social problems due to illicit drug use were reported in significant amounts among incarcerated males. Hence, more attention should be directed to address those problems through appropriate health and social interventions such as rehabilitation programs for drug users and screening for health problems. Further research studies are required to identify risk factors for illicit drug use especially among prison inmates. As there are limitations in routinely collected data by NDDCB, PNB and Prison department in relation to drug related offences, a comprehensive surveillance system is recommended for gathering information using a multi-sectoral approach. Future research studies should be designed to identify patterns, determinants and associated health and social problems of past illicit drug use among incarcerated males in other prison settings in Sri Lanka as the results of this study may not be generalizable for the entire country.

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Surgical site infections following coronary artery bypass grafting at the Teaching Hospital, Karapitiya

Wickramasinghe S S, Nagahawatte Ade S

Department of Microbiology, Faculty of Medicine, University of Ruhuna

Abstract

Infections of surgical incisions are now referred to as surgical site infections (SSIs) (1). SSIs result in substantial morbidity, prolonged hospital stays, increased direct patient costs and higher mortality. Therefore, minimizing SSIs is a top priority for surgeons and hospitals to ensure the safest environment for patients undergoing surgery (2). Aim of this study was to identify the incidence, risk factors and causative micro-organisms of surgical site infections (SSIs) associated with coronary artery bypass grafting (CABG) in patients admitted to Teaching Hospital, Karapitiya (THK).

This study was a descriptive, prospective study on surgical site infections among patients undergoing CABG in the Cardiothoracic Unit at THK. A total of fifty-five patients who were admitted to that unit for CABG from January 2010 to April 2010 were recruited into the study. Pre-operative methicillin resistant *Staphylococcus aureus* (MRSA) screening was performed in all patients and repeat screening was done for the patients who were colonized with *S. aureus*. Post-operative clinical samples were collected from suspected SSIs and antibiotic susceptibility tests were performed for isolated pathogens.

Fifty-five patients were recruited for the study including 40 males (72.7 %) and 15 females (27.3 %). Among them, presence of hypertension, diabetes and chronic obstructive pulmonary disease (COPD) were 49%, 38% and 2% respectively. Twenty percent of the surgical wounds were colonized with *S. aureus* and MRSA rate was 9.1%. The incidence of SSIs, all superficial incisional infections, was 18.2% (10/55). Colonization with *S. aureus,* diabetes and COPD seem to be associated with the development of SSIs. Out of all SSIs, 50% samples did not show any growth, whereas *Acinetobacter* spp. (30%), *Pseudomonas* spp. (10%) and coagulase negative Staphylococci (10%) were isolated in other samples.

Introduction

Despite advances in operative techniques, better understanding of the pathogenesis of wound infection, and wide spread use of prophylactic antibiotics, surgical site infections (SSIs) continue to be a major source of morbidity and mortality for patients undergoing operative procedures. Data from the United States Centre for Disease Control National Nosocomial Infections Surveillance (CDC NNIS) system shows that SSIs are the third most frequently reported nosocomial infections, accounting for 14-16% of such infections among hospitalized patients and 38% among surgical patients (3).

The rates of SSIs vary by the type of surgery, with the highest infection rates found with cardiac surgery (2.5 infections per 100 patients discharges), followed by general surgery (1.9 per 100 discharges), and burn /trauma surgery (1.1 per 100 discharges) (4). SSIs remain a feared complication of cardiac surgery, with a reported incidence of 0.25% to 2.9% (5). These infections result in prolonged hospitalization and increased cost of care and mortality (6). The risk of SSI may be increasing because the patient population undergoing CABG has changed substantially in recent years (7). Although a considerable amount has been documented concerning sternal wound infections after CABG, a little information has appeared in the literature regarding lower extremity morbidity. However, major leg wound complications at the great saphenous vein (GSV) harvest site can cause significant patient morbidity resulting in prolongation of hospital stay, increased hospital cost, and additional surgical procedures with associated deformities and limb loss (8).

Staphylococcus aureus is the main cause of SSIs in patients undergoing major heart surgery and the patient's endogenous flora is the principal source (9). Antimicrobial resistance among these and other clinically important pathogens is an increasing

problem (10). Reducing SSIs as much as possible should be the goal of all surgical practitioners and health systems. Various studies have shown that surgical site surveillance (especially in clean surgery) in an institution can be helpful in infection control measures. Therefore, CDC recommends that hospitals should routinely perform surveillance for SSIs and report the information back to surgeons (3).

In the cardiothoracic unit (CTU) at the THK, there are approximately forty patients undergoing CABG per month. There is no documented evidence available in Sri Lanka regarding SSIs at the sternal site and the harvesting site related to CABG and the associated risk factors among these patients which help largely in preventing these infections. Furthermore, it is much needed to find out the causative microorganisms associated with SSIs and their antibiotic sensitivity pattern in Sri Lanka which may help in early and effective treatment of these infections thus reducing prolonged hospital stay, cost of care and mortality. The aim of this study is to identify bacterial causes of SSIs and determine their antibiotic sensitivity patterns that would be useful for surgeons in the empirical treatment of SSIs among these patients. This study also attempts to identify risk factors associated with surgical site infections among patients undergoing coronary artery bypass grafting surgeries as well as to assess the relationship of perioperative carriage of *Staphylococcus aureus* with the development of SSIs. The baseline information generated would be useful in developing strategies for treatment and prevention of infections which seems to be a timely need.

Study design

This prospective descriptive study was conducted on the patients admitted for coronary artery bypass grafting surgery (CABG) to CTU at the THK for a period of 4 months duration commencing from 1st January 2010. The calculated minimum sample size was 45 according to the formula for a descriptive study considering P value at 5%, precision at 0.05 and prevalence of SSIs following CABG at 0.03. Considering the drop outs, a total of 55 patients who were admitted for CABG were enrolled after obtaining the informed consent. Patients who were admitted for a second open heart surgery

simultaneously apart from CABG eg: valve surgery, closure of septal defect and those who were admitted for CABG with a history of a previous heart surgery (Re-do surgery) were excluded from the study.

Materials and Methods

Pre-surgical risk factors including age, sex, height, weight, admission date, pre-operative stay in the hospital, smoking, underlying diseases (diabetes, chronic obstructive pulmonary disease (COPD), peripheral vascular disease (PVD), hypertension, renal disease, previous hospitalization and antibiotic treatment history and previous diagnosis of MRSA (methicillin resistant *Staphylococcus aureus*) colonization were recorded. Surgical data including date of surgery, elective or urgent, type of surgery, antibiotic prophylaxis and harvesting site were obtained from the BHT. Post-surgical data included were details about surgical site infections if present and date of discharge. Patients were seen at their routine follow up clinic visit in one-month time to observe presence of any SSIs.

For pre-operative MRSA screening, swabs were taken from four sites of each patient, namely anterior nares, throat, axilla and groin within 24 hours of admission to the CTU. Patients who were colonized with *S.aureus* were screened for the second time following decontamination before surgery. For post-operative clinical samples, a sample of pus or swabs were collected from surgical sites either on the sternum or leg harvesting site of the lower limb, if signs and symptoms of infection (eg; pus discharge, pain or tenderness, localized swelling, redness, or heat) were observed by the clinician. Same procedure was done if the patients had any SSI at the clinic visit one month following surgery.

Laboratory processing of samples were done according to the Laboratory manual of the College of Microbiologists (11). Pre-operative MRSA screening swabs were processed by using non-selective and selective (mannitol salt agar) media plates and examining at 24 hours and 48 hours of incubation. Sensitivity to methicillin was done on all *S. aureus* isolates using both oxacillin (1μg) and cefoxitin (30μg) discs.

Clinical samples of pus or swabs were inoculated into

different culture media and incubated at 35^0 -37^0 C aerobically. Direct Gram stained smears were examined. Pathogenic microorganisms were identified by colony morphology, Gram stain and basic identification tests (oxidase, catalase and coagulase tests) and antibiotic sensitivity tests were carried out to determine sensitivity pattern by disc diffusion method on Mueller-Hinton agar according to CLSI (Clinical Laboratory Standards Institute) guidelines, 2009 (11).

Data were entered into excel spreadsheet and were analysed using SPSS computer package. Descriptive statistics were used to explain study variables. Univariate analysis was done using x^2 test . P < 0.05 was taken as statistically significant.

Ethical clearance was obtained from the Ethical Review Committee of the Faculty of Medicine, University of Ruhuna, prior to commencement of study. Informed consent was obtained from all the study subjects. Confidentiality of data and anonymity of subjects were maintained. Reports were issued to the patients after processing the samples. Permission for the study was obtained from the Director and the Consultant Cardiothoracic Surgeon at the THK in August 2009.

Results

The 55 patients in the study group included 40 males (72.7 %) and 15 females (27.3 %). The mean age was of 57.5 years (ranged from 39 years to 71 years). A majority of patients of either sex (49.1%) were in the 56- 65 year age group. Only 3.6% of patients were less than 46 years. Most of the patients (67.3%) in the study population were of average weight (BMI 18-25 kg/m^2). Both obese (BMI more than 30) and malnourished (BMI less than 18) patients were low in

number (5.5%). All female patients and 27.5% males did not smoke during the previous 3 months before getting admitted to the ward. Out of all male patients, 10% had smoked more than 15 cigarettes per day. Regarding hospital stay, pre-operative stay in the hospital ranged from 4 to 27 days with a mean of 14.6 (±5.9) days. Post-operative stay ranged from 8 to 35 days with of 15.4 (±5.9) days. Among these patients, 38.2% had diabetes, 1.8% had COPD and 49.1% had hypertension. Majority of patients with diabetes (60.0%), COPD (6.7%) and hypertension (49.1%) were females. None of patients in the sample had PVD or renal diseases.

Among all patients, 20% (11) were colonized with *Staphylococcus aureus* (Figure 1). This included 90.9% (10/11) MSSA and 9.1% (1/11) MRSA.

S.aureus was mainly colonized in the nose of patients (16.4%). Colonization in the axilla and groin were 5.5% and 3.6% respectively. But it was not isolated in any of the samples taken from the throat (Figure 2).Almost 82% had *S.aureus* isolated only from a single site while 18.2% had *S.aureus* colonized in multiple sites. None of the patients were colonized with *S.aureus* after repeat screening of the patients who had undergone decolonization procedures.

Surgical site infections

The overall incidence of SSIs was 18.2% per 100 procedures (10/55). All the SSIs were superficial incisional SSIs affecting only the skin and subcutaneous tissue. SSIs occurring in the chest on the sternum were called as sternal SSIs. Those were occurring in the lower limb at the vein harvesting site were called as leg SSIs.
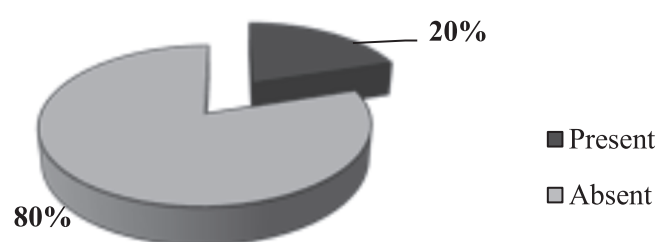
Figure 1: Colonization of Staphylococcus aureus among study population
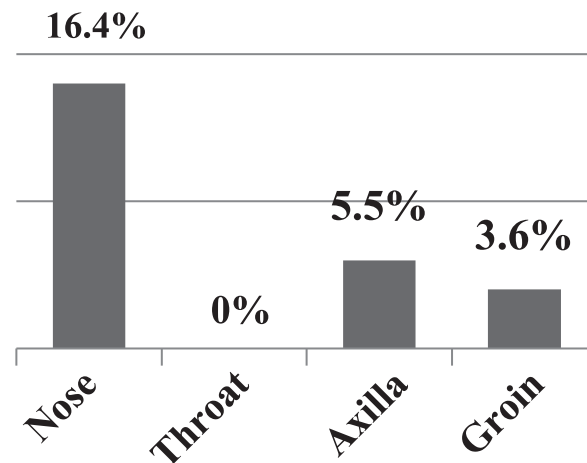
Figure 2: Distribution of *S.aureus* in percentages among study population

Sternum was the commonest site of infection (60%). None of them had deep infections and infections involving mediastinum (mediastinitis). Among males having SSIs, 66.7% had over the sternum and 33.3% had on the leg. Among females with SSI, equal number of patients (50.0%) had each type of SSIs (table 1). Post-operative stay in the ward from the time of surgery to the time of discharge from the ward. Mean duration of stay of patients with SSIs was 20.2 days and for those without SSIs was 14.3 days. The influence of risk factors for the development of SSIs was shown in table 2.

There was a statistically significant difference in SSI rate among patients having diabetes, chronic obstructive pulmonary disease and nasal colonization of *Staphylococcus aureus*. Patients of female sex, age >65 years, obesity, hypertension, prolonged hospital stay (≥7 days) and smoking did not show statistically significant difference in SSI rate.

Microbiology of SSIs

The mean recognition time for leg SSI was 9 days (range 3-15) after the operation whereas, for sternal SSI, it was 8 days (range 5-16). The causative organisms and their site of isolation was shown in table 3.

Sternum was the most common infection site. At the sternal site, most pus samples 66.7% did not show any growth. In the remaining 33.3% specimens, there was *Acinetobacter* spp. At the leg site, 25% pus samples did not show any growth and Coagulase negative Staphylococcus, *Acinetobacter* spp. and *Pseudomonas* spp. were isolated in 25.0% samples.

Table 1: Site and type of SSIs by gender

Site & type of SSI	Sex				Total	
	Male		Female			
	No	%	No	%	No	%
Sternal –Superficial	4	66.7	2	50.0	6	60.0
Leg- Superficial	2	33.3	2	50.0	4	40.0
Total	6	100.0	4	100.0	10	100

Table 2: Influence of risk factors for the development of SSIs

Risk Factor		SSI Present No	SSI Present %	Absent No	Absent %	Total No	Total %	Significance
Gender	Male	6	60.0	34	76.0	40	72.7	$x^2=0.99, df=1$
	Female	4	40.0	11	24.0	15	27.3	$p = 0.32$
Age	< 65 years	8	80.0	39	87.0	47	85.5	$x^2=0.99, df=1$
	≥ 65 years	2	20.0	6	13.0	8	14.5	$p = 0.58$
BMI (kg/m²)	<18(Malnourished)	0	0.0	3	6.7	3	5.45	$x^2=5.52$
	18-25 (Average)	6	60.0	31	68.9	37	67.3	$df=3$
	26-30(Over weight)	2	20.0	10	22.2	12	21.8	$p = 0.14$
	>30 (Obese)	2	20.0	1	2.2	3	5.45	
Diabetes	Yes	7	70.0	14	31.1	21	38.2	$x^2=5.24,$ $df=1,$
	No	3	30.0	31	68.9	34	61.8	$p = 0.02$
COPD	Yes	1	10.0	0	0.0	1	1.8	$x^2=4.58, df=1$
	No	9	90.0	45	100.	54	98.2	$p=0.03$
Hypertension	Yes	6	60.0	21	46.7	27	49.1	$x^2=0.58, df=1$
	No	4	40.0	24	53.3	28	50.9	$p = 0.45$
Preoperative stay	< 7 days	1	10.0	6	13.0	7	12.7	$x^2=0.82, df=1$
	≥ 7 days	9	90.0	39	87.0	48	87.3	$p=0.78$
Smoking habits	<15cigars/day	4	40.0	21	47.0	25	45.5	$x^2=2.46$
	>15cigars/day	0	0.0	4	9.0	4	7.3	$df =3$
	Non smokers	6	60.0	20	44.0	26	47.2	$p = 0.48$
S.aureus in Nose	Yes	5	50.0	6	13.3	11	20.0	$x^2=6.87,$ $df =1$
	No	5	50.0	39	86.6	44	80.0	$P = 0.01$
	Total	10	100	45	100.	55	100	

Table 3: Pathogens according to their site of isolation

Isolated pathogen	Site of SSI Sternal No	Sternal %	Leg No	Leg %	Total No	Total %
Coagulase negative Staphylococcus	0	0.0	1	25.0	1	10.0
Acinetobacter spp.	2	33.3	1	25.0	3	30.0
Pseudomonas spp.	0	0.0	1	25.0	1	10.0
No growth	4	66.7	1	25.0	5	50.0
Total	6	100.0	4	100.0	10	100.0
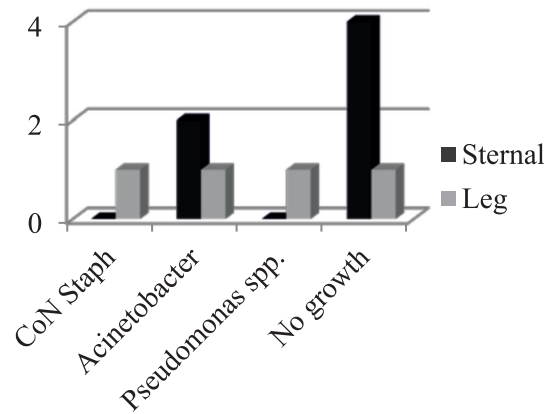
Fig 4: Pathogens according to their site of isolation

Table 4: Antibiotic Sensitivity Pattern of Isolates

Organism	ABST		
	Sensitive Antibiotic	Intermediate Antibiotic	Resistant Antibiotic
Coagulase negative Staphylococcus	VA DA	SXT	FOX CIP
Pseudomonas spp.	AK, CAZ CN, IPM, MEM		CIP TIM
Acinetobacter spp.	IPM MEM		AK CAZ CN CIP TIM
Acinetobacter spp.	IPM MEM		AK CAZ CIP CN TIM
Acinetobacter spp.	IPM MEM		AK CAZ CIP CN TIM

AK Amikacin, CAZ ceftazidime, CN Gentamicin, CIP Ciprofloxacin, DA Clindamycin, E Erythromycin, FOX Cefoxitin, IPM Imipenem, MEM Meropenem, SXT Co-trimoxazloe, TIM Ticarcillin + clavulanic acid , VA Vancomycin

The antibiotic sensitivity patterns of the isolated pathogens were shown in table 4. Isolated *Pseudomonas* spp. was sensitive to many antibiotics except ciprofloxacin and ticarcillin-clavulanic acid. Coagulase negative Staphylococcus was cloxacillin resistant and sensitive to vancomycin, clindamycin and erythromycin. All 3 isolates of *Acinetobacter* spp. were multi drug-resistant and sensitive to carbapenems and showed same antibiotic sensitivity pattern.

Discussion

This study was carried out in the CTU of Teaching Hospital, Karapitiya which of the three centers where major heart surgeries are being carried out in the state sector in Sri Lanka. The type of the operating theatre and the surgical team were the same throughout the study thereby keeping the procedure related confounding risk factors which can contribute to the development of SSIs, constant. All were routine surgeries and did not include a second open heart surgery or re-do surgeries keeping the total time duration of surgery also to a minimum. Preoperative preparation of patients including preoperative chest physiotherapy, adequate treatment of infections in remote sites and procedures for hand washing were the same.

In our study, 20% of patients were colonized with *Staphylococcus aureus* including 90.9% MSSA and 9.1% MRSA. In a study done at National Hospital of Sri Lanka, *S. aureus* carrier state in patients awaiting cardiac surgery was 34.7% and out of all *S. aureus* isolates 76.9% were MSSA and 23.1% were MRSA (12). When compared to these rates, patients in our study were less colonized with *S. aureus*. In an European study done by Munoz et al (2008), nasal carriage of *S.aureus* was 23% and MRSA rate was 9.4% showing similar results to our study (13). Kluytmans et al (1996) observed that the natural and main niche for *S.aureus* is the human nose, but other skin sites could also be colonized (14).

The incidence of SSIs in our study was 18.2% per 100 procedures which were all superficial incisional infections. The reported incidence of SSI has ranged between 2% -20%, the acceptable range being 11%-15% (15). In a study done in India by Bhatia et al (2003), the reported incidence was 18.9 % which was slightly higher than our study (16). Sternum was the commonest site of infection (60%) in our study. NNIS 2002 report also showed that total SSI rate was higher in chest (1.96 and 2.98 respectively) compared to that of the leg/donor site (1.43 and 2.45 respectively).

In our study, out of the patients who developed SSIs, 60% were males and 40% were females which did not show statistically significant difference even though most studies showed that females were associated with higher rates of SSIs (17). Patients who had diabetes or COPD showed statistically significant difference in SSI rates compared to those who did not have these diseases. But there was no significant difference in SSI rates among patients with or without hypertension. Most studies have shown that diabetes is associated with significant higher rates of SSIs (5,16,17).

In our study a majority of SSIs (60.0%) developed in patients with average BMI showing no statistical difference of SSI rates with increasing BMI or obesity. Even though there is difference of SSI rates among patients ≥ 65 years, there was no statistical difference. In the study done by Bhatia et al, 2003, they also did not show a significant correlation with infection among patients over the age of 66 years

(16). Similarly, there was no significant difference in SSI rates among patients who stayed in the ward for less than 7 days and those who stayed for ≥7 days. In the same study done by Bhatia et al (2003), they also did not show a statistical significance with longer preoperative stay (16). Also, majority (23.1%) of SSIs developed in the category of nonsmokers showing no significant difference in SSI rates among patients who smoked and did not smoke. Most studies showed that tobacco use was associated with higher rates of SSIs (3). In this study, there was a statistically significant difference in SSI rates among patients who colonized with *S.aureus* and who did not. Similarly, most studies showed that colonization with *S. aureus* was associated with higher rates of SSIs (3,13).

Out of all pus samples collected from SSIs, 50% did not show any bacterial growth in culture. *Acinetobacter* spp. were isolated in 30% while *Pseudomonas* spp. and coagulase negative Staphylococci were isolated from 10% each of pus samples. Majority (66.7%) of pus samples from the sternum and 25% from the leg site did not show any growth. Only *Acinetobacter* spp. (33.3%) was isolated from sternal wound while coagulase negative Staphylococci, *Acinetobacter* spp. and *Pseudomonas* spp. were isolated in equal number (25%) from leg wound. In a study done by Blanchard, et al in 1995, 85.5% out of all clinically diagnosed SSIs, did not grow any bacteria and only 14.5% (8/55) showed growth with *S. aureus, S.epidermidis* and *Serratia* spp (20). They have suggested that their prolonged antibiotic prophylaxis could have inhibited or slowed the bacterial growth and this theory could be applied to our study results also.

In a recent study done Haas et al (2005), the patient's own flora was found to be the primary source for the infective organisms (9). Farrington et al (1985) suggested leg surgical site or perineum may be the source of Gram negative bacteria that are transferred onto the sternal site when the saphenous vein is harvested (19).

Antimicrobial resistance among clinically important pathogens is an increasing problem (10). Except *Pseudomonas* spp., all other species were multiresistant organisms in our study. These resistant

organisms are likely result from prior exposure of the patient to the health care environment or broad spectrum antimicrobial therapy. The increasing resistance of Gram-negative organisms causing SSI parallels their increasing resistance when they cause other nosocomial infections (10, 17).

Conclusions

In our study, incidence of SSIs was 18.2%. The reported incidence of SSI has ranged between 2% - 20% and the acceptable range being 11%- 15%. All the infections were superficial. None of the patients had deep infections or mediastinitis. None of the patients died after surgery following infections. Among all patients, 20% (11) were colonized with *Staphylococcus aureus*. The commonest site of colonization was anterior nares of patients. Diabetes, chronic obstructive pulmonary disease and nasal colonization of *Staphylococcus aureus* seem to be risk factors for the development of SSIs. Female sex, age >65 years, obesity, hypertension, prolonged hospital stay (≥7 days) and smoking did not show an association with the development of SSIs. Commonest site of infection was the sternum. Majority of pus samples did not show any growth even though direct smear showed pus cells and organisms. Commonest organisms causing SSIs were Gram negatives (*Acinetobacter* spp. & *Pseudomonas* spp.)

Only 10% of infections were caused by Gram positives. No polymicrobial infections were seen among these patients.

Recommendations

Regular surveillance is required to detect the changing pattern of antibiotic resistance and helpful in infection control measures. Information gathered from the surveillance should be reported back to surgeons. Laboratory based diagnosis of bacteriological infection is desirable, before starting treatment or continuation of any treatment. Advices should be given to send a sample of pus than a wound swab to diagnose SSIs as it gives a better yield.

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Immunohistochemical assessment of PTEN expression and its association with tamoxifen resistance in ER positive breast cancers

Wijesiri TW[1], Peiris HH[2], Mudduwa LKB[1]

[1]*Department of Pathology, Faculty of Medicine, University of Ruhuna ,*[2]*Department of Medical Laboratory Science, Faculty of Allied Health Sciences, University of Ruhuna.*

Abstract

Although estrogen receptor (ER) positivity is a good prognostic factor in breast carcinoma (BC), a subset of patients has poor disease free survival (DFS). Mutation in phosphatase and tensin homologue deleted on chromosome ten (PTEN), is identified as a poor prognostic feature in BC. This study was designed to find out the impact of lost or poor PTEN expression on ER positive breast carcinoma, in terms of the recognized prognostic factors and to find out its association with tamoxifen resistance.

This was a retrospective, cohort study. BC tissue blocks submitted to our unit from 2006 to 2012 were selected. From the laboratory data, which also included the follow up data, patients who had ER positive BC, undergone mastectomy, treated with tamoxifen were selected. All clinicopathological parameters, disease free survival (DFS) and overall survival (OS) were analysed against lost or poor PTEN expression. Clinicopathological features were compared using Chi-square test. Kaplan-Meier model with log-rank test was used for the survival analysis.

A total of 130 BC patients satisfied the inclusion criteria. PTEN expression was lost or poor in 82.3% (n=107) patients. PTEN expression had a positive association with the level of ER expression (P=0.011) and a negative association with Nottingham prognostic index (NPI) (P=0.045) and pathological stage (P<0.048). Only 12.1% (n=16) patients had recurrences and 7.69% (n=10) had died over 51 months of mean follow up. There was no significant association between PTEN expression and survival.

This study showed that there is a statistically significant association between lost or poor PTEN expression and low ER expression, high NPI and stage 3 in ER positive BC. Further studies including larger study sample with a longer follow up are recommended to find out the association of PTEN with the survival in ER positive breast carcinomas treated with tamoxifen.

Introduction

Breast cancer is the second commonest cancer in the world and the most frequently occurring cancer among females. In the year 2012, 1.67 million new breast cancer cases were diagnosed and that is about 25% of all cancers around the globe. It is also the fifth leading cause of death of all cancers. Breast cancer is the commonest cause of cancer death in women in underdeveloped countries and the second commonest cause of cancer death in more developed regions in the world (1). In Sri Lanka, it is the leading cancer among females and accounts for 25.4% of diagnosed cancer among females (2). It also accounts for the highest cancer mortality in Sri Lankan females (2,3).

Tamoxifen is the most commonly used selective estrogen receptor modulator (SERM) which is used for the treatment and prevention of estrogen receptor (ER) positive breast cancer and it has been the first line treatment for premenopausal patients with ER positive breast carcinoma. Tamoxifen acts as an anti-estrogen agent in the breast tissue. It acts by binding to ER leading to a conformational change in the receptors. This results in blockage in the expression of estrogen dependent genes. The prolong binding of tamoxifen to the nuclear chromatin leads to decreased estrogen response by tumour cells, hence growth arrest and induction of apoptosis within the breast cancer cells (4).

PTEN, also known as MMAC1 (mutated in multiple advanced cancers), is a tumour suppressor gene located at chromosome 10q23. PTEN mutation is associated with tumorigenesis, cancer progression and drug resistance and it is the second most frequently mutated gene in human cancer after p53 (5,6). Varieties of human tumours are known to associate with PTEN mutation, which includes glioblastoma, prostatic carcinoma, endometrial carcinoma, breast carcinoma and melanoma. Germline mutations in PTEN gene are known to cause Cowden syndrome (CS)and Bannayan–Riley–Ruvalcaba syndrome (PTEN hamartoma tumour syndrome) characterized by a high risk of cancers including breast cancer. Affected female patients with CS syndrome have 25-50% lifetime risk of developing a breast carcinoma. Around 30-40% of sporadic breast carcinomas show PTEN loss (7).

PTEN acts as a tumour suppressor by antagonizing the phosphatidylinositol (3,4,5)-triphosphate kinase (PI3K)/proteinkinase B (Akt)signaling pathway by dephosphorylating phosphorinositol 3,4,5-triphosphate (PIP3),a key signaling component of PI3K/Akt pathway and thereby modulating cell cycle progression and cell survival. The biological consequences of inhibition of PI3K/Akt pathway include stimulation of apoptosis and inhibition of cell cycle entry by halting G1 to S phase progression leading to growth inhibition (8).Therefore, mutation or reduced expression of PTEN can lead to inhibition of tamoxifen induced apoptosis leading to tamoxifen resistance in PTEN mutated breast carcinoma (9).

Though many studies have been done in the past to identify the role of PTEN gene mutation in various cancers, its prognostic significance in breast cancer is not sufficiently investigated. A few studies have found out that reduced PTEN expression in breast cancer have a significant relationship with tumour size, pathological stage, lymph node metastases and ER and PR status (10,11,12).

The aim of the study was to investigate the role of PTEN gene as a prognostic marker in ER positive breast cancer patients by analyzing immunohistochemical expression of PTEN and analyzing its association with recurrence of disease, survival, stage, grade, tumour size and hormonal receptor status and to find out its association with tamoxifen resistance.

Materials and Methods

This was a retrospective, cohort study, which included 130 breast cancer patients. Breast cancer tissue blocks submitted to our unit from 2006 to 2012 were selected. Data from the laboratory data base and co-investigator's data base, patients who had ER positive BC, undergone mastectomy, treated with tamoxifen were selected. Wax blocks with perished tissue, H&E slides showing autolytic changes and patients who were stage IV at presentation were excluded from the study. All relevant clinical parameters were retrieved from the histopathology reports at the Department of Pathology, Faculty of Medicine, University of Ruhuna and the survival data were retrieved from the co-investigator's data base.

Following definitions were used to define recurrence free survival (RFS) and overall survival (OS) which are the same definitions that were used to define the above endpoints in the said data base that contains patients follow up details.

RFS – Time from the date of diagnosis to the date of confirmation of development of local, regional and/or distant recurrences (13).

OS – Time from the date of diagnosis to the date of death due to any reason (13).

Date of diagnosis of the disease - Date of diagnosis or confirmation of breast carcinoma by fine needle aspiration cytology (FNAC), tru cut, and incision or excision biopsy; whichever was done first.

Date of recurrence- Date of diagnosis of recurrence by histology, cytology or radiology; whichever was done first.

TMA blocks were prepared from the wax blocks with

breast cancer tissue for the PTEN assessment (Fig. 1 a). Normal breast tissue was taken as the control.

Immunohistochemistry

PTEN immunohistochemistry was done manually with anti-PTEN antibody (monoclonal, mouse anti human, clone 6H2.1, dilution 1:100, Dako) with EnVision system (HRP labeled Polymer, Dako) and chromogen Dako Dab liquid. Immunohisto chemistry staining was performed according to the protocol, which was optimized and validated for PTEN, in our laboratory.

The sections were taken on to poly-L-Lysine coated slides and were incubated overnight at a temperature of 60 ºC. Then the slides were deparaffinized and hydrated by passing through Xylene and graded series of alcohol. Antigen retrieval was performed by pressure cooking in pH 9 buffer. Then the sections were treated with endogenous peroxidase blocking buffer for 15 minutes to block the endogenous peroxidase activity. As the next step, sections were incubated overnight in the humidified chamber with PTEN primary antibody (6H2.1) (dilution 1:100). Afterwards, they were washed in PBS buffer twice and treated with the secondary antibody (EnVision system). After washing, Dab substrate buffer solution (freshly made) was added to the sections to reveal the PTEN antibody. Following this step, the sections were again washed with PBS buffer and counterstained with Harris Haematoxyline and differentiated with acid alcohol and mounted with DPX (Fig 1 b)

Interpretation of Staining for PTEN

PTEN immunohistochemical expression can show cytoplasmic and/or nuclear localization (14). In our study it was predominantly cytoplasmic and normal glandular epithelium was taken as the control as it showed immunoreactivity for PTEN. Duct epithelial cells and myoepithelial cells showed strong cytoplasmic staining for PTEN. Stromal cells and inflammatory cells also showed strong cytoplasmic staining for PTEN which were useful as internal controls.

Scoring for PTEN immunoexpression was done according to a semi-quantitative scale, introduced by Andrade et al., which is based on intensity of immunohistochemical staining (14). According to the intensity of staining, the tumours were divided in to three groups. Staining intensity of normal duct epithelial cells was taken as the control (Fig 2). The group assigned as "0" had no staining (Fig 3), group assigned as +1 had reduced staining (Fig 4) and group assigned as +2 had equal staining intensity (Fig 5), compared to normal duct epithelial cells (Table 1)

**Table 1:** Scoring of PTEN immune expression by tumour cells

| PTEN expression (compared to normal duct epithelial cells) by tumour cells	Score
No staining	0
Reduced staining intensity	+1
Equal staining intensity	+2
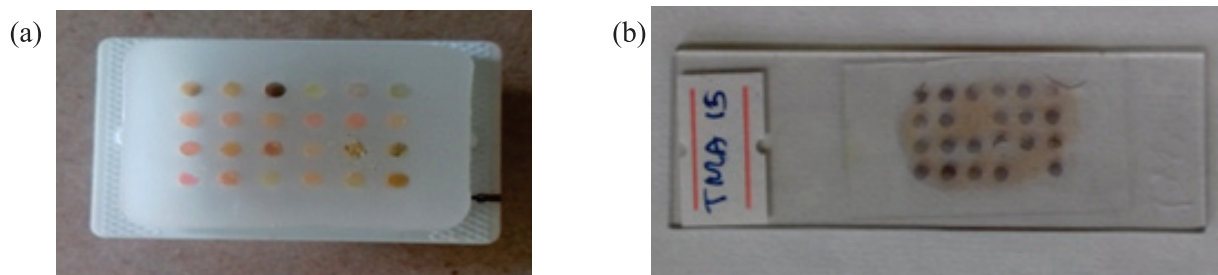
**Figure 1** (a) TMA block. (b) Immunostained slide for PTEN
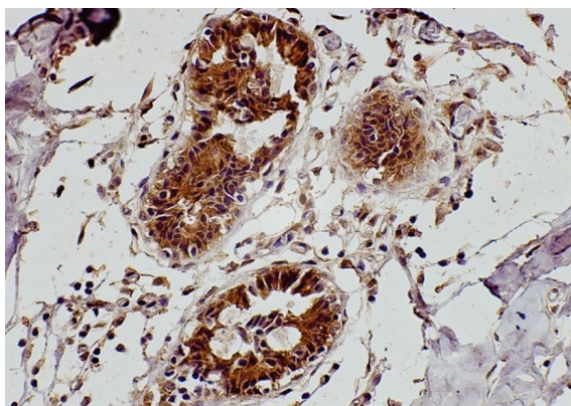
Figure 2: Normal breast tissue showing strong cytoplasmic positivity for PTEN. Background inflammatory cells also show cytoplasmic positivity for PTEN, which was useful as an internal control (x100).
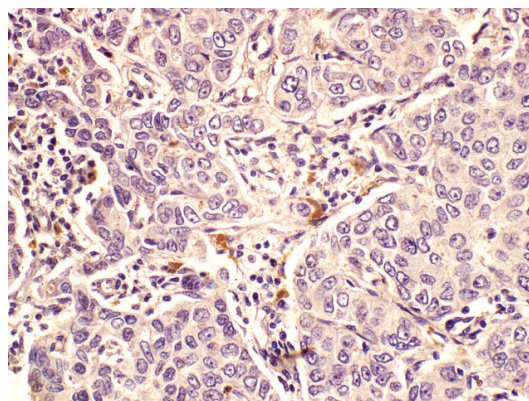
Figure 3: Score 0 = staining undetectable in tumour cells. Background inflammatory cells show cytoplasmic positivity (x100).
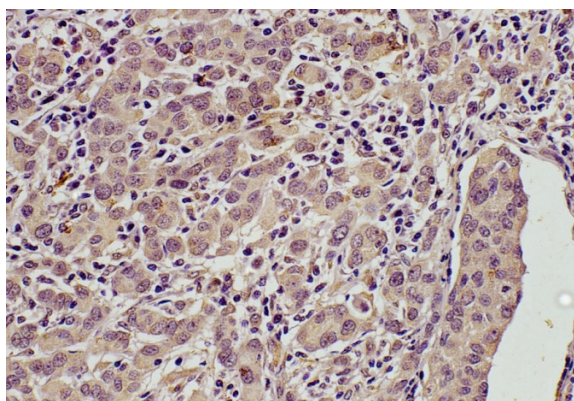
Figure 4 Score 1 = staining weaker than normal duct epithelial cells (X100)
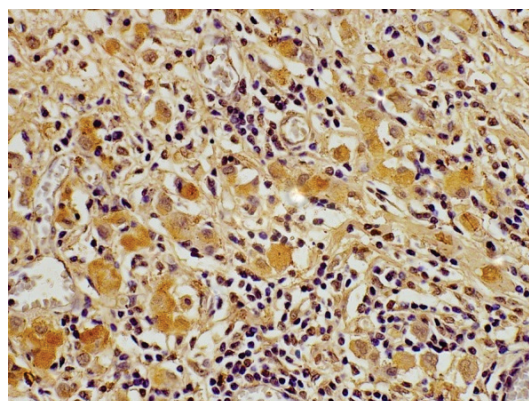
Figure 5 Score 2 = staining equal to that of normal duct epithelial cells (X100).

Statistical analysis

Chi square test was used to determine the associations between different variables. Recurrence free survival and overall survival were calculated by the Kaplan-Meire survival estimates and log rank test. The level of significance was set at 0.05.

Results

Clinicopathological findings

The study sample consisted of 130 patients with ER positive breast cancer who had underwent modified radical mastectomy. A majority of the patients were

between ages 36 and 60 (71%) and the mean age at diagnosis was 53. All patients have been treated with standard adjuvant tamoxifen therapy. Mean patient follow-up period was 51 months (6-93 months). At the completion of the study, 10 patients had died and 120 were alive. In the study group, 117 (90%) patients had duct carcinomas while 10 (7.69%) patients had lobular carcinomas and only three (2.3%) patients had mucinous carcinomas. Out of the total number of 130 patients, LN metastasis was present in 69 (54.3%), whereas only 58 (45.7%) were nodes negative. Disease recurrence occurred in 16 (12.1%) of patients while 113 (86.9%) had no recurrence at the end of the follow up. Out of those who had recurrences, 14 (10.8%) had metastasis and two had local recurrence (1.5%). Patients' characteristics and tumour characteristics are shown in Table 2.

Table 2: Patients' characteristics

Characteristics	Number	Percentage
Age category		
<=35 yrs	5	4%
36-60 yrs	93	71%
>60 yrs	32	25%
Follow-up in months (mean)	51	51
Tumour size (cm)		
<2	55	42%
2-5	64	49%
>5	7	5%
Histological type		
Duct	113	90%
lobular	10	8%
Other	7	2%
NG		
1	27	21%
2	75	58%
3	26	20%
Poor fixation	2	1%
NPI		
<3.4	30	23%
3.4-5.4	72	55%
>5.4	20	15%
Lymph node stage		
1	104	80%
2	16	12%
3	10	8%
Pathological stage		
I	28	22%
II	64	49%
III	32	25%

ER, PR and Her2 phenotype

All patients were ER positive (100%) and Her-2 negative (100%) while 113 (87.6%) patients were PR positive.

PTEN immunophenotype

PTEN expression was positive (Score 2+) in 23(17.7%) patients while it was negative (Score +1 or Score 0) in107 (82.3%) patients. PTEN immunoexpression was analyzed in relation to clinicopathological parameters. No correlation was found between PTEN expression with patients age category (P=0.301), tumour size (P=0.178), histological type, Lympho vascular invasion (P=0.232), Nottingham grade (P= 0.46), LN metastasis (P=0.106), PR expression (PR=0.127), recurrence of the disease (P=0.304). However, 26/27

(95.7%) in the low ER expression category (Allred score 3 and 4) was PTEN negative, while PTEN negativity was observed in 81/103 (78.6%) patients in ER high expression category (Allred score 5 to 8). Therefore, PTEN negativity was more frequent in tumours with low ER expression (P=0.023) demonstrating a strong positive association of PTEN expression with low and high ER expression (Table 3). In contrast, PTEN negativity was frequent among tumours with high NPI score than low NPI score. 22/23 (95.7%) tumours with a high NPI score (>5.4) were PTEN negative, whereas only 78/99 (78.8%) tumours in the low NPI score category had PTEN negativity. These results exhibit a negative association of PTEN expression with NPI score (P=0.045) (Table 4). Similarly, PTEN negativity was significantly more frequent in stage 3 tumours than stage 1 and 2 (30/32vs72/92) P=0.0480. This also highlights the negative association of PTEN expression with pathological stage of the tumour (Table 5).

Table 3: PTEN positivity against ER expression

			PTEN positivity		
			Positive (2)	negative (1,0)	Total
ER in to two categories	3,4	Count	1	26	27
		% within ER in to two categories	3.7%	96.3%	100.0%
	5,6,7,8	Count	22	81	103
		% within ER in to two categories	21.4%	78.6%	100.0%
Total		Count	23	107	130
		% within ER in to two categories	17.7%	82.3%	100.0%

Table 4: PTEN positivity against NPI score

			PTEN positivity		
			Positive (2)	negative (1,0)	Total
NPI to two	<5.4	Count	21	78	99
		% within NPI to two	21.2%	78.8%	100.0%
	>5.4	Count	1	22	23
		% within NPI to two	4.3%	95.7%	100.0%
Total		Count	22	100	122
		% within NPI to two	18.0%	82.0%	100.0%

Table 5 : PTEN positivity against the pathological stage

|			PTEN positivity		
			Positive (2)	negative (1,0)	Total
Stage 1,2 and 3	Stage 1 and 2	Count	20	72	92
		% within Stage 1,2 and 3,4	21.7%	78.3%	100.0%
	Stage 3	Count	2	30	32
		% within Stage 1,2 and 3,4	6.3%	93.8%	100.0%
Total		Count	22	102	124
		% within Stage 1,2 and 3,4	17.7%	82.3%	100.0%

Survival analysis

PTEN expression was analyzed against the overall survival (P=0.713) (Fig 6) and recurrence free survival (P= 0.452) (Fig 7) which did not demonstrate a significant association. Survival analysis in relation to PTEN expression was also done to separate groups of patients, LN stage, Pathological stage, ER expression and NPI value, but failed to demonstrate a significant relationship.

Discussion

The aim of the study was to investigate the role of PTEN gene as a prognostic marker in breast cancer patients by analyzing immunohistochemical expression of PTEN and analyzing its association with recurrence of disease, stage, grade, tumour size and hormonal receptor status and to find out the association of PTEN with the survival in ER positive breast carcinomas treated with tamoxifen. Only two studies, in the past had evaluated the PTEN expression in breast carcinoma with the tamoxifen resistance and they have demonstrated a poor survival in breast cancer patients with PTEN
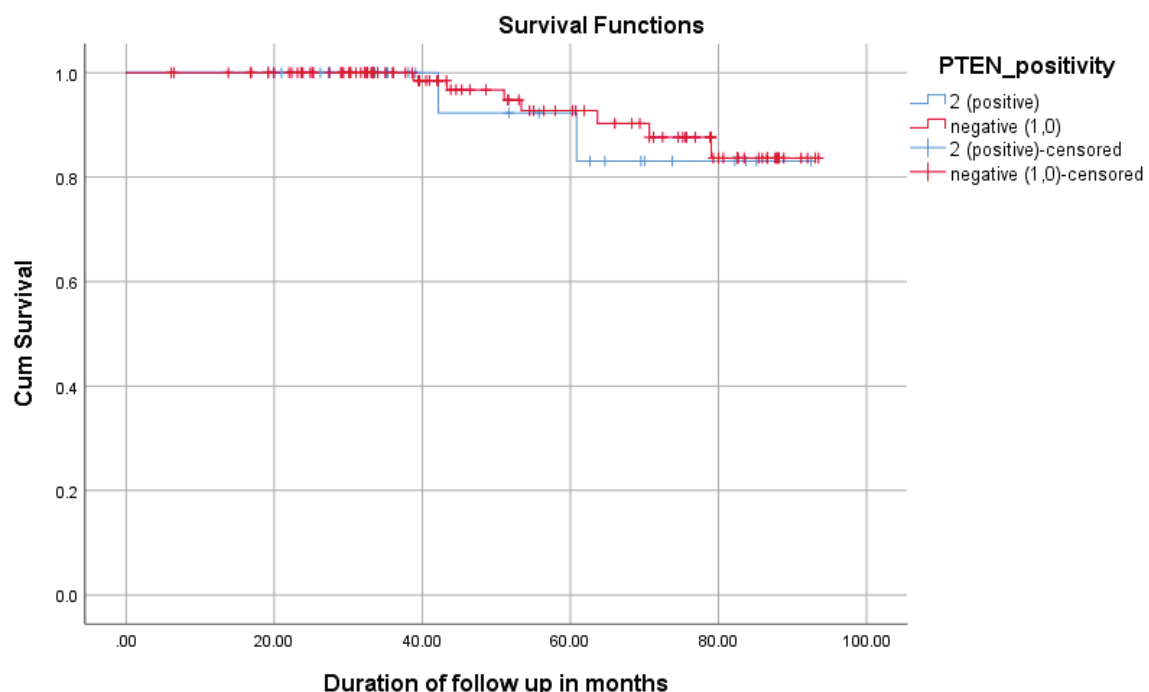
Figure 6: Comparison of overall survival in PTEN negative and positive group
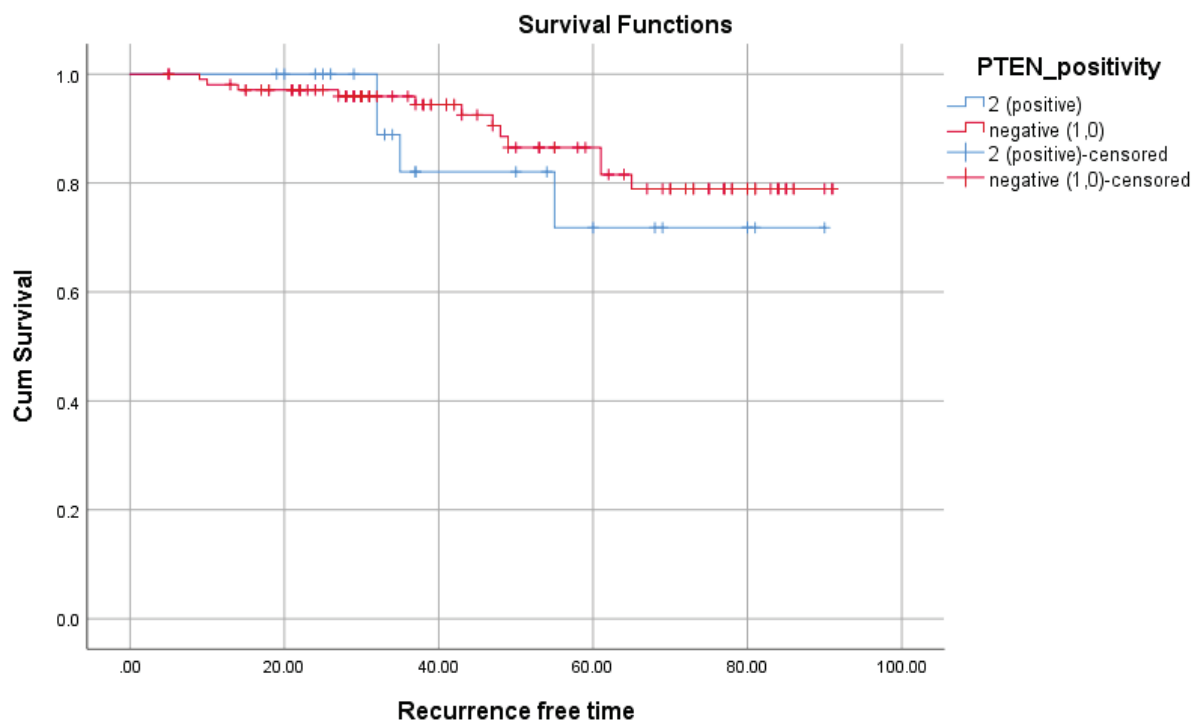
Figure 7 Comparison of Recurrence free survival in PTEN negative and positive groups

mutation compared to none mutated ones (15,16). Both the studies included small numbers of patients, 49 and 100. Both used immunohistochemistry to evaluate the PTEN status, out of those, one study used genomic studies (fragment analysis) to evaluate the PTEN gene (16). Recurrence rate for breast cancer in both studies was significantly high (57% and 47.9%). Survival studies must have a sufficient follow up to capture enough events and thereby ensure there is sufficient power to perform statistical tests. Although the number of participants is small in these two studies, because of longer follow up periods the comparatively higher number of events may have given a sufficient statistical power to the study.

Our study, which included 130 patients, did not demonstrate a relationship with PTEN expression and survival in relation to overall survival or recurrence free survival. However, the study showed that PTEN expression positively correlates with the level of ER expression (high and low). This means that PTEN negative patients are most likely to have low ER expression. Studies have proven that patients with high ER expression respond well to endocrine therapy compared to low expressers (17,18). In

addition, our study demonstrated that PTEN expression negatively correlates with NPI value (patients with >5.4 and <=5.4) and pathological stage of the tumour (patients in stage 1,2 and 3). It is well known that breast cancer prognosis is poor with tumours having NPI scores>5.4 as well as stage 3 tumours, compared to tumours in stage 1 and 2. Therefore, this study gives evidence favoring that loss of PTEN is a prognostic feature which signifies poor prognosis among breast cancer patients. Moreover, our study further illustrates that PTEN can be lost even in patients with well-known good prognostic feature; ER positivity.

One of the above studies (15) also demonstrated a positive association of PTEN with ER expression and a negative association with LN metastasis and tumour recurrence but none of those studies showed a correlation of NPI and pathological stage with the PTEN expression.

Recurrence rate in our study group was very low (12.1%) compared to the above studies (57% and 47.9%) which may be the main reason why our study does not demonstrate a relationship with PTEN expression and survival. The number of events in the

current study cohort appears not sufficient to substantiate an existing relationship. It can also be related to the mean follow-up period, which was nearly 4 years (51 months). In the other two studies the mean follow-up period was 72 (6 years) and 114 months (10 years) respectively (15,16). The follow up period in our study is unlikely to be influencing the relationship between PTEN expression and survival because the study group which followed up to 6 years also demonstrated a significant association with loss of PTEN expression and survival, which was only around 2 years more than our study. The discrepancy in the recurrence rate could be because breast cancer patients are being managed well in the Sri Lankan health care system compared to the other two countries, Canada and Serbia, in the above study groups. All our participants have undergone mastectomy, which is a more radical mode of treatment compared to wide local excision etc. This is further explained by the fact that in Sri Lanka, five year breast cancer survival is around 78.8% (32), which is not too low compared to the USA figures (90%) (33).

In this study, the percentage of PTEN mutation (Low or absent expression) was 82.3 %, which was higher than previously reported values (57% and 44.9%). The observed discrepancy can be related to the study population, which was a different population in a different part of the world as previous two studies were done in European countries, which has a different genetic composition. Other important reason for this discrepancy can be due to the sensitivity of the immunohistochemical analysis. Evidence shows that negative or reduced expression of PTEN is well correlated with structural mono allelic deletion of PTEN gene (19), but in my thorough literature review, standardized reliable and reproducible methods for measuring PTEN expression on formalin-fixed tissue was lacking. The only study that was found by Andrade et al., who had developed a protocol for assessing PTEN status in formalin fixed breast cancer sample immunohistochemically. Our study was the first time that immunohistochemistry was used to evaluate PTEN status in tissues in Sri Lanka. Before commencing the study, we have optimized and validated the immunohistochemistry method for PTEN. We used normal breast tissue as the positive control and inflammatory cells, stromal cells as internal controls when present. Another reasonable argument for the low percentage of PTEN positivity is the tumour heterogeneity. PTEN is known to demonstrate heterogeneity in expression in tumours (20). TMA tissue samples, which are small, could have been a drawback when interpreting the results, because only a small fraction of tumour is available for the assessment.

In conclusion, although this study did not demonstrate a relationship between reduced PTEN protein expression with recurrence free survival and overall survival in tamoxifen treated patients, it was able to give further evidence to substantiate the fact that lost or reduced PTEN expression is related to poor prognosis in ER positive breast cancer patients as it showed a positive association with the level of ER expression and negative association with NPI score and the pathological stage of the tumour. Further, this study also confirmed that a fraction of (one fifth) breast cancer patients are categorized to have a better prognosis (ER positivity) can have a poor prognostic feature; loss or poor PTEN expression. We would recommend further studies recruiting a larger study sample with a longer follow up to find out the association of PTEN with the survival in ER positive breast carcinomas in order to find out any relationship between loss of PTEN and tamoxifen resistance.

Acknowledgement

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Demographic details, clinical characteristics, complications, burden and outcome of patients with acute febrile illnesses in Southern Sri Lanka.

Palangasinghe DR[1], Hewavithana JS[2], De Silva CM[2], Kodithuwakku GDE [2], Kariyawasam AGTA[2], Kularathna OAR [2], Kodithuwakku KKL [2], Dahanayaka NJ[1]

[1]Department of Medicine, Faculty of Medicine, University of Ruhuna
[2]Teaching Hospital, Karapitiya

Abstract

Demographic details, aetiology, clinical characteristics, complications, burden and outcome of patients with Acute Febrile Illnesses (AFIs) vary by country and region. Acute febrile illnesses comprise a significant percentage of admissions to a medical ward in most regions in Sri Lanka and therefore account for a significant health care cost. With the great diversity of causes for AFIs and limited laboratory resources; diagnosis and treatment have become challenges in tropical countries. A methodological evaluation of characteristics (demographic details, clinical characteristics, complications) of AFIs would help in the diagnosis, treatment, predicting future trends and control programmes. Although accurate diagnosis is thought to be difficult without serological tests; careful clinical evaluation with basic laboratory tests helps diagnosis in most occasions. The pattern recognition in history, clinical examination and basic laboratory tests would be of great value in countries where serological tests may not be readily available.

This study describes the demographic details, clinical characteristics, burden and outcome of patients admitted with acute febrile illnesses during a period of 12 months (from 1st of January 2017 to 31st of December 2017) to the University Medical Unit (UMU) of the main tertiary care center in Southern Sri Lanka, Teaching Hospital Karapitiya (THK). In our study highest morbidity and mortality was seen due to leptospirosis although numbers of admissions were highest due to dengue fever (DF). Morbidity and mortality due to urinary tract infections and respiratory tract infections were mostly seen among elderly population with medical co-morbid conditions whereas that of dengue and leptospirosis mainly seen among younger population without previous medical problems.

Key words – acute febrile illnesses, Southern Sri Lanka

Introduction

Acute febrile illnesses (AFIs) comprise a significant number of admissions to medical wards in Sri Lanka. Common causes responsible for AFIs are dengue fever (DF), respiratory tract infections (RTIs), leptospirosis and urinary tract infections (UTIs) with some seasonal and regional variation. Certain percentage of AFIs had no diagnosis after detail clinical evaluation and investigations. They were labeled as undifferentiated fever (UF). Limited resources including serological tests and the diversity in aetiologies of AFIs challenge diagnosis, treatment and public health programmes.

Syndromic-based disease surveillance is important in initial identification, notification and management of diseases until the serological confirmation is available. In some patients serology may never be available. Initiation of appropriate treatment is necessary in most occasions before the serological confirmation is available.

In Southeast Asia most of the prospective studies performed regarding AFIs have identified DF as the main aetiology during the last two decades (1). Other common aetiologies identified were influenza, ricketssial infections, leptospirosis and hepatitis A etc. (1,2,3).

Considering the worldwide disease burden of dengue more than 70% of world dengue burden is faced by the Asia Pacific region (1,2). DF was responsible for highest number of admissions in our study also. Leptospirosis although contributed to less number of admissions, demonstrated the highest mortality out of all AFIs. Morbidity and mortality related to RTIs and

UTIs were mainly noticed among elderly population with medical co-morbidities, in contrast that of DF and leptospirosis was commoner among younger population with no medical co-morbidities.

Materials and Methods

Teaching Hospital, Karapitiya (THK) is the main tertiary care centre in Southern Sri Lanka and the 3rd largest teaching hospital in the country. It provides the healthcare not only to all the municipalities in Galle District; but it is the tertiary care center for several other districts in Southern Sri Lanka. It has about 190,000 patients admitting annually and it is the Teaching Hospital of Faculty of Medicine, University of Ruhuna (UOR).

Ethics approval was granted by the Ethical Review Committee of the Faculty of Medicine, UOR, Sri Lanka. Informed written consent was obtained from all the patients 18 years of age and older. Consent was obtained from all the patients who had characteristic features like malaria infection to share information. For patients younger than 18 years of age written consent was obtained from a parent or legal guardian. Additionally written assent was obtained from patients between 12 and 18 years of age.

All the patients got admitted to University Medical Unit (UMU), THK with fever of 38.0 C for less than seven days duration were enrolled into the study. All the patients enrolled in the study were more than 12 years of age.

A descriptive cross-sectional study where data were collected prospectively over a period of one year from 1st of January 2017. The information including demographics, clinical characteristics, investigations and outcome were collected by the investigators. All the information was gathered during the inward management of the patient and study did not intervene with the investigations and the management of the patient.

Results

AFIs constitute 8% of admissions in the UMU over the period of one year. Mean age of patients was 41 years with a SD of 18. Youngest patient was 14 years of age and oldest patient was 90 years. Out of 1966 patients admitted due to AFIs, 55% were males. Out of all AFIs 36% of admissions were due to either DF or dengue haemorrhagic fever (DHF). Highest number of admissions due to AFIs was noted during the month of June. Five main causes of admissions with AFI had been DF with DHF (36%), RTIs (23.3%), UF (14%), UTIs (6.9%) and leptospirosis (3.5%). Figure 1 & 2 indicate how admissions due to all AFIs and DF varied according to the month of the year.

All the patients with fever, constitutional symptoms, leucopenia and thrombocytopenia on day 3 of the illness were suspected of having DF and 80% out of them confirmed to have DF by either positive dengue NS1 antigen or dengue IgM antibody. Dengue NS1 test was performed if the patient presented within 5 days of illness and IgM antibody testing was performed in all patients with negative dengue NS1 antigen after 5 days of fever. Out of total admissions due to confirmed DF, 120 (16.9%) patients had DHF. Diagnosis of DHF was confirmed by demonstration of free fluid in the peritoneal or pleural cavity by an ultrasound scan (USS) in each patient. All our patients with DHF had a platelet count of <100,000/uL at the time of fluid leakage. The next most common feature observed during critical phase was haemoconcentraion with 80 (66.66%) of our patients demonstrating more than a 20% rise in packed cell volume (PCV) during the critical phase. Out of all DHFs 110 (91.6%) of patients had more than 10% rise in packed cell volume. The patients who had less than 10% haemoconcentration were 10 (8.3%) and all of them had evidence of significant bleeding.

Out of patients with DF or DHF 60% were males. Average duration of hospital stay among patients with DF was 3.2 days and that of DHF was 5.4 days. The highest duration of hospital stay in a patient with DF was recorded as 7 days and that of DHF was 13 days. Out of all the patients with DF or DHF there was only one death (mortality of 0.14%). The age of the patient who died was 26 years. The patient who died had DHF complicated with a haemophagocytic lymphohistiocytosis (HLH) and hospital acquired pneumonia (HAP). Highest number of admissions

due to DF was observed in June where the only death was also recorded.

Among patients with DF 66.8% of patients were in the age range of 14-40 whereas only 33.2% of patients were found in between 40 and 90 years of age. Among patients with DHF 70.9% of patients were in the age range 14-40 whereas only 29.1% of patients were in the age range 40-90 years.

There were 11 pregnant patients with DF and 5 of them had DHF. This make significantly higher percentage of DHF (45%) among pregnant patients compared to non-pregnant patients (16.5%) (P value 0.004). Among pregnant dengue patients only one required intensive care unit admission (ICU) and treatment and the mortality was zero. The rate of ICU admission (9.09%), hepatitis (80%), shock (65%), oliguria (70%) were all significantly more common among pregnant patients compared to non-pregnant patients with DF (p value <0.05).

Among all the patients with DF and DHF only 6 (0.84%) required admissions to ICU and all of them were DHF, with one death. This makes mortality in patients admitted to ICU with DHF to 16.6%.

The lowest platelet count was noted on day 6 of illness in 85% of the patients with DF and DHF. Majority of patients with DF or DHF got admitted on day 3 of fever (60%). About 5% of patients got admitted on day 1 of the illness and 80% of them came with a positive dengue NS1 performed before hospital admission. Among those who got admitted on day 1 of fever, after health education 60% of patients were sent home with the advice of when to admit. Majority of patients with DHF (82%) entered the critical phase on day 5 of the illness. Only 12 (10%) patients entered the critical phase on day 6 of the illness, and 5 (4.16%) each entered the critical phase on day 4 and 7 of the illness.

Considering the total number of patients who had thrombocytopenia of <50,000/uL we have observed the following. Patients with DF constituted about 56%; whereas patients with DHF and leptospirosis contributed to 35% and 7% respectively.

Out of patients with DHF 98% of patients had platelet ranging from 0 to 50,000 whereas only 75% of patients with DF and 70% of patients with leptospirosis found to have a platelet count in the range 0 to 50,000 during their illness. Comparing DF and DHF patients with DHF had significantly higher chance of having thrombocytopenia of < 50,000/uL (p value <0.005).

Considering admissions in the age range of 14-20 years; 73% of admissions were due to DF, 20% of those admissions were related to DHF and 6% was due to leptospirosis while only 1% of those admissions were secondary to other causes. This makes DF, DHF contributed to 93% of admissions while DF, DHF and leptospirosis together accounted for 99% of admissions in the age range 14-19 years during this one year period. Other causes of admissions of this age range had been hepatitis A, RTIs, UTIs, infectious mononucleosis (IMN), acute gastroenteritis and UF.

The highest number of patients with DF was in the age range 21-30 years which was 31% out of total admissions due to DF. Highest number of admissions due to DHF were also in the age range 21-30 (37%). Among patients with leptospirosis the highest number of admissions was in the age range 41-50 which was 27%. This indicates burden due to DF and DHF was more noticeable among younger patients (age range 21-30) compared to leptospirosis (age range 41-50).

Thrombophlebitis was noted in 8% of patients with DF and DHF, which was the commonest secondary bacterial infection among patients with DF or DHF. Other secondary bacterial infections that complicated the course of DF or DHF were UTIs and RTIs with incidences of 5% and 3% respectively. All the patients who had UTI were those with DHF who underwent urethral catheterization for monitoring of urine output. There were 12% of patients complaining of dysuria as a symptom during the course of DF or DHF but only 5% had shown a positive urine culture.

There were 69 admissions due to leptospirosis during this one year (3.5% of admissions due to AFI). Diagnosis of leptospirosis was confirmed with a

positive microscopic agglutination test (MAT). There were 82 patients who were initially suspected to have leptospirosis but only 69 (84.1 %) of them became positive for MAT. Out of them 49 patients were males (72%). All the patients with leptospirosis had exposure history (farming, floods, river bathing especially in stagnant water collections, and working in sewage tanks). In our cohort 20% of patients had exposure to floods making it an important reason for leptospirosis outbreaks. As an occupation farming had been the category with the highest risk of leptospirosis with 18% of our cohort had exposure while rice paddy farming. None of the patients who admitted with leptospirosis had received antimicrobial prophylaxis. Highest number of admissions due to leptospirosis was noted in August. Average duration of hospital stay of a patient with leptospirosis was 7 days. The highest duration of hospital stay of a patient with leptospirosis was 24 days. Considering the age groups 26 (37.7%) patients with leptospirosis were in the age group of 14-40 years, whereas 43 (62.3%) patients were in the age category 40 to 90 years. The youngest patient with leptospirosis was 15 years and the oldest person was 78 years.

Acute kidney injury (AKI) was the commonest complication; [n=50, (72%)] among patients with leptospirosis. Out of 69 patients 11 patients had pulmonary haemorrhages (15%). Out of 11 patients with pulmonary haemorrhage; 4 have died making a mortality of 36% among patients with leptospirosis associated pulmonary haemorrhage. Out of those 11 patients 4 patients underwent therapeutic plasma exchange (TPE). Two patients who had undergone TPE had died while two had survived. All the patients with leptospirosis associated pulmonary haemorrhages were treated with intravenous (IV) methylprednisolone and tranexamic acid. Three patients who had undergone TPE had received IV immunoglobulin. All the patients who was diagnosed with leptospirosis pulmonary haemorrhages had a platelet count of less than 50,000/uL and 8 (72%) of them had a haemoglobin drop by at least 2 g/dL.

The total number of deaths among patients admitted with leptospirosis was 6, making the highest mortality (8.6%) among all the causes of AFIs. Ages of patients

who died of leptospirosis were 32, 52, 56, 58, 62 and 68 years (Mean age 54.6%).

Among 69 patients with leptospirosis 10 required ICU admission (14.4%) and 5 of them died (50%). Only patient with leptospirosis died without any ICU admission was secondary to a sudden cardiac death while in the ward. This makes leptospirosis as the commonest AFI requiring ICU admission. Previous studies demonstrated fatality ratio between 2-3 % of all cases whereas it may be as high as 33% in complicated cases [1]. All the patients who died of leptospirosis underwent postmortem examination. All the patients who died of leptospirosis had AKI, thrombocytopenia of <50,000/ uL, four (66.6%) had pulmonary haemorrhages, two (18.1%) had evidence of myocarditis and pericarditis confirmed by postmortem.

In about 14% of patients with AFIs the diagnosis was uncertain with the available investigations on discharge. They were labeled as UF. All the patients with UF had serological testing for dengue and leptospirosis and other relevant serological tests based on clinical features.

Average duration of hospital stay among patients with UF was 3 days. The highest duration of hospital stay of a patient with UF was 6 days.

RTIs contributed to 23.3% (n=459) of admissions, making the second highest cause of admissions related to AFIs. Out of that about 20% were due to upper respiratory tract infections (pharyngitis, tonsillitis) and rest of the 80% was due to lower respiratory tract infections (acute bronchitis, infective exacerbation of bronchial asthma, infective exacerbation of chronic obstructive pulmonary disease, pneumonia). The highest number of admissions due to RTIs was noted in April.

The majority of patients with RTIs were in the age groups 50-60 years and 60-70 years with percentage of 16.4% each. Mortality due to RTIs were 4.8% (n=22) and was the second highest mortality recorded following leptospirosis. All deaths were either due to pneumonia (either community acquired or hospital acquired) or infective exacerbation of chronic

obstructive pulmonary disease (COPD). All the patients who died of RTIs had at least one of the medical co-morbidities (which included diabetes mellitus, COPD, ischaemic heart disease, chronic lymphocytic leukaemia, chronic kidney disease, cirrhosis) and all of them were more than 60 years of age. Table 1 and 2 summarizes the prevalence of co-morbid conditions and age distribution among deaths due to RTIs. Mean age of patients who died of RTIs was 75 years. Average duration of hospital stay among patients with RTIs was 3 days. Figure 3 compares how admissions due to DF, RTIs and leptospirosis changed according to season of the year.

UTIs (cystitis, pyelonephritis, renal abscess, catheter related UTI and hospital acquired UTI) consisted of 6.8% (n=135) out of total admissions due to AFIs. Out of all UTIs urine culture revealed extended spectrum beta lactamase (ESBL) organisms in 10% of cases. Average duration of hospital stay among patients with UTI was five and among patients with ESBL it was ten. All the patients admitted with ESBL positive UTI were treated with either intravenous carbapenem or an aminoglycoside. Mortality among patients with UTI had been 0.7%. All 10 patients who died of UTIs were complicated UTIs and had at least one of the medical co-morbid condition including diabetes mellitus (DM), ischaemic heart disease (IHD), chronic kidney disease (CKD), chronic lymphocytic leukaemia (CLL) or obstructive uropathy. All the patients were more than 50 years of age and mean age

among patients who died of UTI was 69 years.

The highest number of admissions due to UTIs was noted in the age group of 60-70 years (18.3% of all admissions due to UTIs). Commonest co-morbid condition identified among patients with UTIs was DM (26%).

Acute gastroenteritis was the cause among 1% of patients due to AFIs. The specific aetiology for acute gastroenteritis was not identified among those patients.

Central nervous system infections including bacterial and viral meningitis, encephalitis and cerebral abscess were responsible for 1% out of admissions due to AFIs.

There were 8 patients with typhoid fever in our cohort. Out of them 6 (75%) had positive blood culture and all of them had positive standard agglutination test (SAT). All the patients were treated with ceftriaxone and azithromycin according to local guidelines with a good response. Average duration of hospital stay was six days among those patients.

Number of patients with the diagnosis of typhus was 8 (0.4% of all AFIs). The diagnosis of typhus was arrived on clinical grounds including exposure history, eschar and subsequent good response to treatment with doxycycline. Serology for typhus
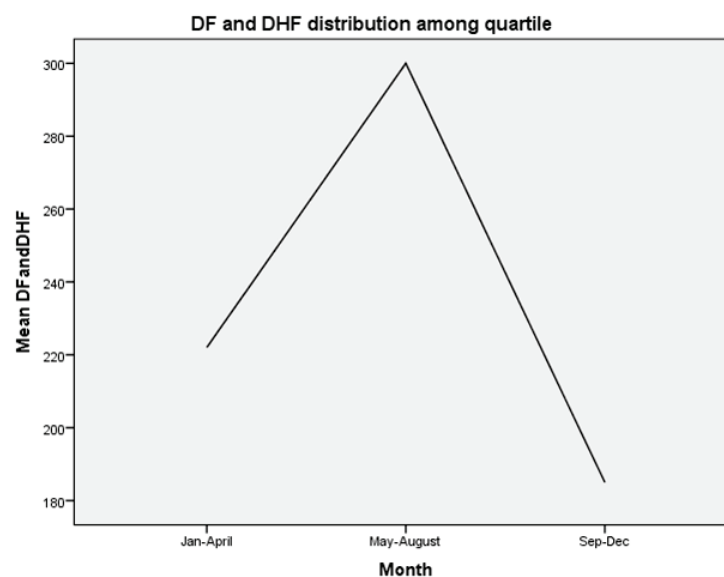
Figure 1: Distribution of admissions due to dengue fever during different seasons of the year.
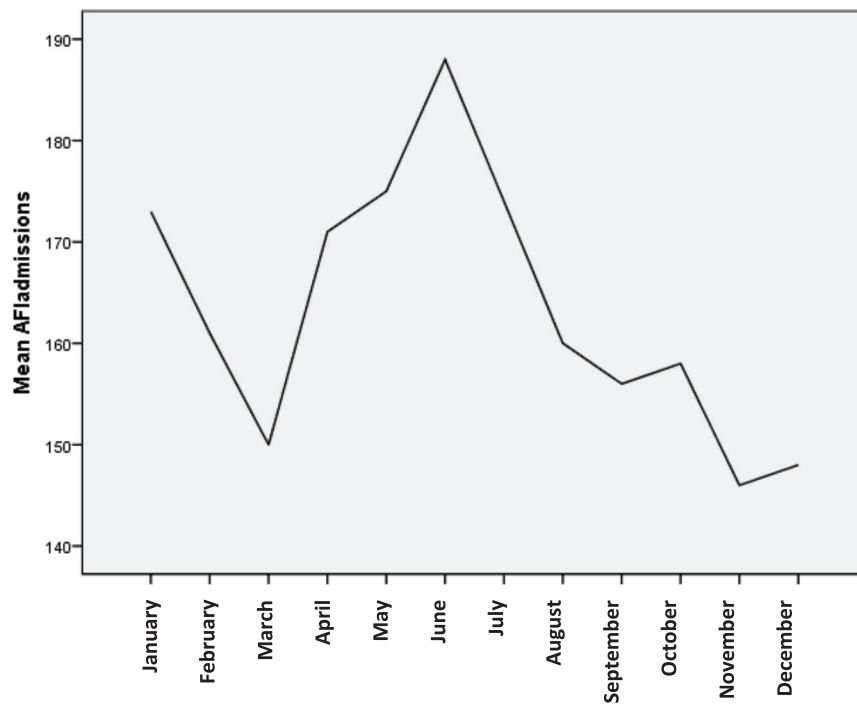
Figure 2: Distribution of admissions due to AFIs during different months of the year.
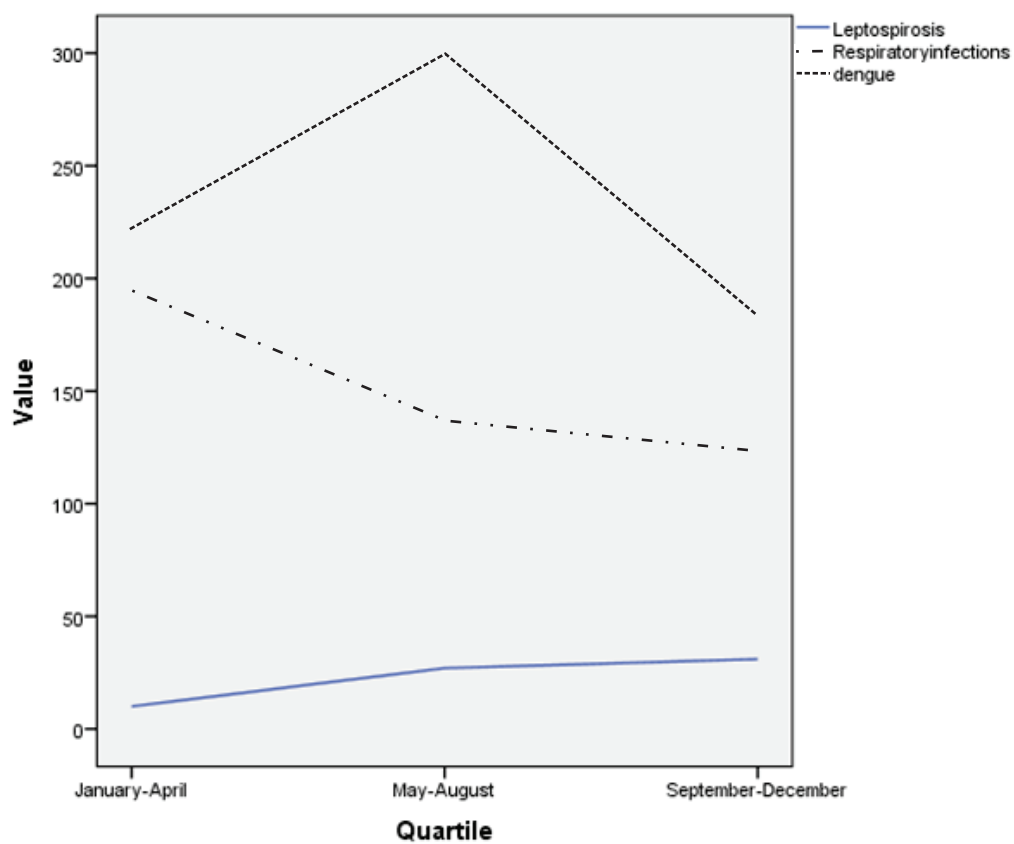
Figure 3: Comparison of number of admissions due to DF, RTIs and leptospirosis during different seasons of the year.

Table 1: Age distribution among deaths due to RTIs

Age group	Percentage among deaths due to RTIs
60-70 years	27.2%
70-80 years	45.4 %
80-90 years	27.2%

Table 2: Incidences of different co-morbid conditions among patients who died of RTIs.

Co-morbid condition	Incidences among deaths due to RTIs (out of 22)
DM	12 (54.5%)
Chronic obstructive pulmonary disease	7(31.8%)
IHD	4 (18.1%)
CLL	3 (13.6%)
CKD	2 (9.09%)
Chronic liver cell disease	2 (9.09%)
Two or more co-morbid conditions	7 (31.8%)

Table 3: WBC trends among patients with leptospirosis compared to patients with DF and DHF

Day of illness		DF	DHF	Leptospirosis	P value
3	WBC<4000/uL	72%	78%	0	P<0.0001(leptospirosis compared to DF or DHF)
	WBC 4000-10,000/uL	26%	21%	54%	(P value <0.05)
	WBC>10,000/uL	1%	0	45%	P<0.0001

Table 4: WBC trend on day 5 of illness among patients with leptospirosis compared to patients with DF and DHF

Day 5 of illness	DF	DHF	Leptospirosis	P value
WBC<4000/uL	57%	47%	20%	<0.05
WBC>10,000/uL	8%	8%	45%	<0.004

Table 5: WBC trends among patients with DF compared to patients with DHF

Day of illness		DF	DHF	P value
3	WBC<4000/uL	72%	78%	0.32
5	WBC<4000/uL	57%	47%	0.15

Table 6: Comparison of platelet count among patients with leptospirosis with that of patients with DF and DHF

Day of illness	Platelet count	DF	DHF	Leptospirosis	P value
3	<50,000/uL	5.7%	31%	0	<0.000
	<100,000/uL	27%	74%	12.5%	<0.001
	>150,000/uL	22%	7%	62%	<0.005
5	<100,000/uL	27%	74%	12.5%	<0.001
	>150,000/uL	22%	7%	62%	<0.001

Table 7: Comparison of platelet count among patients with DF and DHF

Day of illness	Platelet count	DF	DHF	P value
3	<50,000/uL	5.7%	31%	<0.001
5	of >100,000/uL	30%	0	0.000

Also there was a statistically significant difference in the platelet count on day 3 of the illness among patients with DF compared to patients with DHF (p value 0.000005). Among all the patients with DF and DHF 78% of patients had thrombocytopenia (platelet count <150,000 /uL) on admission.

Table 8: incidence of clinical features among patients with DF and DHF.

Clinical characteristic	DF	DHF	P value
Fever	100%	100%	
Body aches (arthralgia/myalgia)	92%	94%	
Headache/retro-orbital pain	58%	54%	
Respiratory symptoms	3%	2%	
Diarrhoea	6%		
Abdominal pain/RHC pain/epigastric pain /central abdominal pain	11%	36%	<00.1
vomiting	13%	28%	0.008
Postural dizziness	8%	40%	<0.05
SBP <90 mmHg	7%	18%	0.018
Oliguria	4%	18%	<0.05
Maculopapular rash	3%	4%	
Bleeding manifestations	14%	16%	
Cutaneous bleeding	14%	15%	
Gum bleeding	2.5%	3%	
haematuria	3.5%	4.5%	
Epistaxis	1.6%	1.8%	
Per vaginal bleeding	8%	10%	
malaena	0.8%	1.4%	
haematemesis	0.3%	0.8%	
haemoptysis	0.3%	0.5%	

Table 9: Incidences of different clinical features observed among patients with leptospirosis.

Clinical feature	Incidence
Fever	69 (100%)
Myalgia and/or muscle tenderness	60 (80.4%)
Dark urine	52 (75%)
Jaundiced sclera	33 (47.8%)
Conunctival haemorrhage	26 (37.6%)
Abdominal pain	24 (34.7%)
Headache or neck stiffness	18 (26.0%)
Haemoptysis	12 (17.3%)

Table 10: Incidences of different complications among patients with leptospirosis.

Complication	Incidence among patients with leptospirosis (total 69)	Incidence among leptospirosis survivors (total 63)	Incidence among leptospirosis deaths (total 6)
AKI	50(72%)	44 (69.8%)	6 (100%)
Liver involvement	46 (66.6%)	40 (63.4%)	6 (100%)
Pulmonary haemorrhages	11 (16%)	7 (11.1%)	4 (66.6%)
Thrombocytopaenia <50000/uL	38 (55%)	32 (50.7%)	6 (100%)
Myocarditis/pericarditis	8 (11.5%)	6 (9.5%)	2 (33.3%)
Neurological involvement	10 (14.4%)	8 (12.6%)	2 (37.3%)
Acute pancreatitis	2 (2.8%)	0	2 (33.3%)
Multi-organ involvement	30 (43.4%)	24 (38.09%)	6 (100%)

Arthralgia, myalgia, headache, retro-orbital pain, back pain, respiratory symptoms and diarrhoea had not shown a significant difference between patients with DF and DHF. Clinical features including abdominal pain, vomiting, postural dizziness, oliguria and systolic blood pressure (SBP) <90 mmHg had all being commoner among patients with DHF compared to DF (P value <0.005). When our cohort was divided into four monthly seasons of the year, the highest number of admissions due to AFI was observed during the period from May to August (37.5%). The lowest number of admissions was noted during the last four months of the year (27.1%).

Considering five main causes of AFI (DF, DHF, leptospirosis, respiratory tract infections and urinary tract infections) we made following observations. Highest percentage of admissions due to DF or DHF was noted during the second four months of the year (60% out of admissions due to five main causes).

Highest number of admissions due to RTIs were noted during first four months of year (n=195; 35.9% out of all admissions due to main causes) Highest number of admissions due to leptospirosis was observed during last four months. (n=31; 7.9% out of total admissions) Lowest number of admissions due to DF and DHF were observed during the last four months of the year.

We made following observations among patients with DF/DHF in relation to the platelet count. Lowest platelet count recorded due to DHF/DF was 2000/uL and that was during the 5th day of illness in a patient with DHF.

Out of 265 patients with DHF lowest mean platelet count was noted on the day 6 of the illness which was 24,000/uL with a SD of 19.6. Mean platelet count observed during day 5 of illness among 265,000/uL patients with DHF was 30,500/uL with a SD of 21,000/uL. Among patients with DHF mean platelet count on day 3 of the illness was 73,000/uL with a SD of 44.5. Highest platelet counts observed on day 5 and day 6 of the illness was 98,000 and 96,000 /uL respectively.

Among 510 patients with DF lowest platelet count recorded was 7000 /uL and that was on day 7 of the illness. Lowest platelet counts observed during day 5 and 6 of the illness among patients with DF was 12,000 and 11,000/uL respectively.

None of our patients with DHF had platelet counts above 100,000/uL on day 5 of the illness.

Other diagnoses among AFI were influenza A, hepatitis A, malaria, septic arthritis, reactive arthritis and thrombotic thrombocytopenic purpura. There was only one patient with malaria who turned out to be a mixed malaria and mycoplasma co-infection. There were three patients with dengue and leptospirosis co-infection who demonstrated clinical features and serology typical for both infections.

Statistical analysis

Data were entered into a SPSS format to analyse. Diagnoses were categorized as DF, DHF etc. Categorical variables were compared using the Chi-square test or Fisher's exact test as appropriate and continuous variables were compared using the Student's t test and the Mann-Whitney U test where applicable. Results with values $P < 0.05$ were considered statistically significant.

Discussion

Epidemiology unit of Ministry of Health (MOH) Sri Lanka has reported 186,101 suspected cases of DF Island wide during year 2017 with over 320 deaths (5). This makes a mortality of 0.17% in the country among suspected cases of DF. Mortality observed in our cohort was 0.14%, but this was from 707 confirmed cases of dengue.

The highest number of dengue admissions was recorded in June in our study where the only death was also recorded. This run in parallel to the peak in dengue incidence observed in the whole country during the period of May to July with the South-west monsoon rains which commenced in late May 2017 (5). But the highest numbers of dengue cases were reported in July in the whole country (5). During the period of April to June we have observed few admissions to our unit from people whose residence was in Western province. According to their residential address we had 17 people from Western province getting admitted to UMU with DF during this time where the peak incidence of dengue was recorded. This was a period where hospitals of Western province had received an exceptionally high number of admissions due to DF and some patients were couldn't be even provided a bed. Over 40% of dengue cases were reported from the Western province in 2017 (5). This increase burden of dengue faced by hospitals of Western province during the peak incidence should alert us about requirement of more staffing at all levels (medical, nursing, laboratory) and also to make medications, intravenous fluids more readily available in those hospitals in the future during that particular period of the year.

The peak incidence of dengue in May-July period 2017; created the largest outbreak of dengue experienced by Sri Lanka for the last three decades (5). The increase in number of dengue patients is nearly fourfold during year 2017 compared to same period between 2010 and 2016 (5).

Considering dengue burden among districts highest number of cases reported in Colombo District followed by Gampaha, Kurunegala, Kalutara, Batticaloa, Ratnapura and Kandy (5). In our cohort also DF was responsible for highest number of admissions due to AFIs. DF was the commonest cause of admission to our unit due to any illness during the year 2017.

The outbreak of dengue in 2017 was the largest dengue epidemic Sri Lanka experienced during the last seven years (5). Several factors including a change in the dengue virus serotype, unusually heavy monsoon rains and failure to control mosquito breeding sites may have contributed to the magnitude of this epidemic.

This emphasizes the importance of strengthening public health measures for vector control and flood control in order to minimize the morbidity and mortality due to DF in possible future epidemics.

Among 6 patients admitted to ICU with DHF the mortality observed in our cohort was 16.6%. The only patient who died in our cohort (a patient with DHF complicated by haemophagocytic lymphohistriocytosis, acute liver failure, hospital acquired pneumonia and adult respiratory distress syndrome) required ICU admission. Among a cohort 75 Taiwanese patients admitted to ICU the mortality observed was 41.3%. This clearly indicates the significantly higher mortality among patients with DHF getting admitted to ICU; obviously due to the much higher severity of the disease among those patients (6).

There were no maternal deaths or intrauterine death among patients with DF and DHF in our cohort and one patient had premature pre-labour rupture of membranes requiring delivery. Only one pregnant patient required platelet transfusion in our study, who went in to premature labour. Ultimately the outcome of the mother and the baby was good. In one study done in epidemic of DF in Sri Lanka in 2009 there was an observed mortality of 6.6% with one in 15 pregnant patients dying (7). Dengue is well known to increase morbidity and mortality among pregnant patients (7,8). In a previous population based cohort study DF increased the maternal mortality by 3 times and DHF increased the risk of maternal death by 450 times when compared to mortality of pregnant women without dengue (7, 8). In our cohort also the percentage of DHF, ICU admission, acute hepatitis, shock, oliguria were significantly higher among pregnant patients compared to non-pregnant patients with DF. This also supports the more complicated course among pregnant patients with DF compared to non-pregnant patients (7,8). To assess the maternal mortality related to DF the sample size might not have been adequate.

In our study 67% of patients with DF or DHF were in the age range of 14-40 years and only 33% of patients in the age range 40-90 years. This clearly indicates the burden of DF and DHF is seen among younger population compared to older population. This is consistent with studies done in other dengue endemic countries like Pakistan, India and Malaysia (9).

Fever was the most common clinical symptom (seen in 100%) followed by body aches (92%) seen among patients with dengue; while thrombocytepaenia became the commonest laboratory abnormality (platelet <150,000/uL observed among 100% of patients) followed by leucopaenia (WBC <4000/uL was seen among 80% of patients).

Our data indicates lowest platelet count in patients with DHF was noted during day 5, 6 and 7. Minimum platelet count recorded among patients with DHF on day 5, 6 and 7 of the illness were 2000/uL, 5000/uL and 3000/uL respectively. Maximum platelet count recorded during day 5,6 and 7 were 98,000/uL, 93,000/uL and 150,000/uL respectively. This indicates in our cohort none of the patients with DHF had platelet count of >100,000/uL on day 5 or 6 of the illness. Most of our patients (82%) entered the critical phase on day 5 of the illness. None of the patients had platelet count of >100,000/uL by the time of diagnosis of critical phase. This supports the consistent observation of platelet count <100,000/uL as one of the well-recognized features among patients with DHF who enter the critical phase. The clinical features which were significantly more common among patients with DHF compared to DF were abdominal pain, vomiting, postural dizziness, oliguria and systolic blood pressure of <90 mmHg. These clinical features would indicate patient is more likely to have DHF than DF which has to be confirmed by demonstration of free fluid by ultrasound scan.

Leptospirosis was the AFI with the highest mortality in our study (8.69%). Although the number of cases was only 69 (3.5%), compared to number of cases of dengue fever (707 which was 36% of admissions due to AFI) and RTIs (450 which was 22.9% of admissions due to AFI) the burden due to leptospirosis was very significant. This was proven by average duration of hospital stay of 7 days, highest mortality (8.69%), and highest rate of ICU admission among all AFIs (14.4%). The average duration of hospital stay among patients with leptospirosis higher than that of DF, DHF, RTIs, UTIs and UF. Commonly observed complications among deaths due to leptospirosis were AKI (100% of patients who died of leptospirosis), liver involvement (100%) thrombocytpaenia of <50,000/uL (100% among cases of death), multi organ involvement (100%), pulmonary haemorrhages (66.6%), pancreatic involvement (33.31%) and myocarditis+pericarditis

(18.1%). Among deaths 66.6% of patients had renal, liver and pulmonary involvement. All this indicates that burden due to leptospirosis was striking in our population. This makes leptospirosis, the most challenging out of all the AFIs. The cost of treatment for leptospirosis admissions were considerably high than for any other AFIs due to duration of hospital stay, cost of treatments like TPE, immunoglobulin, methylprednisolone, antibiotics, haemodialysis. Number of medical staffing from different specialities (acute physician, nephrologist, intensivist, transfusion medicine consultant, anaesthetist) nursing staff involved in looking after a patient with leptospirosis was significantly higher compared to any other AFI. Although the situation is this DF still gets the main attention in public health interventions and remained to be the most discussed infectious disease. The number of deaths due leptospirosis had been significantly higher compared to deaths due to dengue according to present estimates. In our study 6 deaths were attributed due to leptospirosis out 69 confirmed cases whereas only one death was attributed to dengue out 706 cases. This was reflected in the statistics of whole country as well, with 400 deaths attributed to dengue in year 2017 whereas an estimated average of 730 deaths was attributed to leptospirosis (5,11).

Added to this burden still there is significant debate when it comes to the management of leptospirosis especially the complications like pulmonary haemorrhages, multiorgan failure (9,10,11). In our cohort there were several different treatment strategies utilized in management of pulmonary haemorrhages including methylprednisolone, TPE and immunoglobulin with variable response. Currently there is no proven definitive treatment for leptospirosis associated pulmonary haemorrhages practiced in the country (9,10,11). In contrast DF, DHF and associated complications are managed according to a national guidelines used by physician all over the country. This again makes leptospirosis more challenging to physician who involve in the management. Both leptospirosis and DF affected predominantly younger population in our study. This is also true for the patients who have died of DF and leptospirosis compared (mean ages of 26 and 54.6 years respectively) to mean ages of patients who died of UTIs and RTIs (69 and 75 years respectively). It is important that all treating physicians to be familiar and screen early for possible life threatening complications associated with leptospirosis like

AKI, myocarditis, pulmonary haemorrhages, acute liver failure, acute pancreatitis and multiorgan failure. Early detection helps for careful monitoring, early initiation of appropriate treatment, considering ICU admission which all might contribute to minimize morbidity and mortality.

All the patients who died of RTIs or UTIs had at least one of co-morbid condition including DM, COPD, IHD, CKD, CLL, and chronic liver cell disease. In contrast only 1 in 6 patients (16.6%) who died of leptospirosis had the medical co-morbidity of diabetes mellitus and patient who died of dengue had no medical co-morbid conditions. This clearly indicates the morbidity and mortality among patients with dengue and leptospirosis was noted mainly among younger population with no medical co-morbid conditions compared to that of RTIs and UTIs.

Among patients with DHF majority of our patients entered the critical phase on day 5 or 6 of the illness (92%). Only 5 patients each entered the critical phase either on day 4 or 7 of the illness. This was useful various aspects of management. Performing USS for the demonstration of free fluid could be done from day 4 of the illness and could continue up to day 7 of the illness. It is very unlikely for a patient to enter critical phase before day 4 of the illness as well as beyond day 7 of the illness. Extra monitoring could be provided in units where USS is not readily available to diagnose the critical phase during this period of the illness. In addition to USS demonstrating free fluid in pleural or peritoneal cavities which was observed in 100% of our patients with DHF, platelet count of <100,000/uL was observed among all our patients with DHF at the time of fluid leakage. Other most common laboratory abnormality observed among patients with DHF was haemoconcentration. The two clinical features that were observed more commonly among patients with DHF compared to patients with DF were abdominal pain and postural dizziness.

Preventive measures at the community level would be of great value in order to prevent the disease burden of leptospirosis. As risk categories people who get exposed to floods and those who are involved in farming could be mainly targeted population for health education on preventive measures including antimicrobial prophylaxis. Interestingly none of the patients who had a planned exposure like rice paddy farming had taken

antimicrobial prophylaxis which was thought to be effective in prevention of leptospirosis [14, 15]. Although now increasing number of cases are being notified all over the country still there are some deficiencies associated with the surveillance system of leptospirosis. Lack of familiarity with case definitions, lack of knowledge among other supportive staff, lack of interest in notifications and delay in notifications in busy set up in most medical wards are those deficiencies. In addition there is a deficiency of inclusion of private sector data in national databases. This could result in under reporting leading under estimation of true leptospirosis burden in the country.

Considering seasonal variation of admission and disease burden our attention should mainly focus during the period from May to August where Southern Province is likely to be affected by South-western monsoon rains with resultant floods in draining areas of THK. It is the same all over the country as well. It is the period where highest number of admissions due to AFIs was noticed with highest number of admissions due to dengue recorded in June and that of leptospirosis in August. It makes attempts to prevention of floods with prompt attention to health education in population who were affected with floods an important public health intervention in minimizing the burden due DF and leptospirosis mainly.

When it comes to diagnosis of AFIs careful clinical evaluation followed by careful interpretation of initial basic laboratory tests (full blood count, urinalysis, renal function tests and liver function tests) would be very useful in arriving at diagnosis and initiating treatment in most of the AFIs (16,17). There are a lot of limitations that occur with serological tests including being not readily available, cross reactivity, background positivity due to previous infections (14, 15, 16). Therefore it is very important to interpret of all serological tests in the clinical context of the patient. Whenever possible it is important confirm with four fold rising titers (16, 17, 18). Detecting the pathogen directly by PCR or culture is another reliable method when arriving at a more accurate diagnosis although not readily available in most settings.

All health education activities at the community level, public measures in minimizing floods, educating farming population about wearing protective clothing and antimicrobial prophylaxis would be important measures in reducing the burden of AFIs. Extra level of staffing may be required at all levels from community to hospitals during those high risk times of the year to minimize the morbidity and mortality of AFIs.

Limitations

Those who had fever for 7 or more days on admission were excluded from the study. They included conditions like infective endocarditis.

Some cases of typhoid fever and typhus were not included since they had fever for more than seven days on admission.
In UFs all the patients were not tested for all the possible aetiologies of AFI like influenza, chickengunya, hepatitis A unless there was a clinical suspicion.

All the patients with a clinical diagnosis of typhus couldn't be confirmed with serology.

Almost all the patients enrolled in our study were residing in Southern Province with an exception. That was few patients with DF from Western Province got admitted from during the period of April to July to UMU, THK. This was in parallel with the massive increase in dengue admissions in the country with Hospitals in Western Province having the highest burden during that period. We had 17 such patients from April to July.

All the cases of leptospirosis were confirmed by MAT and only some of the patients had undergone PCR (polymerase chain reaction).

Dengue virus subtyping was not performed among our patients.

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Ongoing postgraduate research projects & thesis submitted during 2020 from projects registered at the Board of Study in Medicine, Faculty of Medicine, University of Ruhuna and Faculty of Graduate Studies, University of Ruhuna

MPhil Degrees

MPhil studies in progress

01. **Antimicrobial properties of five medicinal plants found in Sri Lanka: Possible application as effective disinfectants to nosocomial infections**

Candidate – WSG De Soyza

Principal Supervisor – Dr. M T Napagoda, Department of Biochemistry, Faculty of Medicine, University of Ruhuna
Co-Supervisors – Dr. W M D G B Wijeyaratne, Faculty of Microbiology, Faculty of Medicine, University of Ruhuna, Dr. S Witharana, Department of Mechanical Engineering, Faculty of Engineering, University of Moratuwa

Funding – NSF Grant No RG/2015/BS/01

02. **Age related trends and population specific reference ranges of bone mineral density and biomarkers of bone turnover in adult females**

Candidate – MRP Hasanga, Department of Biochemistry, Faculty of Medicine, University of Ruhuna

Principal Supervisor – Prof. S Lekamwasam, Department of Medicine, Faculty of Medicine, University of Ruhuna
Co-Supervisors – Prof. CM Wickramathilake, Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Prof. RSJ Lenora, Department of Physiology, Faculty of Medicine, University of Ruhuna

Funding – UGC Block Grant No RU/PG-R/16/02

03. **Effect of core stability training of physical performance and knee jerk reflex in army male rugby players in Sri Lanka**

Candidate – SADCS Senavirathna, Department of Physiotherapy, Faculty of Allied Health Sciences, Sir John Kotelawala Defense University, Werahara

Principal Supervisor – Prof. S Gunawardena, Department of Physiology, Faculty of Medicine, University of Ruhuna

Co-Supervisors – Prof. A L Karunanayake, Department of Anatomy, Faculty of Medicine, University of Kelaniya, Mr. ASP Mallawaarachchi, Instructor Education, Department of Physical Education, University of Peradeniya

Funding – Self funded

04. **Development of effective sunscreen formulation from medical plants in Sri Lanka: An *in vitro study***

   Candidate – CE Liyanarachchi, Department of Biochemistry, faculty of Medicine, University of Ruhuna

   Principal Supervisor – Dr. M T Napagoda, Department of Biochemistry, Faculty of Medicine, University of Ruhuna
   Co-Supervisors – Prof. L Jayasinghe, Natural Products Research Division, Natural Institute of Fundamental Studies, Kandy, Dr. S Witharana, Department of Mechanical Engineering, Faculty of Engineering, University of Moratuwa

   Funding – NFS Research Grant RG/2017/BS/05

MPhil thesis submitted during 2020

01. **Outcomes of alcohol cessation interventions and impact of co-existing depression; A hospital based quantitative and qualitative study**

   Candidate – NHDP Fonseka, Department of Nursing, Faculty of Allied Health Science, University of Ruhuna

   Principal Supervisor – Dr. I H Rajapakshe, Department of Psychiatry, Faculty of Medicine, University of Ruhuna
   Co-Supervisor – Dr. AS Dissanayake, Department of Medicine, Faculty of Medicine, University of Ruhuna

   Funding – Faculty Research Grant, Faculty of Medicine.

   Date of Submission- May 2020

02. **Effects on health and social wellbeing due to drug abuse among the institutionalized male drug addicts in four selected districts in Sri Lanka**

   Candidate – ILAN Darshana, Department of Community of Medicine, Faculty of Medicine, University of Ruhuna

   Principal Supervisor – Prof. PV De Siva, Department of Community Medicine, Faculty of Medicine, University of Ruhuna
   Co-Supervisor – Dr. CJ Wijesinghe, Department of Community Medicine, Faculty of Medicine, University of Ruhuna

   Funding – UGC grant No UGC/VC/DRIC/PG 2016(II)/RUH/01

   Date of submission – Nov 2020

03. Development and use of a new instrument to evaluate parenting competencies among mothers with infants at early infancy period in Galle

Candidate – ADSS Karunanayaka, Department of Nursing, Faculty of Allied Health Science, University of Ruhuna

Principal Supervisor – Dr. CJ Wijesinghe, Department of Community Medicine, Faculty of Medicine, University of Ruhuna
Co-Supervisor – Prof. KG Somasiri, Department of Physiology, Faculty of Medicine, University of Ruhuna

Funding – Faculty Research Grant, Faculty of Medicine

Date of Submission – Nov 2020

04. Fragility hip fracture; clinical outcome and burden on healthcare system

Candidate – TUW Abeygunasekara, Department of Nursing, Faculty of Allied Health Science, University of Ruhuna

Principal Supervisor – Prof. S Lekamwasam, Department of Medicine, Faculty of Medicine, University of Ruhuna
Co-Supervisors – Prof. RSJ Lenora, Department of Physiology, Faculty of Medicine, University of Ruhuna, Dr. LWGR Alwis, Department of Anatomy, Faculty of Medicine, University of Ruhuna

Funding – UGC grant No - UGC/VC/DRIC/PG2017(1)/RUH/01

Date of submission – Sept 2020

PhD Degrees

PhD studies in progress

01. Effects of metformin and lifestyle modifications on the progression of atherosclerosis among individuals with impaired glucose tolerance

Candidate – ATIM Amarasinghe, Department of Pharmacology, Faculty of Medicine, University of Ruhuna

Principal Supervisor – Prof. S Lekamwasam, Department of Medicine, Faculty of Medicine, University of Ruhuna
Co-Supervisors – Prof. TP Weerarathna, Department of Medicine, Faculty of Medicine, University of Ruhuna, Dr. M Sumanathilaka, National Hospital of Sri Lanka, Colombo

Funding – UGC grant No- 2016-UGC/2015/RUH/01

02. A one health approach: the epidemiology of methicillin - resistant *Staphylococcus aureus* isolated from humans, animals and animal products in southern Sri Lanka

Candidate – MRP Kurukulasooriya, Duke, Faculty of Medicine, University of Ruhuna, Karapitiya, Galle

Principal Supervisor – Prof. A de Silva Nagahawatte, Department of Microbiology, Faculty of Medicine, University of Ruhuna
Co-Supervisors – Dr. WMDGB Wijayaratne, Department of Microbiology, Faculty of Medicine, University of Ruhuna, Dr. LG Tillekeratne, Duke Global Health Institute (DGHI), Durham, USA, Prof. CK Bodinayake, Department of Medicine, Faculty of Medicine, University of Ruhuna, Prof CW Woods, Duke Global Health Institute, Duke University, USA, Prof T Ostbye, Duke Global Health Institute, Duke University, USA, Dr D de Silva, Sir John Kotelawala Defence University, Rathmalana

Funding – UGS Block Grant No- RU/PG-R/16/03 & NRC Grant No 19-099

03. Nephroprotective activity of a novel herbal nutraceutical mixture derived from selected medicinal plant extracts in rats with chemically induced nephrotoxicity

Candidate – AMSS Amarasiri, Department of Medical Laboratory Science Faculty of Allied Health Science, University of Ruhuna

Principal Supervisor – Dr. AP Attanayake, Department of Biochemistry, Faculty of Medicine, University of Ruhuna
Co-Supervisors – Prof. KAPW Jayatilake, Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Prof. LKB Mudduwa, Department of Pathology, Faculty of Medicine University of Ruhuna

Funding – UGC Block Grant No – RU/PG-R/16/14 & NSF Grant No – RG/2016/HS/03

04. Delusional disorder (Jealous type): frequency of presentation to mental health services and web-based community survey on psychological mechanisms and psychosocial correlates of abnormal jealousy in intimate relationships

Candidate – MKOK De Silva, Department of Clinical Sciences, Faculty of Medicine, General Sir John Kotelawala Defence University, Ratmalana

Principal Supervisor – Dr. IH Rajapakse, Department of Psychiatry, Faculty of Medicine, University of Ruhuna
Co-Supervisors – Dr. MC Rajasuriya, Department of Psychiatry, Faculty of Medicine, University of Colombo, Dr. NFJ Fernando, Department of Clinical Sciences, Faculty of Medicine, General Sir John Kotelawala Defence University, Ratmalana

Funding – Self funded

05. **Vasculopathy, systemic inflammation, body composition and cardiometabolic risk among patients with chronic kidney disease**

Candidate – EH Silva, Department of Medical Laboratory Science, Faculty of Allied Health Science, University of Ruhuna

Principal Supervisor – Prof. CM Wickramatilake, Department of Biochemistry, Faculty of Medicine University of Ruhuna

Co-Supervisors – Prof. S Lekamwasam, Department of Medicine, faculty of Medicine, University of Ruhuna, Prof. LKB Mudduwa, Department of Pathology, Faculty of Medicine University of Ruhuna, Dr. RA Ubayasiri, Consultant Vascular and Transplant Surgeon, Teaching Hospital, Karapitiya

Funding – UGS Block Grant No- RU/PG/16/06

06. **Double blind placebo controlled randomized clinical trial of a herbal capsule of *Coccinia grandis* (L.) Voigt in newly diagnosed patients with type 2 diabetes mellitus and its' bioassay guided isolation of antidiabetic compounds**

Candidate – KGP Wasana, Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Karapitiya, Galle

Principal Supervisor – Dr. AP Attanayake, Department of Biochemistry, faculty of Medicine, University of Ruhuna
Co-Supervisors – Prof. TP Weeraratna, Department of Medicine, Faculty of Medicine, University of Ruhuna, Prof. KAPW Jayatilaka, Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Dr. JMS Jayasinghe, Department of Chemistry, Faculty of Science, University of Peradeniya

Funding – NRC Research Grant (N0.17 -029)

07. **Cardiovascular and psychological comorbidity among patients with plaque psoriasis**

Candidate – PLAN Liyanage, Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Principal Supervisor – Prof. S Lekamwasam, Department of Medicine, faculty of Medicine, University of Ruhuna
Co-Supervisors – Prof. PV De Silva, Department of Community Medicine, Faculty of Medicine, University of Ruhuna , Prof S Imafuku, Department of Dermatology, Fukuoka University, Japan

Funding – Pending

PhD thesis submitted during 2020

01. **Anthracycline induced cardiotoxicity: A clinical, ethnopharmacological and biochemical approach**

Candidate – JAN Sandamali, Department of Medical Laboratory Science, Faculty of Allied Health Science, University of Ruhuna

Principal Supervisor – Prof. RP Hewawasam, Department of Biochemistry, Faculty of Medicine, University of Ruhuna
Co-Supervisor – Prof. KAPW Jayatilaka, Department of Biochemistry, Faculty of Medicine, University of Ruhuna

Funding – UGC Grant No –UGC/VC/DRIC/PG2015 (III)/RUH/01 and University of Ruhuna Research Grant No – 2015/RU/PG-R/15/03

Date of Submission – Nov 2020

02 **Psychological distress, social dysfunction and coping strategies of patients with Lymphatic Filariasis (LF): A field based study to improve the current morbidity management programme in Sri Lanka**

Candidate – J Ruban, Department of Parasitology, Faculty of Medicine, University of Ruhuna, Galle

Principal Supervisor – Prof. TC Yahathugoda, Department of Parasitology, Faculty of Medicine, University of Ruhuna
Co-Supervisor – Dr. C Senadheera, Department of Psychiatry, Faculty of Medicine, University of Ruhuna
Prof. BP Perera, Department of Community Medicine, Faculty of Medicine, University of Ruhuna,
Prof. KG Somasiri, Department of Physiology, Faculty of Medicine, University of Ruhuna

Funding – CNTD Project of the Department of Parasitology

Dean's Awards - 2019

Dean's awards are awarded annually to the students with the best overall performance in each Faculty. They are funded by the University and administered by the Deputy Vice Chancellor's Office in consultation and collaboration with the faculties and assisted by the Divisions of Examinations and student affairs.

Dean's awards for 2019 were awarded to the following students.

Dean's Award for the Best 2nd MBBS student for 2019.

Miss. Devuni Akashmi Wijenayaka received her primary education at Vihara Maha Devi Balika Vidyalaya, Kiribathgoda and Hillwood Girls College, Kandy and secondary education from Sanghamitta Balika Vidyalaya, Galle. She entered the Faculty of Medicine in 2016. She passed her 2nd MBBS examination with first class honors with distinctions in Biochemistry and Physiology. She placed 1st in the faculty level of Orator of the year competitions in 2018 and also represented the faculty at Professor Carlo Fonseka Challenge Trophy physiology quiz in 2019. She is a member of the women's faculty table tennis team which was able to place 1st runners-up in inter-faculty tournaments in 2017 and 2018 as well as 1st runners up in the inaugural inter-medical faculty championship. She has also compeered in faculty events including grand finale of orator of the year 2018 of the University of Ruhuna, 77th annual academic sessions of GMA and 13th Sri Lanka University Games.

Dean's Award for the Best 3rd MBBS student in 2019

Miss. Alahapperuma Wijesinghage Kalani Mithunika studied at Tangalle Girls School. She entered the Faculty of Medicine, University of Ruhuna in 2015. She passed the 2nd MBBS examination with first class honors with distinctions for all three subjects. She has passed 3rd MBBS examination with first class honors with distinctions in Parasitology, Pharmacology and Pathology. She has presented a research on "Spectrum of clinical presentation and complications in patients diagnosed with Leptospirosis; a study done at Teaching Hospital Karapitiya" at the 3rd National Undergraduate Research Symposium in 2018 which was organized by the Ruhuna Science Research Circle.

Dean's Award for the Best final MBBS student in 2019

Dr Gayani Nadinika Minuvanpitiya completed her primary and secondary education at Musaeus College Colombo. She entered the Faculty of Medicine in the year 2013. While at the University she excelled in her academic work, successfully completing the degree programme with First Class honours at the Second, Third and Final Examinations for Medical Degrees while earning distinctions in 11 out of 14 subjects and was placed third in the all island merit order list. For obtaining the highest mark for pharmacology at the Third Examination for Medical degrees, she was awarded the "Senaka Bibile Memorial Scholarship" by the State Pharmaceutical Cooperation in 2017. She was a semifinalist of the Orator of the Year Competition organized by the University of Ruhuna in collaboration with the Indian High Commission in Sri Lanka in 2015 and was placed third at the Singing Competition (English) at the 'Sithum Siyawal' Art Festival organized by the Faculty of Medicine the same year.

Free Paper Session

Open Category

1st place
Vidanage DI[1], Hettiarachchi P[2], Wasalathanthri S[3].
Impact of a 3-month combined exercise regimen on taste perception for sucrose in patients with type 2 diabetes mellitus.
Department of Nursing & Midwifery[1], General Sir John Kotelawala Defence University, [2]Department of Physiology, University of Sri Jayewardenepura, [3]Department of Physiology, University of Colombo

2nd Place
Punchihewa GDP[1], De Silva HWS[2], Ranamuthuge RTS[2], Siriwardana KCR[2], Jayaweera DHPK[2]
Evaluation of Midwives' knowledge on use of Edinburgh Postnatal Depression Scale (EPDS)- a study conducted in Galle district
[1]Department of Psychiatry, Faculty of Medicine, University of Ruhuna, [2]Medical officers of Mental health, Galle district.

3rd Place
Seneviranthna TKRR[1], Hettiarachchi UPK[1,] Athiththan LV[1], Weerawansa P[2], Pilapitiya S[2], Lokunarangoda N[2], Sarathchandra C[2], Senanayake H[2], Peiris H[1], Siribaddana S[2]
Dysglycaemia and acute anticholinesterase poisoning, an association?
[1]Department of Biochemistry, Faculty of Medical Sciences, University of Sri Jayewardenepura,
[2]Department of Medicine, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka

Student Category

1st place
Hansani JKM[1], Harshana KVR1, Harshani NWU1, Heshani NKC[1], Hettiarachchi HAAK[1], Indika GBH[1], Vidanage KP[1], Wijesinghe CJ[2]
Completeness of laboratory request form filling and the perceptions regarding request form filling among medical officers in Teaching Hospital, Karapitiya.
[1] Research Group 7, 37th Batch, Faculty of Medicine, University of Ruhuna, [2]Department of Community Medicine, Faculty of Medicine, University of Ruhuna

2nd Place
Dias PGNJ[1], Dilanka IWGM1, Dinuranji KSH[1], Dissanayaka BS[1], Dissanayake DMVB1, Ediriwickrama PE1, Ekanayake SAGS[1], Suriarachchi SR[1], De Silva PV[2]
Prevalence and associated factors of musculoskeletal problems among tea estate workers in Homadola estate, Galle.
[1]Research Group 5, 37th Batch, Faculty of Medicine, University of Ruhuna, [2]Department of Community Medicine, Faculty of Medicine, University of Ruhuna

3rd Place
Wathsala DC[1], Weerabansha AR[1], Weerasinghe DM[1], Welagedara JP[1], Weragoda WVSP[1], Weerahera SLJI[1], Wickramanayake LA[1], Wickramanayake NDIA1, Wijesinghe CJ[2]
Awareness and practices related to use and storage of pharmaceuticals among patients with chronic diseases attending Teaching Hospital Karapitiya.
[1]Research Group 23, 37th Batch, Faculty of Medicine, University of Ruhuna, [2]Department of Community Medicine, Faculty of Medicine, University of Ruhuna

<u>Poster Session</u>

Open Category

<u>1st place</u>

Rathnayake N1, Alwis G[2], Lenora J[1], Lekamwasam S[4]
Association between bone mineral density and body composition; a study involving pre and postmenopausal women.
[1]Department of Nursing, Faculty of Allied Health Sciences, University of Ruhuna, [2]Department of Anatomy, Faculty of Medicine, University of Ruhuna, [3]Department of Physiology, Faculty of Medicine, University of Ruhuna, [4]Department of Medicine, Faculty of Medicine, University of Ruhuna

<u>2nd Place</u>

Prabath Nisshanka1, Wasantha Kodikararachchi[2], Amaranath Karunanayake[3]
Correlating platelet count to the onset of leaking phase among Dengue patients admitted to two selected medical wards in Teaching Hospital, Karapitya
[1]Post Graduate Institute of Medicine, [2]Teaching Hospital Karapitya, [3]Faculty of Medicine, University of Ruhuna

<u>3rd Place</u>

De Silva LAPNF[1], Peiris HH[1], Wijerathna WMDGB[2]
Comparison of the effectiveness of different Substrates and culture media on Germ Tube (GT) production.
[1]Department of Medical Laboratory Science, Faculty of Allied Health Sciences, University of Ruhuna, Galle.
[2]Department of Microbiology, Faculty of Medicine, University of Ruhuna, Galle.

Student Category

<u>1st place</u>

Munasinghe HKCP[1], Munasinghe VLH[1], Nanayakkara BPN[1], Narmada WB[1], Navanjana HLL[1], Wijesinghe CJ[2]
Awareness of risk factors and early detection of breast cancer in women of reoroductive age attending Teaching Hospital Karapitiya.
[1]Research Group 15, 37th Batch, Faculty of Medicine, University of Ruhuna, [2]Department of Community Medicine, Faculty of Medicine, University of Ruhuna

<u>2nd Place</u>

De Silva BKT[1], De Silva DAA[1], De Silva RKSN[1], De Silva SMUJ[1], De Silva WDS[1], Deegala SA[1], Deemanthi MN, Perera B[2]
Quality of life and associated factors in patients with Rheumatoid Arthritis treated at Teaching Hospital Karapitiya.
[1]Research Group 4, 37th Batch, Faculty of Medicine, University of Ruhuna, [2]Department of Community Medicine, Faculty of Medicine, University of Ruhuna

<u>3rd Place</u>

Mangalika SJ[1], Marasinghe TP[1], Mihindukulasooriya JSL[1], Mihiran AKKA[1], Mihiran DJD[1], Mithunika AWK[1], Munasinghe DYT[1], Wijesinghe CJ[2]
Prevelance of overweight and obesity among medical undergraduates of University of Ruhuna and its association with stress
[1]Research Group 14, 37th Batch, Faculty of Medicine, University of Ruhuna, [2]Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Gaps in knowledge, attitudes and practices on medical laboratory safety among technical officers in Faculty of Medicine, University of Ruhuna

Wickramaratne KAC[1], Wijewickrama DC[2]

[1]*Department of Pathology,* [2]*Department of Physiology, Faculty of Medicine, University of Ruhuna.*

Abstract:

Background and objectives: With improving quality and standards, assuring safety of employees, users (patients or students) and environment is integral in medical laboratories. The practices and attitudes on safety are built mainly on the knowledge of the technical personnel. This study was carried out in Faculty of Medicine, University of Ruhuna to determine gaps in knowledge, practices and attitudes on laboratory safety as per the International and National safety standards among technical personnel.

Materials and methods: Data were collected with an investigator administered questionnaire containing open and close ended questions. Data were analyzed qualitatively.

Results: Of the 40 technical officers, 32 consented and participated in the study. Majority (27) were Advanced Level qualified. Seventeen (53%) had training on laboratory safety. Their knowledge on door signage and practices in general laboratory safety were satisfactory while knowledge on principles of laboratory safety, waste disposal, universal precautions, first aid, management of blood spills, materials safety data sheet and use of fire extinguishers were suboptimal. Surprisingly, two of them mentioned the use of mouth pipetting which is obsolete. Adherence to safety practices showed lapses. Majority accepted training on laboratory safety as a requirement. They showed a positive attitude towards improvements and safety implementations in the laboratory they are working.

Conclusion: Knowledge and adherence to safety practices of technical officers is suboptimal thus establishing a training program on laboratory safety for technical staff is an urgent need.

Key words: Knowledge, Laboratory safety

Introduction:

It is the twenty first century, we move to total automation in diagnostics. With ever increasing test menu, the quality and standard of practice of laboratory medicine has improved dramatically with minimal errors and accidents. Even though the safety concerns are minimized by automation and recent laboratory innovations, it is mandatory and of paramount importance to ensure safety of employees, patients and the environment in medical laboratories. The potential hazards in clinical laboratories can vary. Safety issues related to handling, analysis and evaluation of clinical samples for diagnostic purposes are well documented (1-5). With the recent Covid 19 outbreak, attention on laboratory safety is stressed and much discussed globally.

Laboratories are indispensable in patient care, teaching and research. Processes in laboratories are designed to fulfill various roles as diagnostic evaluation, research education, analytical testing, quality controlling etc. All laboratories share common characteristics regardless of their purpose or setting. Those include, development and validation of testing protocols and sampling strategies; instrument calibration and internal quality assurance; product sampling and collection; transport and delivery of samples to the laboratory; receipt, acceptance (or rejection) and record keeping; sample preparation; sample analysis; calculation and reporting of results;

information was gathered by an investigator administered, pre-tested questionnaire. The questionnaire was in four parts. Part I inquired about basic demographic data. Part II included twenty semi-structured open ended questions on medical laboratory safety. The participants were expected to provide brief answers. Part III was a checklist to assess knowledge on usage of fire extinguishers. Here, the different fire extinguishers were included with the colour code and they were asked to indicate the type of fire which can be controlled by each. Part IV consisted of twenty items to assess attitudes and practices of the participants on laboratory safety and it included closed ended questions to answer with responses in a scale ranging from never to always. The answers given in Part II and III were categorized in to two groups, either acceptable or unacceptable depending on the accuracy of the answers as per the standard safety requirements. The answers to Part IV were analyzed quantitatively.

Results

Of the 40 permanent technical officers attached to the institution, 32 consented and participated in the study. Only 17 technical officers (53%) had some training on laboratory safety during their period of employment. The educational background of study subjects ranged from advanced level to a diploma or a degree in science. A majority (n=23, 71.88%) were advanced level recruits.

All the participants (100%) were able to describe at least two good laboratory practices which can prevent accidental chemical ingestion. A majority of participants could recognize door signage correctly (Table 1). Twenty two (68.8%) participants appropriately described the need of eye wash stations as a safety measure. Majority (n=22, 68.8%) were aware of potential carcinogens in use in laboratories. The knowledge on infection transmission was satisfactory and 25 (78.1%) officers correctly listed infections which can be transmitted through blood. Twenty three (71.9%) described good laboratory practices which can prevent fire in a laboratory while

22 (68.8%) were able to describe electric hazard preventive measures.

Inadequate knowledge on basic principles of laboratory safety was reflected by the failure to give acceptable answers to many questions including, universal precaution (0%), waste disposal methods (n=8, 25%), first aid measures following needle stick injury (n=10, 31.3%), blood spills management (n=5, 15.6%) and method of carrying and storing corrosives (0%). Surprisingly, in spite of knowing blood borne infection risk, all failed to describe the universal precautions correctly. Only 25% of participants correctly described waste classification and proper disposal while 15.6% were aware of adherence for the central environment authority regulations as a requirement in waste disposal.

The procedure to follow when presented with a needle stick injury was correctly described by only 10 (31.3%) technical personnel. Only 5 (15.6%) were able to describe the proper management of blood spills. Only 11 (34.4%) participants mentioned use of hypochlorite always when blood spills are managed. This indicates non adherence to standard safety practices of other technical personnel.

Eventhough, none could describe the technique of storing corrosives correctly and how to carry corrosives when volume is over 500ml, a majority (n=29, 90.6%) knew it should never be stored in top shelves of the laboratory.

Six (18.8%) participants described the materials safety data sheet correctly and its contents were described correctly by ten (31.3%).

Surprisingly, eventhough obsolete, a few (n=5, 15.7%) stated mouth pipetting as a procedure that is used when performing manual blood cell counts.

The knowledge of technical officers on different types of fire extinguishers and their appropriate use was also sub optimal. A majority (n=27, 84.4 %) was aware on use of water as an extinguisher on fires of

and waste disposal. Out of these, the greatest concern for potentially hazardous exposures involve sample collection, preparation and analysis (1). Despite using automated equipment and techniques, still aerosol formation, sample spillage and surface contamination can occur with an assessable risk of infection transmission. Lack of knowledge on hazards, absence of awareness training and sub optimal safety performance make the laboratory personnel more vulnerable to these hazards (1, 3).

The potential hazards in a laboratory are classifiable into four main categories: chemical, physical, radiological, and biological (1). All these risk categories are prevalent in University laboratory settings as well. Laboratories in Medical Faculties are used to provide direct diagnostic services, teaching and research. Each laboratory exhibits a unique set of concerns depending on the risks which require specialized attention based on their service. Provision of safety training is very important in any health care institution or in any laboratory setting nowadays to promote the standard of care and services offered.

Laboratory safety management includes identification of all the potential hazards of the laboratory and classification of them. Preparation of safety manual, routine safety check, reporting and implementing suitable remedy to contain accidents or emergencies, and prevention of breach in safety in all its operations is the final goal of such a program (1, 6-9).

A study carried out among undergraduates in an allied health sciences faculty in Sri Lanka revealed a significant difference of knowledge on safety between BSc medical laboratory science students and the other students of different allied health disciplines. However, the same study showed adherence to poor safety precautions by all the allied health science students (10). To understand training requirements, it is important to define lapses in the safety system in any institution. It is of paramount importance to research in to the available knowledge level, practices and provisions of laboratory workers with regard to

safety. This study was carried out in the Faculty of Medicine, University of Ruhuna in which, many different laboratories are in operation in different Departments and Units. Diagnostic laboratories handle clinical samples collected from patients in teaching hospital and private hospitals. Laboratories involved in medical research handle clinical samples of patients and of healthy volunteers. In addition, student laboratories meant for teaching medical undergraduates handle patient samples as and when required. Some laboratories use strong chemicals such as formaldehyde, absolute alcohol, acids and xylene etc while a few use radioactive agents to carry out immunological and radioimmunoassays. Therefore, biohazards, chemical hazards and general safety hazards are equally, potentially prevail in all these laboratories. Thus, evaluation and assessment of gaps in knowledge, attitudes and practices in relation to laboratory safety among technical officers attached to these laboratories is the foundation stone for the establishment of proper safety training and safety management program. As there is no properly implemented safety training program within the Faculty of Medicine focusing technical personnel, this study can provide a good insight on needs and key areas to address in such a program. Therefore, this study was carried out to determine the gaps in technical officers' knowledge, failures on adherence to general laboratory safety recommendations and their attitudes on laboratory safety as per expectations and recommendations in the national & international safety standards.

Materials and methods

A descriptive cross-sectional study was carried out among all the technical officers working in Faculty of Medicine, University of Ruhuna, after obtaining informed-written consent. Ethical approval was obtained from the Ethics Review Committee of Faculty of Medicine, University of Ruhuna. Objectives of the study were to assess the knowledge, attitudes and practices on medical laboratory safety among technical officers and to determine their adherence to laboratory safety recommendations. The

solids. The knowledge on other types of fires and appropriate extinguishers was inadequate (Figure 01).

Data on attitudes and practices of technical officers on medical laboratory safety is shown in Table 02. Almost all (96.9%) the technical officers correctly mentioned avoidance of use and storage of food inside laboratories. A majority (n=22, 68.8%) was not wearing laboratory overcoats when working in the laboratory but 71.9% (n= 23) used disposable gloves as a practice. Most were aware on prevention of splashes by the use of goggles. Majority (n=26, 81.3%) agreed that left over samples should never be emptied to wash basins. Twenty eight (87.5%) participants understood the safety training as a need and 80% endorsed regular safety check as a requirement. The good practices of not serving and storing food (96.9%,), water (96.9%,), and personal belongings (71.9%,) show their good attitudes towards safety. The collection of needles together with other clinical waste into polythene bags show a mixed response. While 40.6% never practiced such,

43.8% practiced it always which reflected their attitudes.

Discussion

Quality standards and accreditation of medical and clinical laboratories demand assurance of safety of employees, environment and patients (users) as mandatory requirements. Therefore, it is a necessity to have safety measures, safety education, safety training and safety practices in medical clinical laboratories and the laboratory employees should have the necessary knowledge and information on laboratory safety. Technical officers are key players in laboratories whether these are for patient sample testing, research or student teaching. As a medical faculty, we expect appropriate knowledge and practices inculcated among technical personnel to assure safety. The findings of this study highlights the inadequacy of knowledge and gaps in practices on laboratory safety by the technical personnel attached to Faculty of Medicine, University of Ruhuna. Regular training in specific spheres of practice is

Table 1: Technical officers' knowledge on medical laboratory safety (n=32) (Open ended questions)

	Questions on Knowledge on laboratory safety	Acceptable Answer n (%)
1	State the two types of illumination needed in the laboratory.	04 (12.5)
2	What is meant by room temperature?	03 (09.4)
3	What do you understand by the term - universal precautions?	00 (00)
4	Do you know the regulations of Central Environmental Authority of Sri Lanka with regard to medical laboratory waste?	05 (15.6)
5	What is the standard method of disposal of different types of waste in your laboratory?	08 (25.0)
6	When do we need eye wash stations?	22 (68.8)
7	What first aid measures should be taken when there is a needle stick injury?	10 (31.3)
8	State the method for management of a blood spill on a table top	05 (15.6)
9	What do you understand by door signage?	20 (62.5)
10	Link the standard door signage a. Bio hazard b. Laser hazard c. Radiation hazard	21 (65.6) 24 (75.0) 20 (62.5)
11	State the recommended method to carry corrosives if the volume is more than 500ml	00 (00)
12	State the method of storage of corrosives	00 (00)
13	What do you understand by "MSD or material safety data sheet"?	06 (18.8)
14	Indicate four basic contents of a MSD	10 (31.3)
15	What is a carcinogen?	22 (68.8)
16	State few carcinogenic chemicals used in medical laboratories	13 (40.6)
17	State three measures to be taken to prevent electric current related laboratory accidents	22 (68.8)
18	State two good laboratory practices which can prevent accidental ingestion of chemicals	32 (100)
19	State two good laboratory practices which can prevent accidental fire in laboratories	23 (71.9)
20	State main diseases which can be transmitted by handling clinical samples	25 (78.1)

Fire Extinguisher Chart

Extinguisher		Type of Fire				
Colour	Type	Solids (wood, paper, cloth, etc)	Flammable Liquids	Flammable Gasses	Electrical Equipment	Cooking Oils & Fats
[red extinguisher]	Water	A. 27 B. 01 C. 04	A. 02 B. 14 C. 16	A. 01 B. 15 C. 16	A. 01 B. 14 C. 17	A. 01 B. 15 C. 16
[yellow extinguisher]	Foam	A. 10 B. 02 C. 20	A. 13 B. 0 C. 19	A. 05 B. 04 C. 23	A. 0 B. 09 C. 23	A. 11 B. 02 C. 19
[blue extinguisher]	Dry Powder	A. 12 B. 03 C. 17	A. 16 B. 03 C. 13	A. 13 B. 06 C. 13	A. 16 B. 07 C. 09	A. 14 B. 04 C. 14
[black extinguisher]	Carbon Dioxide (CO2)	A. 12 B. 03 C. 17	A. 17 B. 02 C. 13	A. 18 B. 02 C. 12	A. 20 B. 01 C. 11	A. 17 B. 04 C. 11

Figure 1: Fire extinguisher chart with the results of technical officers' knowledge on the type of extinguishers that can be used on different type of fires(n=32)

A – number correctly answered. B - number incorrectly answered, C - number who do not know the answer

described as a mandatory requirement. Development of highly reliable teams through training has been described as the key of success in organizational development (7). Being a medical faculty with resources, absence of an established training program on safety for technical officers is a vaccum in the system.

According to literature, most of the laboratory related infections and accidents are due to inadequate proactive measures due to poor knowledge or negligence (1,3,8). Most of the participants in this study had the concern on safety check as a regular requirement. Their knowledge on measures that can be adopted to prevent chemical ingestion, occurrence of fire and electric hazards endorses their potential to implement good safety practices (9). Surprisingly none of the technical personnel knew accurate handling of corrosive volumes exceeding 500ml. Inconsistent use of laboratory overcoats stresses the

need of implementation and regularization of general safety requirements, establishment of safety protocols and standard operative procedures within departments. A clear relationship between absence of accidents and compliance with safety practices has been described (9). Whether accident occurrence and incidence reporting is timely and appropriately reported in our setup is doubtful and in this study we could not assess it. However, the responses of the participants raise a potential higher risk of laboratory related adverse events. It will be interesting to assess the accidents and events related to laboratory practices and the steps taken at individual Departmental level in the University. High overall incidence of laboratory related occupational illnesses over a period of four years (1998 -2001) in medical and dental laboratories compared to private industry and testing laboratories in USA have been documented (1). This shows the overall high risk in medical laboratories even with highest facilities. Although the initial education and training of people

Table 2: Technical officers' attitudes and practices on medical laboratory safety (n=32) (closed questions)

	Assessment of attitudes and practices on laboratory safety	Never n (%)	Occasio nally n (%)	Freque ntly n (%)	Most of the time n (%)	Always n (%)
1	Drinking water is stored in laboratory refrigerator.	31(96.9)	1(3.1)	0	0	0
2	Food is served and stored inside the laboratory.	31(96.9)	0	0	0	1(3.1)
3	Personnel belongings are kept in the laboratory.	23(71.9)	6(18.8)	1(3.1)	2(6.3)	0
4	Wear laboratory over coat when work in the laboratory.	22(68.8)	6(18.8)	2(6.3)	2(6.3)	0
5	Wear disposable gloves when handle all the clinical samples.	0	1(3.1)	5(15.6)	3(9.4)	23(71.9)
6	Broken pieces of sample tubes are removed from a centrifuge by bare hand.	27(84.3)	1(3.1)	2(6.3)	0	2(6.3)
7	Blood spill is cleaned with hypochlorite solution.	6(18.8)	8(25)	3(9.4)	4(12.5)	11(34.4)
8	Blood soaked cotton, syringes and needles are collected in to polythene bags in a bucket.	13(40.6)	3(9.4)	0	2(6.3)	14(43.8)
9	Left over blood samples from patients are directly emptied in to laboratory sink.	26(81.3)	2(6.3)	2(6.3)	0	2(6.3)
10	Universal precautions are applied to all the clinical samples	4(12.5)	5(15.6)	0	7(21.9)	16(50)
11	Fume hood is needed when volatile toxic substances are handled.	2(6.3)	0	3(9.4)	21(65.6)	6(18.8)
12	Corrosive chemicals are stored in top shelf of the laboratory rack.	29(90.6)	1(3.1)	0	0	2(6.3)
13	Mouth pipetting is practiced when perform manual blood cell counting.	24(75.0)	3(9.4)	2(6.3)	0	3(9.4)
14	Goggles are needed to prevent harmful flashes.	3(9.4)	3(9.4)	0	3(9.4)	23(71.9)
15	Electrical safety is a requirement in medical laboratories.	0	2(6.3)	2(6.3)	2(6.3)	26(81.3)
16	Emergency exit is a requirement in laboratories.	2(6.3)	2(6.3)	0	2(6.3)	26(81.3)
17	Entry to a laboratory must be restricted.	2(6.3)	3(9.4)	1(3.1)	11(34.4)	15(46.9)
18	Routine safety check is a requirement in your laboratory.	0	3(9.4)	3(9.4)	6(18.8)	20(62.5)
19	Safety practices in other countries can be directly applied and practiced in our laboratories.	2(6.3)	10(31.3)	3(9.4)	10(31.3)	7(21.9)
20	Safety training is a requirement for technical officers.	0	0	2(6.3)	2(6.3)	28(87.5)

cause an impact on their knowledge and practices on safety, whether what was learnt is applied when they are employed is questionable. The results of a study carried out among allied health science students at University of Sri Jayewardenepura, Sri Lanka shows inadequacy of their safety practices although they were taught and trained on those as undergraduates (10). This highlights the need of continuous training when they are employed since, what was learnt are inculcated when they are practiced and applied. Other than that, the working environment too should encourage the technical personnel to adhere to proper practices and proactive safety measures (10).

Training is very important in spite of the advent of latest error detection methods and safety engineering which cannot prevent man related failures in safety practices or man related errors in safety (1, 8, 9). Safety always needs proactive measures before its occurrence (1,2,7,8). Therefore, it is an urgent need

to establish a reliable human force to carry out safety assurance program in any institution. The role of reliability of human factor in safety management is based on the knowledge and attitudes of laboratory employees (7).

The reason for these observations can be attributed to the fact that most of them are advanced level qualified while only 17 (53%) had training on laboratory safety during their carrier. Mentioning of obsolete practices such as mouth pipetting, absence of knowledge on handling of corrosives, not knowing information on material safety data sheet, inability to describe procedures to follow in a needle stick injury and failure to describe universal precautions urge imperative remedy. This highlights potential high risk of infection transmission to the technical staff due to the absence of updated knowledge. Issues related to laboratory safety in the recent past in UK related to brucellosis cases

detected among laboratory workers show breach in safety practices, absence of high degree of suspicion and stress the need of adherence to safety guidelines always (2). A study conducted in Costa Rica showed an increasing proportion of work-injury absence in general services (27.5%) compared to professionals (7.3%) (8).

The findings of this study points towards unseen and un-estimated occupational health risks of employees in Universities and shows the iceberg of the hidden problem of laboratory safety in Sri Lanka. This endorses the importance of implementation of proper training programs and regular audits in relation to safety in all the health care and educational institutions in Sri Lanka. This study is an eye opener to plan and implement regular safety training programs to improve knowledge, attitudes and practices of the technical staff on laboratory safety to prevent occurrence of laboratory related occupational hazards and accidents and to prepare them for twenty first century practices.

Acknowledgement

Conflicts of interest
Authors declare no conflicts of interest.

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FMAS Oration 2019

Impact of national salt iodization in Sri Lanka on iodine requirement during pregnancy and neonatal thyroid functions: A rational approach for policy makers

De Zoysa GED, Senior Lecturer in Biochemistry, Faculty of Medicine, University of Ruhuna

Introduction

The history of iodine in health

Iodine has a very long history in medicine which was running back to ancient time. It was recorded in early Chinese medical writings in approximately 3600 B.C. that the size of the goiter decreases upon ingestion of seaweed and burnt sea sponge. Even though they did not have any idea about the active component in them, these remedies remained effective and their use continued globally, as was documented in writings by Hippocrates, Galen, Roger, and Arnold of Villanova in later centuries (1).

Iodine was discovered in 1811 by a French chemist Bernard Courtois as a violet vapor arising from seaweed ash while manufacturing gunpowder for Napoleon's army and English chemist Sir Humphry Davy named it as iodine from a Greek word for "violet coloured" and published his work in 1813. In 1820 Jean Francois Coindet concluded that iodine deficiency causes goiter and introduced iodine treatment for goiter (2).

Iodine is the essential element for the production of hormone - thyroxin in the thyroid gland which is important for many aspects in human metabolism. Therefore, iodine became a micronutrient of crucial importance for the health and well-being of all individuals (3).

Iodine nutrition during pregnancy

Nutritional deficiencies affect various stages of human life and pregnancy is considered as the most critical period because requirements are significantly higher. Pregnancy has a profound impact on the thyroid gland and thyroid function and it is a stress for the thyroid gland. During pregnancy, production of thyroid hormones increases by 50%, along with a 50% increase in the daily iodine requirement (4) and if a pregnant woman is deficient with iodine during pregnancy it can cause thyroid dysfunctions. Insufficient iodine levels during pregnancy has been shown to be associated with a number of adverse outcomes such as increased risk of pre-term birth, placental abruption, fetal death, and impaired neurological development in the child (5,6,7).

Effect of maternal iodine status on the offspring

During the first trimester of pregnancy, the developing foetus is completely dependent on the mother for thyroid hormones because the foetal thyroid gland does not develop until 13–15weeks of gestation (8). As the foetus progresses into the third trimester, it is gaining the ability to produce its own thyroid hormones but still dependent on maternal iodine for hormone synthesis (9,10). Further, thyroid hormones have been reported to play an important role in the processes of brain development, such as neurogenesis, neuronal migration, axon and dendrite formation, myelination, synaptogenesis and neurotransmission (11). Therefore, in utero iodine deficiency can cause irreversible damage to the developing foetal brain. This highlights the importance of maintaining adequate iodine nutrition throughout the pregnancy period and even mildly low maternal thyroxine and elevated serum TSH levels during pregnancy may result in cognitive delays in the offspring (12) It was reported that iodine deficiency can result in a mean IQ loss of 13.5 points in the population and effects of poor maternal iodine nutrition on children; ranging from gross hypothyroidism to mild cognitive impairment is a threat to the social and economic development of countries and that was the primary motivation behind the current worldwide drive to eliminate iodine deficiency disorders (IDD).

Salt iodization

The term "iodine deficiency disorders" (IDD) was first introduced by Basil Hetzel in 1983 including a spectrum of related disorders such as goiter, impaired thyroid function, retarded growth and mental development, decreased fertility and increased prenatal mortality (13,14).

The importance of addressing IDD on a global basis was first recognized in 1990 and universal salt iodization (USI) was introduced as a measure to eliminate IDD . However, Francisco Freire-Allemao, a Brazilian physician, proposed iodine prophylaxis in a government-administered public health program, for goiter prevention way back in 1831(14).

The Primary targets of universal salt iodization are to reduce the goiter rate to <5% in school-aged children, to maintain the median urinary iodine level in the population between 100–200 µg/L and to keep the usage of iodized salt >90% at the household level (15). When we look at the current global situation in eliminating IDD- almost after three decades of salt iodization programme in practice, recent studies have revealed from the available data from 127 countries, 15 countries are iodine deficient, 102 have optimal iodine nutrition, and 10 have excess iodine intakes. This reflects tremendous global progress against iodine deficiency and now countries are recognizing the importance of monitoring the iodine status in populations that are particularly vulnerable to the negative consequences of iodine deficiency, such as pregnant women. The main challenge of salt iodization program is to maintain the iodine requirements throughout the pregnancy to prevent negative impact on foetal brain development (16).

Situation in Sri Lanka

If we look at the iodine nutritional status of Sri Lanka, many studies have been carried out over the past few decades and a study done in 1987 found that the overall goiter prevalence rate was as high as 18.8% and all 17 districts where this study carried out were considered as endemic for goiter (17). Based on the results of different studies, iodine deficiency was identified as a significant health problem in Sri Lanka

The Government of Sri Lanka launched USI in 1995 as the mainstay of control of IDD. The relevant legislation was adopted under the food act 26, of 1980 where salt for human consumption should be iodinated and it should have an iodine content of 50ppm at the factory level and 25ppm at the consumer level. This was amended in 2005 with new recommended level of iodine in salt at the consumer level is 15- 30 ppm (Amendment No: 4 to SLS 79:1987). After launching the salt iodization programme, three national surveys were carried out in 2000/2001, 2005 and 2010 to assess the impact of the programme. In all three surveys, urinary iodine level of school aged children was used as an indicator of iodine nutrition. Regarding some of the key findings of the first surveys it revealed that median UI levels were above the cut-off point (100µg/L) in all Provinces except in Uva and 35.4% of school aged children had UI levels in the 'ideal' range (100–199.9 µg/L) and it was found that 30.6% of them had lower urinary iodine values less than 100 µg/L indicating iodine deficiency and also only 49.5% of households had used adequately iodized salt. According to findings of these surveys' Sri Lanka has considered as a country which achieved a satisfactory control of IDD after the national salt iodization programme according to WHO criteria (18,19). However, it is important to note that iodine status in school aged children is not a good indicator of iodine nutrition in vulnerable groups such as pregnant women and also the survey done in 2010 revealed that median urinary iodine level in pregnant women was far below the WHO recommendation

These findings raised a question about iodine nutritional status among Sri Lankan pregnant women after many years of salt iodization and the quality of the iodized salt products and it has also been shown that the consumption of iodized salt is not sufficient to maintain the optimal iodine level throughout the pregnancy even in some of the developed countries as well.

Based on this background, this study was mainly designed to assess the iodine status of pregnant women throughout the pregnancy and to assess the effect of maternal iodine status on neonatal iodine status and the thyroid functions. Other possible

contributory factors for the maternal iodine nutrition including iodine content in commercially prepared iodized salt products in the local market was also assessed in the study. To our knowledge, this study is the first prospective study done in Sri Lanka to assess the gestational changes in iodine nutrition along with the thyroid profile assessment and the utility of iodine during infancy.

Objectives

General Objective

To assess the iodine and iron status in women during pregnancy and their effects on the thyroid function of the mother and the newborn.

Specific Objectives

1) To assess the knowledge and to identify the practices regarding consumption of iodized salt.
2) To determine the iodine content of the salt products that is currently available for the study population.
3) To assess the maternal iodine status by measuring
   a. urinary iodine excretion at each trimester
   b. serum TSH / Free T_4
   c. thyroid volume by palpation method and ultrasound scanning
4) To evaluate the iodine status of their new born babies (blood spot TSH assay and urine iodine excretion)

Materials and methods

This study was conducted in the Galle district with the approval from the Ethical Review Committee of the Faculty of Medicine, University of Ruhuna and the Faculty of Graduate Studies. With the assumption of a possible prevalence of 50 % iodine deficiency during pregnancy (further inflated by 10 % to cover up possible termination of pregnancies and drop outs during the study period), 425 women with gestational age: $\leq$ 12 weeks (calculated by the date of last menstrual period) were included in the study. Those who had a previous history of thyroid or renal diseases were excluded at the study entry. Data collection was done using a pretested interviewer administered questionnaire to get the baseline demographic data.

The knowledge and practices of consumption of iodized salt among the study subjects were assessed by using a separate interviewer administered questionnaire and the iodine content of the different brands of salt samples available in the study area was assessed by using iodometric titration method recommended by WHO/UNICEF/ICCIDD.

Maternal iodine status was assessed by measuring urine iodine concentration (UIC) which is the gold standard for monitoring iodine nutrition at the population level by using ammonium persulfate method recommended by WHO/UNICEF/ ICCIDD. Thyroid gland size and volume was assessed by ultra sound scan method and serum parameters of thyrotrophin (TSH), free thyroxine (fT_4) and thyroglobulin (Tg) levels were measured by enzyme link immunosorbent assay. The effect on babies was assessed using neonatal UIC and neonatal thyroid stimulating hormone (nTSH) levels with dried blood spot analysis as part of the on-going newborn screening programme for congenital hypothyroidi--sm.

Results

Altogether samples from 89 salt packets from 42 different brands were analyzed and the overall median iodide level of the total sample was 20.41 ppm (range 0.0 to 73.81). In this study it was found that only 64% of samples contained iodine content within the recommended limits (15-30ppm). Further it was revealed that >50% brands of marketed salt products did not contain iodine within that range. It is important to note that of the 42 brands of salt only 2 had obtained the standard certificate from the Sri Lanka Standard Institute i.e., SLS certification.

It was revealed that 50% of pregnant women had poor knowledge on iodized salt resulting improper practices on consumption. The level of knowledge was significantly associated with mothers' age

(p<0.001), level of education (p<0.001) and social class (p=0.007). Even though the above factors showed a highly significant association with their level of knowledge, such an association was not seen when it comes to practices of the study subjects regarding the usage of iodized salt. This shows that, though they have a good knowledge on iodine and iodized salt, they did not put it into practice. The reason for that may be their lack of understanding of the gravity of IDD as a significant health problem.

The assessment of thyroid gland has revealed that 67 (16.0 %) women had palpable or visible goiters and 55 (13.1 %) of them had a goiter that was palpable but not visible. The median thyroid volume of the sample was 5.16 mL (IQR 4.30; 6.10 mL) as measured in US scan. The thyroid volume has shown a significant direct relationship with the gland size since the mean ± SD volume among grade 0 was 5.25 ± 1.5 ml; grade 1 was 5.89 ± 1.6 ml whereas grade 2 was

8.11 ± 6.1 ml ($p < 0.001$). Further, it was evident that mean thyroid volume (5.10 ± 1.9 ml) of women who were in their first pregnancy was significantly low ($p < 0.001$) when compared with that of women who were in their second or subsequent pregnancies (mean volume of 5.61 ± 1.9 ml) (Table 1). Further, the younger women (age <25 years) had significantly lower mean thyroid volume ($p = 0.04$) when compared with older group (age > 25.1 years) of pregnant women (5.11 ± 1.4 ml vs. 5.61 ± 2.3 ml respectively).

The median UIC at study entry was 170.9 μg/L (IQR 100.00 – 261.10 μg/L). It was dropped to 123.80 μg/L (IQR 73.50 – 189.50 μg/L) at the second trimester ($p < 0.001$) and 105.00 μg/L (IQR 67.00 – 153.50 μg/L) by end of third trimester (i.e., 36 weeks of gestation) (Table 2).

Table 1: Thyroid size and the volume of the pregnant mothers

Thyroid size	n (%)	Thyroid volume (mL)	Significance
Grade 0	354 (84.1%)	5.25 ± 1.5[a]	F test =16.9; df = 2
Grade 1	55 (13.1%)	5.89 ± 1.6[b]	P<0.001
Grade 2	12 (2.9%)	8.11 ± 6.1[c]	

[a,b,c] *Within a given column was significant between groups (p<0.001)*

Table 2: Urinary iodine concentration in study sample

	1st trimester (n=425)	2nd trimester (n= 347)	3rd trimester (n=373)
Urinary iodine level (μg/L)[1]	170.9 (100.0; 261.1)	123.8 (73.5; 189.5)	105.0 (67.0; 153.5)
Wilcoxon Signed Ranks Test	Z=7.28; p<0.001		
		Z=4.11; p<0.001	
	Z=10.39		p<0.001

[1]*Results presented as median (inter-quartile-range) Chi-square test at 2 df is 94.3; p = <0.001*

Table 3: Distribution of serum TSH levels among study subjects

Group	n	Missing	Levels (mIU/mL)	Significance
1st Trimester	425	6	1.30 (0.80; 1.80)	Z-test = 6.4;
3rd Trimester	425	57	1.60 (1.20; 2.10)	p<0.001

[1]*Results presented as median (IQR value); Wilcoxon Signed Rank Test (based on positive ranks*

Further,41.7% (n=177) women had insufficient UI concentration (< 150.0 μg/L) at the study entry. This percentage was increased to 58.8% (n=204) and 72.9% (n=272) at second and third trimesters respectively. The first trimester urinary iodine level has a significant positive correlation (p = 0.02) with women's weight, but not with any other parameters (demographic & biochemical) at the study entry and the results of UIC level confirmed mild to moderate iodine deficiency in this study sample.

The serum TSH level of the subjects in their first trimester was 1.3 μIU/mL (IQR 0.8–1.8 μIU/mL). At the end of the third trimester it was significantly increased (*p* < 0.001) to 1.6 μIU/mL (IQR 1.2–2.1 μIU/mL). (Table 3) Median vales of fT_4 for first and third trimesters were 18.0 pmol/L and 15.5 pmol/L (*p* = 0.002) respectively. None of the subjects were found with fT_4 values below the lower limit (<6.4 pmol/L) of the method specific reference (hypothyroid) range in both first and third trimesters (Table 4).

Serum thyroglobulin level was also determined to assess the maternal iodine nutrition among pregnant women at the study entry and the median thyroglobulin level was 5.09 μg/L. Of the sample,47 subjects had thyroglobulin level < 3.0 μg/L. In contrast to UIC, maternal thyroid status was maintained within the reference range. However, the significant increase in serum TSH level and the reduction of fT_4 should be considered with the fact that even mildly low maternal T_4 and/or elevated maternal serum TSH levels during pregnancy may result in cognitive delays in the offspring.

The analysis of iodine status of neonates showed that only 10.9% (n=35) of neonates had insufficient UI level (< 100 μg/L). The median UIC was 105.20 (81.25; 142.00) μg/L indicating moderate iodine deficiency according to WHO guidelines. The median nTSH level was 3.55 (2.50; 6.50) mIU/L whereas 37.7% (n=130) of neonates had neonatal TSH >5.0 mIU/L indicating moderate iodine deficiency. Neonatal UI level had significant positive correlations with maternal 3rd trimester UI (r=0.23; p<0.001) concentration. The initiation of decline in nUI in the sample was seen at nTSH level of 5.03 mIU/L (Figure 1).

Table 4: Distribution of serum free thyroxine status[1]

	n	Missing	Level (pmol/L)	Significance
First trimester	425	3	18.00 (14.20 – 21.90)	z = 3.1;
Third trimester	425	55	15.50 (11.60; 21.90)	p=0.002

[1]*Results presented as median (IQR); significance on Wilcoxon Signed Rank Test (based on positive ranks)*
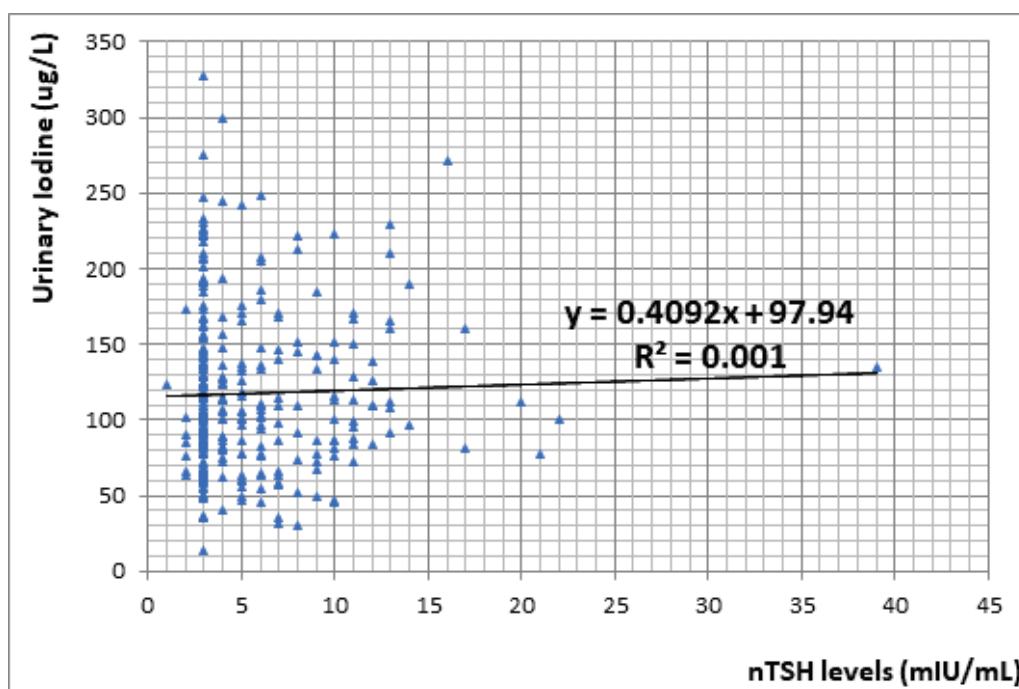
Figure 1: Regression analyses between nTSH and nUI among infants in the study sample

Discussion

This research project has revealed that the overall knowledge about iodine and iodized salt in this population is less satisfactory and about half of them had improper practices related to the iodized salt usage, even two decades after the implementation of USI programme. Poor correlation between the good knowledge and proper practices is an issue to be addressed.

UIC did not show significant association with any of the parameters used to assess iodine nutrition such as serum TSH, fT_4 and thyroid volume during pregnancy. The poor iodine nutrition status as shown by decreasing UIC during the course of the pregnancy was not reflected by the thyroid function tests in this study sample. However significant increase in maternal TSH (with reduction of maternal fT_4) on advancing pregnancy is a matter of concern.

Especially there were no local studies done to assess the impact of maternal thyroid status on cognitive development assessment in offspring. It can be concluded that more attention should be given in order to maintain the proper maternal iodine level throughout the pregnancy to prevent or minimize complications of iodine deficiency on new born babies and health education for pregnant women and female adolescent should be provided regarding importance of proper iodine nutrition for them and their babies. The iodized salt manufacturing process should be improved to maintain the quality and monitoring of salt iodization should be done at the production level regularly. Further, facilities for salt producers should be available for samples analysis at the regional level and regular analysis should be legalized.

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Abstracts
FMAS - 2020

OP-01 Prediction of insulin resistance by simple clinical parameters in patients with newly diagnosed type 2 diabetes mellitus

KGP Wasana[1], AP Attanayake[1], TP Weerarathna[2], and KAPW Jayatilaka[1]

[1] *Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka*
[2] *Department of Medicine, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka*

Introduction : Type 2 diabetes mellitus (T2DM) is typified by insulin deficiency (ID) or insulin resistance (IR) or combination of both. Hence, IR has been considered as a therapeutic target in the management of T2DM.

Objective : To study the utility of readily available clinical parameters in predicting IR in a cohort of newly diagnosed patients with T2DM.

Methods : The fasting plasma glucose concentration, fasting serum insulin concentration and serum lipid profile parameteres were estimated from 147 newly diagnosed patients with T2DM of age of 30-60 years in a semi-urban locality in Galle district, Sri Lanka. Data on age, body mass index (BMI), waist circumference (WC) were collected. IR indices namely homeostasis model assessment (HOMA), quantitative insulin sensitivity check index (QUICKI) and McAuley (MCA) were calculated. Linear correlation analysis was performed to assess the correlation between clinical parameters and IR indices. The area under the receiver operating characteristic (ROC) curves (AUC) were obtained to calculate optimal cut-off values for the clinical markers which were significantly correlated with the selected IR indices as predictors of IR. Patients were considered as IR by combination of all three indices of HOMA, QUICKI and MCA. The optimal cut-off values for IR prediction of the clinical parameters were determined by using Youden index (maximum [sensitivity + specificity − 1]).

Results : BMI and WC were significantly correlated ($p<0.05$) with HOMA, QUICKI and MCA. Age and TG/HDL-C were significantly correlated ($p<0.05$) only with QUICKI and MCA respectively. The AUC-ROC of BMI was 0.728 (95% CI 0.648-0.809; $p<0.001$) and 0.646 (95% CI 0.559-0.734; $p=0.003$) for WC, in selected patients. The optimized cut-off value for BMI and WC were 24.91 kg/m^2 and 81.5 cm respectively to differentiate the patients with IR or ID.

Conclusions : There was a significant positive correlation between BMI, WC and HOMA while a significant negative correlation with QUICKI and MCA in the cohort of newly diagnosed patients with mild T2DM in Sri Lanka. BMI and WC with the cut-off values of 24.91 kg/m^2 and 81.5 cm respectively could be used as simple clinical markers to differentiate IR and ID in newly diagnosed patients with diabetes. The findings could be beneficial in rational decision making in the management of patients with mild T2DM in limited resource settings.

OP-02 A study on "Non-Invasive Follicular Thyroid neoplasm with Papillary-like nuclear features (NIFTP)", in a Sri Lankan cohort.

Wijesiri TW, Mudduwa LKB, Liyanage TG

Department of Pathology, Faculty of Medicine, University of Ruhuna.

Introduction : Papillary carcinoma of thyroid is the commonest cancer occurring in thyroid with an increasing incidence over the past few decades. A subset of papillary carcinomas was re-classified into "Noninvasive Follicular Thyroid Neoplasm with papillary-like nuclear features" (NIFTP) in late 2017, due to the excellent prognosis they exhibit. Identification of NIFTP is important because surgical management and follow up is similar to follicular adenomas (lobectomy), thus reducing the psychological burden to patient, eliminating unnecessary exposure to radiation and economic burden to the society. This study intended to assess the prevalence and the inter-observer consistency in identifying NIFTP in the study sample.

Methods : This retrospective, descriptive, cross sectional study included all thyroid specimens received at our unit in 2017. Thyroid neoplasms with a potential for reclassification to NIFTP were reassessed according the WHO criteria by two investigators who were blinded to the previous and each other's diagnoses.

Results: Out of the 256 thyroid specimens received, 74/256 (28.90%) considered to have potential to be reclassified as NIFTP which included 34 cancers. Only 5/74 (6.75%) satisfied the criteria for NIFTP. Three NIFTPs had been reported as papillary microcarcinoma and the other two as follicular variant of papillary carcinoma. Inter-observer consistency in re-classifying the 74 tumours was 94.6%, with a 100% consistency in diagnosing NIFTP. Following re-classification, the proportion of cancers in the study sample reduced to 56/256 (21.87%) from 61/256 (23.82%). The prevalence of NIFTP in the study sample was 1.95% (5/256).

Conclusion : The prevalence of NIFTP in the study sample is comparable to the Asian population. High inter-observer consistency can be obtained in recognizing NIFTP among potential lesions, when WHO defined criteria is used.

Keywords: Thyroid cancer, NIFTP, Inter-observer consistency

OP-03 Effect of parity and breast feeding duration on measures of sarcopenia in women aged 40-60 years: a community-based cross-sectional study

[1]**Rathnayake N,** [2]**Alwis G,** [3]**Lenora J,** [4]**Lekamwasam S**

[1]*Department of Nursing, Faculty of Allied Health Sciences, University of Ruhuna*
[2]*Department of Anatomy, Faculty of Medicine, University of Ruhuna*
[3]*Department of Physiology, Faculty of Medicine, University of Ruhuna*
[4]*Department of Medicine, Faculty of Medicine, University of Ruhuna*

Background : Few studies have been studied the effect of parity and breast feeding on muscle function; but not in the local setting. However, it is not still clear whether the parity and breast feeding duration (BFD) have an impact on sarcopenia which affects on muscle mass and muscle function.

Objective : To investigate the effect of parity and BFD on measures of sarcopenia; relative skeletal muscle mass index (RSMI), hand grip strength (HGS) and gait speed (GS) among women aged 40-60 years from Bope-Poddala area in Galle

Methods : A community-based cross-sectional study was done with randomly selected 285 healthy women aged 40-60 years. Muscle mass was evaluated as appendicular skeletal muscle mass (ASMM), measured with total body DXA scanner and RSMI was calculated by adjting the ASMM for height (m). Muscle function was tested by evaluating HGS (kg) and GS (m/s). Women were devided in to groups according to parity (nulliparous; n=32, one child; n=35, two children; n=80, three children; n=74, and 4-7 children; n=64) and BFD (none; n=34, 1-36 months; n=47, 37-66months; n=69, 67-96 months; n=72, and $\geq$97 months; n=63). One-way ANOVA and ANCOVA (adjusted for confounders; age, menopausal status, body mass index and parity/BFD) tests were used to identify the associations.

Results : Mean(SD) age of the women was 51.7(6.1) years. High parity showed increasing trend of RSMI (p=0.002), but it was not observed in HGS (p=0.05) and GS (p=0.13). Greater BFD showed increasing trend of RSMI (p=0.003), however, it was not observed in HGS (p=0.13) and GS (p=0.78). Sarcopenic measures adjusted for confounders did not show associations with niether parity nor BFD (p>0.05).

Conclusions : Parity and BFD have a potential to affect on muscle mass, but not on muscle fucntion of studied women; however, the effect of parity and BFD on muscle mass is affected by non-modifable factors such as age and menopausal status.

Keywords – Measures of sarcopenia, parity, breast feeding duration, women

OP-04 Morphological variants of the hand motor cortex and their associations for a selected Sri Lankan Population-A pilot study using MRI

Kodikara I, Samaranayake SASS, Baduraliyage BDBM, Udeshika EP, Akalanka JGG, Ilayperuma I

Department of Anatomy, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka.

Introduction: The primary motor cortex is located in the pre-central gyrus. It is organized into different cortical territories where an extensive area is reserved for hand motor cortex (HMC) which is involved in controlling hand movements, especially the thumb. Though, magnetic resonant imaging (MRI) of the brain has identified five morphological variants of HMC, still this entity is under-evaluated.

Objective: This retrospective study has evaluated the morphological variants of HMC in relation to age and gender.

Material and Method : Study sample consisted of patinents (n=60) with normal MRI brain scans which was equally distributed in three age groups: 1-6 years; 7-18 years; 19-65 years to represent the development of hand motor function. Subjects with any cerebral pathology or previous surgery were excluded. Using axial brain MRI images HMC morphology recorded as per Caulo et al.

Results : The study group consisted of 48.3% males and 51.7% females. Out of five morphological variants of HMC, omega (right:61.7%, left:58.3%) was the commonest, followed by null (right:33.3%, left:30%), epsilon (right:3.3%, left:6.7%), laterally asymmetric epsilon (right:1.7%, left:3.3%), and medially asymmetric epsilon (right:0%, left:1.7%). In 48.3% of subjects, same HMC morphology was found in both hemispheres. There was no significant difference in HMC morphology among different age groups (right: χ^2=11.467;p=0.177, left: χ^2=11.467; p=0.177) or gender (left: χ^2=4.195; p=0.380, right:χ^2=4.982; p=0.173).

Conclusion: The current study for the first time, describes the HMC morphological variants and their inter-hemispheric distribution for a Sri Lankan population. No age or gender variation in MHC morphology was observed. Such data would provide insight to clinicians & neuroscientists.

Keywords: hand motor cortex; morphology; MRI

OP-05 Anthropometric parameters and inflammatory markers in a group of patients with end stage renal disease: A case-control study

Silva EH[1], Wickramatilake CM[2], Lekamwasam S[3], Mudduwa LKB[4], Ubayasiri R[5]

[1]Department of Medical Laboratory Science, Faculty of Allied Health Sciences, University of Ruhuna

[2]Department of Biochemistry, Faculty of Medicine, University of Ruhuna

[3]Department of Medicine, Faculty of Medicine, University of Ruhuna

[4]Department of Pathology, Faculty of Medicine, University of Ruhuna

[5]Teaching Hospital, Karapitiya

Introduction : Patients with end stage renal disease (ESRD) have high mortality and morbidity due to cardiovascular disease. Anthropometric parameters and inflammatory markers predict the CVD risk in the general population. This study compared the anthropometric parameters and inflammatory markers among patients with ESRD with age and sex matched controls.

Methodology : A case-control study of 100 participants (50 patients with ESRD and 50 age and sex machted controls) was conducted at Teaching Hospitals Karapitiya and Kandy during the period of December 2016 to September 2019. Anthropometric measurements were obtained using standard methods. Serum high sensitivity C-reactive protein (hs-CRP), interleukin-6 (IL-6), were measured using ELISA technique. Independent sample T- test and Mann - Whitney U test were used to compare the two groups.

Results : Out of fifty patients with ESRD, 23 (46%) had diabetes mellitus, 47 (94%) had hypertension, 3 (6%) had cardiovascular disease and 15 (30%) had hypercholesterolemia. None of the controls had any comorbidity. Mean (SD) waist to hip ratio (WHR) of the patients [0.92 (0.06)] were significantly higher than the controls [0.86 (0.12)] (p=0.002). Mean (SD) BMI of the patients [22.0 (3.7)] kgm^{-2} were significantly lower than the controls [23.9(3.7)] kgm^{-2} (p=0.010). Median (IQR) of hs-CRP of the patients [2.2 (3.2) mg/L] were significantly higher than controls [0.9 (2.0) mg/L] (p=0.001). Median (IQR) of IL-6 of the patients [26.5 (66.1) pg/mL] were significantly higher than controls [6.9 (24.6) pg/mL] (p=0.002).

Conclusion : We observed a significantly increased waist to hip ratio and inflammatory markers and significantly lower BMI among patients with ESRD compared to age and sex matched controls in spite of being on full treatment regime.

OP-06 Legal consequences of illicit drug use among institutionalized male drug addicts in selected rehabilitation centers in Sri Lanka

Darshana ILAN, Wijesinghe CJ, De Silva PV

Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction and Objectives : Illicit drugs are psychoactive substances that the production, sale or use is prohibited. Use of illicit drugs and criminal activities are closly related. This study was conducted to assess legal consequences following illicit drug use among institutionalized male drug users in selected rehabilitation centers in Sri Lanka.

Methods : A cross-sectional study was conducted among a sample of 431 drug addicts in five selected rehabilitation centers in Sri Lanka. An interviewer assisted, self-administered questionnaire was used to assess the legal consequences following initiation of drug use behavior. Data were analyzed using SPSS statistical software. Multiple logistic regression was used to assess predictors of legal problems. Level of significance was considered as 0.05. Ethical approval for the study was obtained from Ethics Review Committee, Faculty of Medicine, University of Ruhuna.

Results: Majority of drug users (n=372, 86.3%) had reported some form of legal consequences following drug use. Nearly 88% (n=380) reported 'Ever been arrested following drug use' and 92.6% (n=352) of these arrests had resulted in convictions. Majority of drug users (n=353, 81.9%) had ever been arrested for possession of drugs, though only 70.3% (n=248) have been charged. History of incarceration following drug use was reported by 67.7% (n=292) of the drug users and 60.9% (n=178) of them were due to drug related crime. Having public intoxication (n=167, 67.3%) , engaging in illegal activities to purchase drugs (n=169, 68.1%) and drug dealing (n=123, 49.6%) were identified as main drug related crimes reported by the drug users. Drug users who were initiate illicit drug use after aldolecsence period (OR=2.094, 95% CI=1.148-3.821, p<0.05) had more likely to have legal problems while being a manual worker (OR=0.410, 95% CI=0.212-0.791, p<0.05) had less likely to have legal problems following drug use in multivariate analysis.

Conclusion and Recommendtion : Legal problems were identified as a common adverse consequence following drug use among institutionalized male drug addicts. As these legal problems create a huge burden to the criminal justice system of the country, a proper plan is required to prevent drug use altogether to minimize adverse consequences including legal consequences.

Key words: legal problems, male illicit drug users, rehablitation centers

SOP -01 Computer vision syndrome among long term computer users

Praboda GAD[1], Prasadi WKA[1], Premachandra KAKGK[1], Premarathne HGP[1], Priyadarshana PNSL[1], Priyadarshani RMN[1], Punchihewa CNKG[1], Wimalasundara S[2], Ponnamperuma T[2]

[1] *38th Batch, Faculty of Medicine, University of Ruhuna*
[2] *Department of Community Medicine, Faculty of Medicine, University of Ruhuna*

Introduction: Computer vision syndrome (CVS) is a group of visual symptoms experienced in relation to the use of computers. Nearly 60 million people suffer from CVS globally, resulting in reduced productivity at work and quality of life of the computer workers. The present study aimed to describe the prevalence, awareness, precautions taken and associated factors for CVS among employees in a conveniently selected software company in Colombo district.

Methods: A cross-sectional study was conducted among long term computer users in a selected reputed software company in Colombo district. Data were collected using a computer generated self-administered questionnaire and analysed using SPSS statistical software.

Results: Of the 341 participants, the majority were males (65%) and most (67%) were in the age category between 20-40 years. The prevalence of CVS was 55% and the awareness of CVS was 53%. In the whole sample, 92% of the officers have used at least one preventive method to get protected from CVS; namely, adjusting brightness (71.6%), using contact lenses/spectacles (40.2%) and reducing the screen time used (16.1%). CVS score was associated with gender, pre-existing eye diseases, not having work breaks and use of contact lenses (all p<0.05).

Conclusions: Over half of the computer workers suffer from CVS and only a half of the sample knew about this occupational problems. Therefore, we recommend that all computer workers should be educated and screened for CVS. Further, necessary precautions should be taken to prevent this occupational problem.

Keywords: Computer vision syndrome, computer workers, screen time

SOP-02 Correlates of breast feeding difficulties among mothers of children below six months in Galle municipal council health unit area

Indeewari GKP[1], Iranga JW[1], Jayarathne KDKDR[1], Jayaruwan PKGYT[1], Jayasinghe HC[1], Jayasinghe MNY[1], Jayasiri LNH[1], De Silva KKWJC[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Breast milk is the safest and healthiest source of nutrition for infants. However, breast feeding difficulties (BFD) within the exclusive breast-feeding period hinder the optimal growth, development and health of the children.

Methods: A descriptive cross-sectional study was carried out at the well-baby clinics conducted by Galle Municipal Council Health Unit area. Interviews were conducted with a convenient sample of 280 mothers of infants aged up to six months to identify the BFDs. Data were analysed using SPSS. Frequencies, proportions and means were used to present the descriptive statistics and chi-square test was used to find the associates for BFDs. A p value <0.05 was considered as the significance level.

Results: Approximately 38% (n=106) of the mothers were found to have BFDs. The most frequently encountered BFD was maternal perception of poor sucking of breast milk (n=69, 65.5%). Caesarean delivery (p=0.000), low birth weight (p<0.05), feeding breast milk from methods other than direct sucking (p=0.000), commencement of formula (p<0.05) or complementary food (p=0.000) and presence of maternal comorbidities (p<0.05) were positively associated with BFD. Ethnicity, maternal age, educational level and monthly income were found to be not associated with BFD.

Conclusions: A significant proportion of mothers of infants up to six months of age in Galle have BFD. Therefore, the existing breast feeding counselling and support services available for mothers in Galle should be strengthened further.

Keywords: Breast feeding difficulties, infants aged up to six months, Galle

SOP-03 Rational use of antibiotics among second year undergraduates of University of Ruhuna: A descriptive cross-sectional study

Abeyrathne AHKR[1], Abeysekara EL[1], Abeysuriya SE[1], Abeywickrama CI[1], Amali HDI[1], Amaradasa WPH[1], Amarasiri LHDR[1], De Silva KKWJC[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Antibiotics are lifesaving drugs which are used to treat and prevent bacterial infections. However, the irrational use of antibiotics has become a serious issue worldwide because of the emergence of antibiotic resistance. This study aimed to assess the practices on antibiotic usage among second year undergraduates of University of Ruhuna.

Methods: A descriptive cross-sectional study was conducted among a random sample of 450 second year undergraduates of the nine faculties of University of Ruhuna. Sixteen statements incorporated into a self-administered questionnaire were used to assess the practices in antibiotic usage. The total scores were calculated and converted into percentages. An overall score 65% was considered as the rational use of antibiotics. Data were analysed using SPSS. Frequencies, proportions and means were used to present the descriptive data. Chi-square test was used to detect associates for rational use of antibiotics. $p < 0.05$ was considered as the significance level.

Results: Majority of the study sample (n=266, 59.1%) were females. Mean age of participants was 23 (SD= $\pm$ 1.2) years. The majority (n=356, 79%) started taking antibiotics after consulting a medical officer. Only 46% (n=207) of students completed the full course of antibiotics. Sixty-two percent of students (n=279) preferred taking antibiotics for mild diseases like common cold. Rational use of antibiotics was only found to be associated with the enrollment in Medical and Allied Health Sciences degree programs (χ^2=7.617, $p < 0.05$).

Conclusions: Irrational use of antibiotics was noted among a significant proportion of second year undergraduates of University of Ruhuna. Measures to increase awareness on rational use of antibiotics should be carried out among undergraduates, especially among the undergraduates enrolled in degree programs other than Medical and Allied Health Sciences.

Keywords: Rational use of antibiotics, undergraduates

SOP-04 Prevalence of burnout syndrome and associated factors among undergraduates of Medicine and Allied Health Sciences of intake 2015/2016 of University of Ruhuna

Thathsara PHN[1], Thilana WG[1], Udayanga AM[1], Udeshika KAG[1], Viduranga MAO[1], Vitharana SB[1], Wanasinghe WLMS[1], Darshana ILAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Burnout syndrome is a set of symptoms leading to emotional exhaustion, depersonalization and reduced performance. It is a common problem among professionals and undergraduates following exposure to chronic stressors. This study aimed to assess prevalence of burnout syndrome and associated factors among medical and Allied Health Sciences (AHS) undergraduates of intake 2015/2016 of University of Ruhuna.

Methods: A descriptive cross-sectional study was conducted among 157 medical and AHS undergraduates in the University of Ruhuna of intake 2015/2016. Burnout was measured using the judgmentally validated Oldenburg Burnout Inventory (Student version). Data were collected using a self-administered questionnaire through a Google form. Data were analysed using SPSS (Version 20). Chi-square test was used to assess factors associated with burnout syndrome at 0.05 significance level.

Results: Total of 157 undergraduates, medical (n=112) (71.34%) and AHS (n=45) (28.66%) participated for the study. Prevalence of burnout syndrome was 47.8% (n=75) in total sample while 58.1 % (n=65) among medical and 22.2% (n=10) among AHS undergraduates. Being a medical undergraduate (p<0.001), having financial difficulties (p<0.05) and undergraduates who were selected for the course according to advanced level merit (p<0.001) were more likely to have burnout syndrome. Among undergraduates with burnout syndrome, majority (>70%) had adopted active coping strategies for burnout.

Conclusions: Burnout syndrome is reported in high prevalence among the sample and more in medical undergraduates. As financial status, course and selection criteria for the course were associated with having burnout, those factors need to be considered to avoid chronic stressors among medical and AHS undergraduates.

Keywords: Burnout syndrome, associated factors, medical and AHS undergraduates

SOP-05 Self-medication practice among adults in selected Medical Officer of Health (MOH) areas in Sri Lanka

Gunaweera TP[1], Heshan SGY[1], Hettiarachchi CS[1], Hettiarachchi EHASRN[1], Hewagama DY[1], Hewamulla ST[1], Hewavitharana CNC[1], Darshana ILAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Self-medication is the use of drugs to treat self-diagnosed disorders or symptoms or the intermittent or continued use of a prescribed drug for chronic or recurrent diseases or symptoms. This study assessed self-medication practice among adults in selected Medical Officer of Health (MOH) areas in Sri Lanka.

Methods: A descriptive cross-sectional study was conducted among 391 adults in selected MOH areas in Sri Lanka. Multi stage cluster sampling method was used to recruit study subjects. An interviewer-administered questionnaire was used for data collection. Data was analysed by using SPSS (20th version). Chi-square test at a significance level of 0.05 was used to assess the associated factors with self-medication practice.

Results: Out of total sample (n=391), majority were females (n=243, 62.1%). The mean (SD) age was 44.5 (11.4) years and majority (n=221, 56.5%) were 45 years and above. The prevalence of usage of self-medication practices was 58.8% (n=226). Highest percentage of population used self-medication for common cold (n=88, 38.9%) followed by gastritis (n=46, 20.3%) as diseases while for headache (n=89, 39.3%) and joint pain (n=58, 18.1%) as symptoms. Cetirizine (n=54, 23.8%), diclofenac sodium (n=41, 18.1%), omeprazole (n=33, 14.6%), amoxicillin (n=52, 23.0%) and vitamin C (n=38, 16.8%) were identified as commonly used self-medications. Previous prescriptions issued by the doctors was identified as the commonest source to identify relevant drugs for self-medication (n=141, 62.3%). Adults having satisfactory income were more likely to have self-medication usage (p<0.05) but age, gender and the level of education did not have statistically significant association with self-medication practices (p>0.05).

Conclusions: High prevalence of self-medication practice was reported in the study sample and identified as a health problem in community. Strengthening community awareness will be required to minimize self-medication practices in community and to prevent its adverse consequences.

Keywords: Self-medication practice, associated factors, adults

SOP-06 Prevalence of disordered eating behaviours among medical and allied health undergraduates of University of Ruhuna and its association with their nutritional status

Dinith JWR[1], Dilshan GP[1], Dinusha SKKD[1], Dissanayake NW[1], Dissanayake PNT[1], Edirisinghe EAHD[1], Fernando MTL[1], Wijesinghe CJ[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Disordered eating behaviours (DEB) are risk factors for eating disorders and have shown a high prevalence among university students. However, the extent of this problem among undergraduates of Sri Lankan universities is not known. This study aimed to assess the prevalence of disordered eating behaviours among undergraduate students of Faculties of Medicine and Allied Health Sciences, University of Ruhuna and its association with their nutritional status.

Methods: A cross-sectional study was conducted among a conveniently selected sample of 252 students of Faculties of Medicine and Allied Health Sciences, University of Ruhuna. The Eating Disorder Examination Questionnaire 6.0 (EDE-Q) was administered as an online survey to assess the presence and type of disordered eating behaviours. Self-reported height and weight were used to determine the body mass index (BMI) of the participants and association between EDE-Q scores and BMI was assessed using Pearson correlation coefficient. Data were analysed using SPSS statistical software.

Results: None of the undergraduates had clinically significant DEB according to global EDE-Q score and only 0.8% (n=2) each reported restraint eating behaviour and weight concern. A greater risk of DEB was associated with higher age of undergraduates but not with faculty of study, gender or place of residence. A significant weak positive correlation was observed between BMI and global EDE-Q score (r=0.184, p=0.003) and scores of restraint (r=0.233, p<0.001) and shape concern (r=0.145, p=0.022) subscales. A weak non-significant negative correlation was found between BMI and weight concern subscale scores (r=-0.047, p>0.05).

Conclusions: Although DEBs are not a major problem among medical and allied health undergraduates of University of Ruhuna, a considerable proportion has a potential risk for developing them. Nutrition education particularly focusing on restraint behaviours and weight concerns can be beneficial in minimizing this risk.

Keywords: Disordered eating behaviours, EDE-Q, undergraduates, nutritional status, Sri Lanka

PP -01 Help-seeking behaviours for morbid jealousy in intimate relationships: an interim analysis of a web-based survey

De Silva MKOK[1], Rajapakse IH[2], Rajasuriya M [3], Fernando NFJ[4]

[1,4] *Department of Clinical Sciences, Faculty of Medicine, General Sir John Kotelawala Defence University*
[2] *Department of Psychiatry, Faculty of Medicine, University of Ruhuna*
[3] *Department of Psychiatry, Faculty of Medicine, University of Colombo*

Introduction : There has been a conjecture that the low rates in presenting morbid jealousy to mental health services does not reflect the true morbidity of morbid jealousy rather absence of propensity in seeking professional help. Gaps and delays in seeking professional help are known to compromise the prognosis and lead to multiple psychosocial issues.

Objectives : The current study aimed to investigate the perceived need for help-seeking in morbid jealousy, extent to which help has been sought, and from whom has the help been sought.

Methods: A non experimental, descriptive cross-sectional study was conducted via an anonymous, synchronous, web-based survey consisting of demographic information, screening questions, operational criteria for morbid jealousy and information on help-seeking behaviours. Survey was hosted on web-based software tool Q Point. Social networking apps, email, word-of-mouth were used as vehicles for inviting individuals to participate in the survey. Respondents reported jealousy and help seeking behaviours of their partners.

Results : Sample (n= 133) consisted of 89 (66.91%) males and 44 (33.08%) females. Mean age of the partners was (M= 33.98, SD= 8.88). Age of the partners ranged from 19 to 75. 88 (66.66%), 32 (24.24%), 9 (6.81%) and 1 (0.75%) were married and living together, unmarried and in a relationship, married and living separately and in an extramarital relationship consecutively. Out of the 11 entries that meet operationalization criteria for morbid jealousy, 7 (63.63%) respondents felt their partners need help for jealousy related issues. 5 (45.45%) respondents felt their partners had not considered seeking help. 9 (81.81%) partners estimated of having morbid jealousy have never sought help. Where help was sought, partners' sources of help were unknown to the respondents.

Conclusion : Help-seeking for morbid jealousy in the current sample was poor. Jealous partner did not include the other partner in the help-seeking process. Reasons for not seeking help by partners were mostly unknown to the respondents. This finding will be confirmed at the goal of 385 samples; however, these early data suggest that help-seeking behaviour in patients with morbid jealousy is poor.

PP-02 Profile of stress of early female adolescents in Galle educational zone: A descriptive study

Madhushanthi HJH [1], Wimalasekera SW [2], Goonewardena CSE [3], [4]Amarasekara AATD, [5]Lenora RSJ

[1]*Department of Nursing, Faculty of Allied Health Sciences, University of Ruhuna,*
[2]*Department of Physiology, [3]Department of Community Medicine , Faculty of Medical Sciences, University of Sri Jayewardenepura, [4]Department of Nursing & Midwifery, Faculty of Allied Health Sciences, University of Sri Jayewardenepura,[5]Department of Physiology, Faculty of Medicine, University of Ruhuna*

Background : Age range from 11 to 14 years is regarded as early adolescence. Particularly females are vulnerable to experience stress with rapid physical, psychological, cognitive and social changes accompanied in adolescence. Stress experience in adolescence is linked with range of adverse physical and psychological consequences.

Objective : The study aimed to determine the level of stress and factors contributing to stress among female adolescents in Galle educational zone, Sri Lanka.

Method : A school based cross - sectional study was conducted on female adolescents (11 - 14 years, n = 218). After obtaining baseline data, self administered socio demographic questionnaire and psychosocial adversity scale were used to assess socioeconomic state and psychosocial adversities respectively. The Body Mass Index (BMI), waist hip ratio (WHR), waist height ratio (WHtR) and fat percentage (FM%) were calculated to assess the nutritional status. Adolescent Stress Questionnaire (ASQ), which measures 9 dimensions of stress, was used to assess stress. SPSS 20 version used to analyze the data.

Results : Normal nutritional state was observed in 118 (54.1%) while 65 (29.8%) and 35(16.1%) adolescents were underweight and overweight respectively. Nearly one third 35.3% (n=77) of participants were centrally obese. Many adolescents were stressed as n=139 (63.7%) and n=79 (36.3%) belonged to non stressed group category respectively. Stresses were found to be due to school attendance 93.1% (n=203), future uncertainty 92.7% (n=202), school performance 84.9% (n=185), emerging responsibility 85.3% (n=186), and conflict of school/leisure time 81.7% (n=178).

Conclusion : Most adolescents focused the stress of future uncertainty and school attendance as the greatest stress inducing factors. Urgent measures to decrease stress levels amongst these adolescents need to be implemented.

PP-03 Gross anatomical assessment of gender differences in the brain and cerebellar size for a selected Sri Lankan study population - A preliminary study

Kodikara I, Udeshika EP, Gunarathna KKAT, Kumari VMDDWP, Baduraliyage BDBM, Ilayperuma I

Department of Anatomy, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka.

Introduction : The brain consists of two cerebral hemispheres, brain stem and cerebellum. In human, gender differences typically explain the inter-individual variability. Expansion of brain volume through evolution and advanced social dynamics has been vastly influenced by behaviors of male and female. Furthermore, study of brain size is important as it is closely related with the skull volume.

Objective: This preliminary study was conducted to assess the gender differences in brain and cerebellar size for a selected Sri Lankan study population.

Methods: A total of 16 formalin preserved (for 2 years) human brains without apparent neuropathology were studied. Brains were positioned in anatomical position and maximum antero-posterior diameter, maximum transverse diameter and maximum supero-inferior diameters were defined as brain length (L), width (W) and height (H) respectively. Brain volume was calculated using ellipsoid formula for volume estimation (0.52xWxLxH). Cerebellar size which was reflected by a dimension, the "Cerebellar Factor" was calculated by multiplying cerebellar length and width.

Results: Mean age of the population was 83 ± 9 years with 56% males. In males, mean brain volume was 1070.3 ± 68.2 cm^3 and in females it was 903.5 ± 94.4 cm^3. Statistically significant gender difference was observed between mean brain volumes (t=4.113, p=0.005). In males mean left and right cerebellar factors were 26.9 ± 3.5 cm^2 and 25.6 ± 2.4 cm^2 respectively. In females mean left and right cerebellar factors were 22.6 ± 2.0 cm^2 and 22.5 ± 2.3 cm^2 respectively. There was no statistically significant gender difference in both left and right cerebellar factors (left: t=2.837; p=0.013, right: t=2.591; p=0.021).

Conclusion: This preliminary study documents significant gender differences in brain volumes in a Sri Lankan population. Since brain volume is increasingly considered as a biomarker of clinical state as well as progression of cerebral pathology, further research is warranted.

Key words: Brain volumes, Gender, Cerebellar Factor, Sri Lanka

PP-04 Morphology and morphometry of abdominal aortic bifurcation and common iliac arteries in a group of Sri Lankan subjects: A cadaver study

Samarawickrama MB, Rodrigo PM, Eranga URR, Akalanka JGG, Kumari VMDDWP, Samaranayake SASS, Baduraliyage BDBM, Udeshika EP, Gunarathna KKAT.

Department of Anatomy, Faculty of medicine, University of Ruhuna, Karapitiya, Galle

Introduction : The anatomy of the aortic bifurcation and its relationship to the lumbar vertebrae would provide useful information to surgeons during the anterior lumbosacral approach for various procedures. There is scarcity of the studies on geometry of aorta-common iliac bifurcation on Sri Lankan subjects.

Objectives : The aim of the present study was to determine the position of the aortic bifurcation in relation to lumbar vertebrae and morphology and morphometry of its terminal branches.

Methodology : The study was carried out on cadavers used for the educational dissection by medical students in the department of Anatomy Faculty of Medicine, University of Ruhuna. The aortic bifurcation was identified at retroperitoneal position and its level of bifurcation in relation to lumbar vertebra, distance of bifurcation from the inferior mesenteric artery (IMA), diameters and length of the common iliac arteries were measured using a Vanier caliper.

Results : Twenty eight abdominal aortas were studied in 11 male and 17 female cadavers. The level of the bifurcation was in between L4 and L5 vertebra in all the cases. In the majority of cases [10 (33.3%)], the bifurcation was at the level of the disc between L4 and L5 vertebrae. There is no significant gender difference observed in the distance between IMA and aortic bifurcation. The right common iliac artery diameter was larger than the left though it was not statistically significant.

Conclusion : The aortic bifurcation mostly found at the level of L4 and L5 vertebral disc in the present study. This is a reliable landmark for determining the lumbar vertebral segments on MRI or CT. This level does not show significant gender variation. Therefore this finding would be useful for radiologists and surgeons who perform invasive procedures in this region.

PP-05 Morphology and relations of the inferior vena cava confluence in a group of Sri Lankan subjects: A cadaver study

Samarawickrama MB, Rodrigo PM, Eranga URR, Kumari VMDDWP, Samaranayake SASS, Akalanka JGG, Baduraliyage BDBM, Gunarathna KKAT, Udeshika EP.

Department of Anatomy, faculty of Medicine, University of Ruhuna, Karapitiya, Galle

Introduction: Though rare, anomalies of inferior vena cava (IVC) can lead to severe hemorrhagic complications especially during aorto-iliac surgeries. Therefore the prior knowledge of its anatomical variations is important to avoid such complications during interventional procedures and surgeries and proper interpretation of radiological images of this region.

Objectives : The aim of the study was to determine the position of IVC confluence in relation to the lumbar vertebrae and right common iliac artery and morphological variations of its tributaries.

Methodology : The study was carried out on cadavers used for the educational dissection by medical students in the department of anatomy faculty of medicine university of Ruhuna. The IVC was identified in its retroperitoneal position and the lumbar vertebral level of its confluence was recorded. The distance of the confluence from the left renal vein, length of the common iliac veins were measured using a Vanier caliper. Any variations of the tributaries also were noted.

Results : Total of 28 (11 male and 17 female) IVC confluences were studied. The level of the confluence was on the 5th lumbar vertebra (L_5) in majority (31%). There were no significant gender difference in the distance between left renal vein and IVC confluence. Most of the IVC confluences (61.5 %) were located posterior to the right common iliac artery closed to the aortic bifurcation. Lengths of right and left common iliac veins did not show significant difference. The median sacral vein drained to the IVC confluence in one case.

Conclusion : The IVC confluence lies at the level of the L_5 in two third of the subjects in the study group. It is worth to know the relationship to the right common iliac artery in surgeries of the right iliac fossa as in renal transplantation in both sexes. The study confirms the rarity of the morphological variations at this site.

PP-06 Incidence and morphology of rectus sternalis muscle in a group of Sri Lankan subjects: A cadaver study

Samarawickrama MB, Rodrigo PM, Nanayakkara PGCL, Eranga URR

Department of Anatomy, Faculty of Medicine, University of Ruhuna

Introduction : Rectus sternalis is an uncommon but clinically important muscle in the pectoral region. The knowledge of its incidence is important for radiologists who interpret breast imaging to avoid false positive reports of breast lesions.

Objectives : The study was aimed to understand the morphology of the muscle and to identify its incidence in a group of Sri Lankan subjects.

Methodology : Presence of rectus sternalis was observed over a 10 year period during the educational dissection of cadavers at the Department of Anatomy, Faculty of Medicine, University of Ruhuna. The location of the muscle and its attachments were recorded and photography was taken. The dimensions of the muscles were recorded in millimeters with a Vernier caliper.

Results : There were 175 cadavers of both sexes: male (n=93, 53%), female (n=82, 47%). We encountered 2 (1.4%) rectus sternalis muscles in one male and a female cadaver. Both of them were unilateral. The origin and the insertion of both muscles were similar. When considering its dimensions, the muscle in the female cadaver was larger than that in the male.

Discussion and conclusions: This study gives baseline information of the incidence of the rectus sternalis muscles in Sri Lankan subjects. The incidence in our subjects is in the lower range when compared with the other studies. The knowledge of its presence is important in performing interventional and imaging procedures in the region.

Key words: Rectus sternalis, Sternalis, Presternalis, Musculus sternalis, Sternalis thoracis

PP-07 Association of bone turnover markers with body composition and serum high sensitivity C-reactive protein levels in adult women

Rathnayake H[1], Lekamwasam S[2], Wickramatilake CM[1], Lenora J[3] and De Zoysa E[1,4]

[1]Department of Biochemistry, [2]Department of Medicine, [3]Department of Physiology, Faculty of Medicine, University of Ruhuna, Sri Lanka.
[4]Nuclear Medicine Unit, Faculty of Medicine, University of Ruhuna, Sri Lanka.

Introduction and objectives : Relationship of bone turnover markers with body composition and systemic inflammation is unclear. We studied the association of bone turnover markers with body composition and serum high sensitivity C-reactive protein (hs-CRP) levels in a group of adult women.

Methods : Community living adult women aged >20 yers (n=308) were recruited from Bope-Poddala MOH area using age-stratified random sampling method. Serum hs-CRP, cross linked C-telopeptide of type I collagen (CTX; bone resorption marker) and procollagen type I N-propeptide (PINP; bone formation marker) were measured by ELISA. Fat mass (TBFM), lean mass (TBLM) and bone mineral content (TBBMC) of the total body were measured by DXA. Participants were categorized in to low risk (<1 mg/L, n=122) and high risk ($\geq$1 mg/L, n=190) of cardiovascular disease based on hs-CRP level. Group comparison was done using multivariate analysis while adjusting for confounding factors. Partial correlation was used to elicit correlation between variables.

Results : Compared to the low risk group, subjects in the high risk group had higher mean CTX (0.57 ng/mL vs 0.49 ng/mL, p=0.007), lower mean TBBMC (1581.6 g vs 1601.4 g, p=0.008) and higher mean TBFM (23 kg vs 18 kg, p<0.001) but, mean PINP and mean TBLM was not significantly different. Furthermore, CTX showed a positive correlation with hs-CRP levels (r=0.17, p=0.003) and a negative correlation with TBBMC (r=-0.28, p<0.001) while it did not show significant correlations with TBFM and TBLM. PINP did not show significant correlations with hs-CRP, TBBMC, TBFM or TBLM. Further, hs-CRP levels showed a negative correlation with TBBMC (r=-0.12, p=0.029) and positive correlation with TBFM (r=0.44, p<0.001).

Conclusion : Bone resorption marker CTX, is associated with systemic inflammation and reduced bone mineral content of body in this group of women.

PP - 08 Quantification of polyphenol and flavonoid content in aqueous leaves extract of Ivy gourd collected from different geographical locations in Sri Lanka

Shanmuganathan E[1], De Silva WN[1], Attanayke AP[1], Arawwawala LDAM[2]

[1] *Department of Biochemistry, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka*
[2] *Industrial Technology Institution, Colombo, Sri Lanka*

Introduction: Polyphenols and flavonoids have an array of health-promoting benefits; they are of current interest due to their vital biological and pharmacological properties including the possible role in preventing cardiovascular diseases and cancer. The geographical location is an important determinant in the collection of plants for preparation of polyphenol rich extracts for a wide array of medicinal applications such as development of novel therapeutic agents and/or nutraceuticals.

Objective: To determine and compare the total polyphenol and flavonoid content of aqueous leaves extract of the Ivy Gourd - *Coccinia grandis* (L.) Voigt (Family: Cucurbitaceae) collected from Central, Northern, Southern and Western provinces.

Method: The plant material in flowering age, was collected from different provinces, oven dried (40 °C) and subjected to ultrasonication (240W, 35kHz) for 20 min, followed by refluxing for 180 min. The solid: liquid ratio was kept as 20 g of *C. grandis* leaves in 325 mL of distilled water. The resulting extracts were freeze dried and used to quantify total polyphenols and flavonoids using Folin-Ciocalteu and aluminum chloride method with gallic acid and quercertin as reference compounds respectively. The values are expressed as mean ± standard deviation. The data were analyzed using ANOVA, followed by Tukey HSD to compare relevant means.

Results : The total polyphenol and flavonoid contents were in the range of 27.62 ± 0.42-35.77 ± 0.36 mg of GAE/g of extract and 6.14 ± 0.09- 7.94 ± 0.08mg of QE/g of extract respectively. The plant material collected from the Northern province has the highest polyphenol and flavonoid content. A statistically significant difference ($p<0.05$) was found in total polyphenol and flavonoid content of *C. grandis* collected from Northern and Central provinces.

Conclusions: The results revealed that there is no statistical difference in total polyphenol and flavonoid content of *C. grandis* collected from selected geographical locations except in the plant samples collected from Northern and Central provinces. Based on the quantification results, *C. grandis* has a considerably high polyphenol and flavonoid content which might be beneficial in development of polyphenol-based herbal therapeutic agents/nutraceuticals.

PP-09 Poor socioeconomic state, stunting and fatness are negatively associated with cognitive performance of female adolescents

Madhushanthi HJH [1], Wimalasekera SW [2], Goonewardena CSE [3], [4]Amarasekara AATD,
[5]Lenora RSJ

[1]Department of Nursing, Faculty of Allied Health Sciences, University of Ruhuna,
[2]Department of Physiology, [3]Department of Community Medicine , Faculty of Medical Sciences, University of Sri Jayewardenepura, [4]Department of Nursing & Midwifery, Faculty of Allied Health Sciences, University of Sri Jayewardenepura,
[5]Department of Physiology, Faculty of Medicine, University of Ruhuna

Background : Age range from 11 to 14 years is regarded as early adolescence. This period is characterized by physical, psychological, cognitive and social changes. The brain continues to develop into adolescence and these developmental changes in brain are also sensitive to environmental stresses. Cognitive performance (CP) of an individual is influenced by many factors varying nutritional, psychosocial and genetics.

Objective : The present study aimed to determine the influence of nutritional and psychosocial factors on CP of early female adolescents aged 11 -14 years (n=218) selected from schools in Galle, Sri Lanka.

Method : After obtaining baseline data, eight subtests of the Wechsler Intelligence Scale for Children (WISC - IV), Tests of Nonverbal Intelligence (TONI –3) and two computer based executive function tests (inhibition and visuo- spatial working memory) were administered to assess the CP of above adolescents. The nutrition status of adolescents was assessed using by anthropometric measurements while height for age z score (HAZ), weight for age z score (WAZ), BMI for age z score (BAZ) were calculated to measure acute and chronic nutritional status. Self administered socio demographic questionnaire was used to assess socioeconomic state (SES). Tricep, bicep and subcapsular skin fold thickness were measured and Srı Lankan validated fat mass equation was used to calculate FM%.

Results: Age of the study participants ranged from 11 to 14 years with mean age 12.31(±1.16) years. In the multivariate regression model indicate that HAZ, SES index, waist circumference and FM% are significant predictors of CP of female adolescents. A single unit change of SES index resulted in 0.268 unit change of estimated full scale IQ. Similarly a single unit change of HAZ (stunting) is resulted -0.211 unit change of EFSIQ of female adolescents. A single unit change of FM% resulted -0.252 unit change of Processing Speed Index (PSI).

Conclusions : The result implies that improvement of female adolescent nutrition wellbeing and socioeconomic state through effective interventions could have significant effect on CP.

SPP-01 Factors affecting satisfaction of the patients attending Physiotherapy and Rehabilitation Unit in Teaching Hospital, Karapitiya

Danwaththa R[1], Darshika SKUR[1], Dayarathna SHTL[1], De Silva NSTDS[1], De Silva GHNH[1], De Silva DSD[1], De Silva AKTN[1], Dissanayake SP[2], Liyanage PLAN[3]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Teaching Hospital, Karapitiya

[3] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Physiotherapy and rehabilitation is a main health service provided at public sector focusing on optimisation of patient function and well-being. Patient satisfaction is important in the field of physiotherapy as it is a more patient-centered form of health care delivery. Data on patient satisfaction related to physiotherapy services in local setting is sparse. The aim of the study was to determine the factors affecting satisfaction of the patients receiving physiotherapy and rehabilitation services.

Methods: A descriptive cross-sectional study was conducted among 148 patients attending the physiotherapy and rehabilitation unit in Teaching Hospital, Karapitiya using a self-administered questionnaire. Validated Sinhala version of MedRisk questionnaire was used to assess the patient satisfaction.

Results: Among the 148 patients, 54.1% were females and the median age (inter-quartile range) was 50 (23) years. Physiotherapy was provided for patients with rheumatoid arthritis (39.2 %), orthopaedic concerns (24.3%) and osteoarthritis (21.6%). The commonest therapy received was exercise (46.6%) followed by heat therapy (41.9%) and electromagnetic therapy (11.5 %). High patient satisfaction level was reported in 79.7%, whereas 2% and 18.2% had moderate and low levels of satisfaction respectively. Patient satisfaction was statistically significantly associated with both travel time (p<0.05) and expenditure per visit (p<0.05) but not with number of visits per month.

Conclusions: Majority receiving physiotherapy services are in economically productive age group and patients with rheumatoid arthritis are commonly referred. The patient satisfaction is associated with travel time and expenditure, but not number of visits per month. Outreach physiotherapy services are recommended to improve patient satisfaction ensuring quality patient care.

Keywords: Patient satisfaction, rehabilitation, physiotherapy, MedRisk

SPP-02 Quality of life among patients with chronic kidney disease attending Teaching Hospital, Karapitiya

De Silva PHDK[1] , De Silva ACS[1], Devindi HKW[1], Dhanapala DHDA[1], Dharmasena PDLP[1], Dharmasiri AMTDK[1], Dilanka ML[1], Liyanage PLAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Patients with chronic kidney disease (CKD) are increasing in number in Sri Lanka and the burden of the disease not only affects the severity but also the quality of life (QoL) of the patients due to its chronicity. The aim of the study was to assess the QoL and factors associated among patients with CKD.

Methods: A cross-sectional descriptive study was conducted among patients with CKD attending Teaching Hospital, Karapitiya. Demographic and disease characteristics were obtained through interviewer-administered questionnaire and perusal of medical records. QoL was assessed by self-administered validated Sinhala translation of World Health Organization Quality of Life (WHOQOL-BREF) questionnaire.

Results: Out of 168 patients with CKD, 106 (63.1%) were males and the median age (IQR) was 56 (46-64) years. Majority (53.6%) had monthly income less than 20000 rupees. The median duration (IQR) since diagnosis of CKD was 24 (12-36) months. The types of treatment received include medication alone (76.8%) and combination of haemodialysis and medication (23.2%). Among the medication alone group 2.4% had kidney transplantation. Among the comorbidities, diabetes mellitus, hypertension and dyslipidaemia were reported in 73.8%, 77.4% and 37.5% patients respectively. Median (IQR) scores for the QoL components including physical, psychological, social and environmental were 38 (31-50), 44 (31-56), 44 (31-50) and 56 (44-63) respectively. A significant association was observed between physical QoL with gender (χ^2=3.969, p<0.05) and type of treatment (χ^2=4.470, p<0.05) while social QoL was associated with type of treatment. None of the components of QoL was associated with the duration of treatment.

Conclusions: The physical component of the QoL is mainly affected in patients with CKD and is associated with gender and type of treatment, while social QoL is associated with type of treatment. Health promotion targeting physical QoL and upgrading therapy may create positive impact QoL among patients with CKD.

Keywords: Quality of life, chronic kidney disease, demographic factors, disease characteristics

SPP-03 Knowledge, attitudes and practices on institutional infection control guidelines among attendants in Teaching Hospital, Karapitiya

Waragoda RS[1], Weerasinghe PGNN[1], Weerasinghe KBPM[1], Weliwita DD[1], Wickramasinghe VC[1], Wickramasinghe WATD[1], Wickramasuriya HS[1], Piyasiri DLB[2], Liyanage PLAN[3]

[1] *38th Batch, Faculty of Medicine, University of Ruhuna*

[2] *Teaching Hospital, Karapitiya*

[3] *Department of Community Medicine, Faculty of Medicine, University of Ruhuna*

Introduction: Awareness and adherence to institutional infection control guidelines along with appropriate practices of infection control measures among hospital attendants are critical to prevent hospital acquired infections. However, there is inequity on available resources and opportunities across different strata of human resources of health. Hence this study was conducted with the objective of assessing knowledge, attitude and practices on institutional infection control guidelines among attendants in Teaching Hospital, Karapitiya.

Methods: A cross-sectional study was conducted among attendants at Teaching Hospital, Karapitiya, Galle, Sri Lanka. Stratified sampling was used according to the allocated units. Self-administered questionnaire based on institutional guidelines with predesigned scoring system was used for the assessment.

Results: Out of 128 responders, 64.1% were female with median age (IQR) of 41 (14) years. Among them 70 (54.7%) had adequate knowledge on institutional infection control guidelines. Approximately 37% had participated in at least one educational programme and 98.4% indicated positive attitudes towards participation. Satisfactory self-reported practices were identified on hand washing (75.78%) although practice on usage of personal protective equipment was unsatisfactory (50.8%). A significant association was observed between the knowledge on infection control guidelines and participation in educational programs (p<0.05) as well as exposure to needle prick injuries (p<0.05).

Conclusions: Knowledge and practices of the attendants related to institutional infection control guidelines was suboptimal while majority had highly favourable attitude on participation in educational programs. Since attendants play an important role in patient care, provision of knowledge and skills on infection control is recommended for the betterment of health services.

Keywords: Healthcare associated infections, attendants, knowledge, attitudes, practices, infection control guidelines

SPP-04 Child-rearing behaviours and support for children under five years and its impact on the occupational performance among female nurses in Teaching Hospital, Karapitiya

Madusanka SLL[1], Madhushan MKD[1], Madubhashini TNP[1], Madurika APS[1], Madusanka PWS[1], Madushanka HK[1], Madushanka KWD[1], Liyanage PLAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Nurses are considered as one of the main human resources in health care and nursing continues to be largely a female dominated profession. The occupational performance of nurses relies not only on their professional ability but also on personal wellbeing which most importantly depends on the provision of child care and support rendered during work. The aim of the study was to assess the impact of child-rearing behaviours and support on the occupational performance among female nurses.

Methods: A cross-sectional study was conducted at Teaching Hospital, Karapitiya (THK) among female nurses who had children below five years. Female nurses who were having syndromic children or children with congenital abnormalities were excluded. Data were collected using an interviewer-administered questionnaire. A predesigned scoring system was used to assess occupational performance.

Results: Among 184 nurses, the median age (IQR) was 35 (5.57) years and their age ranged from 28 to 43 years. Satisfaction related to children's safety was reported by 88% while 12% of the nurses did not satisfy with the safety of their children. Considering occupational performance, 54.8% had satisfactory occupational performance and 45.1% did not have a satisfactory occupational performance. There was a significant association between satisfactory occupational performance and satisfaction about children's safety during work (p<0.05).

Conclusions: Occupational performance in the majority of nurses who have children below five years in THK was satisfactory. The results indicate that ensuring the safety of children during work could be beneficial in uplifting the occupational performance of the female nurses.

Keywords: Female nurses, child-rearing behaviours, occupational performance

SPP-05 Clinico-epidemiological profile of patients presenting with animal bites requiring post exposure rabies prophylaxis at Teaching Hospital, Karapitiya

Jayawardane CLM[1], Jothimuni MC[1], Kalansooriya US[1], Kalpana KPS[1], Kapukotuwa KMHL[1], Kasthuriarachchi KANN[1], Kasun SWY[1], Liyanage PLAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Rabies is a fatal but preventable zoonotic viral disease transmitted following a bite of an infected animal and had recently emerged as a public health concern. It is important to identify the clinico-epidemiological profile of patients presenting with animal bites to aid prevention and further elimination of human rabies in Sri Lanka. This study aimed to assess the clinico-epidemiological profile and its associations among patients with animal bites attending the Rabies unit, Teaching Hospital, Karapitiya (THK).

Methods: A cross-sectional study was conducted using an interviewer-administered questionnaire among a consecutive sample of 247 patients attending Rabies unit, THK for post exposure prophylaxis.

Results: Of 247 animal bite victims, majority were males (61.5%). Median age (IQR) was 35 (52-16) years and 58.7% were in 18-64 age group. Thirty percent of animal bites were reported from Galle divisional secretariat. Dog bites were reported in 63.5% while 26.7% were cat bites. Animal bites occurred in lower limbs, upper limbs and face in 52.6%, 43.8% and 6.1% victims respectively. Single site was involved in 78.9% of victims. Puncture or laceration was recorded in 61.5% and 34.8% had abrasions. The severity of exposure was associated with the presence of recurrent attacks by the culprit animal ($p < 0.05$) but not with age of the victim or type of animal.

Conclusions: Majority of animal bite victims were adult males attending THK following dog bites. The severity of exposure is associated with recurrent attacks by the culprit animal. Public awareness on rabies transmission should be strengthened for the prevention of this fatal disease.

Keywords: Rabies, clinico-epidemiology profile, animal bites

SPP-06 Knowledge, attitudes and practices on first aid for snakebites among the residents in Poddala area

Maduwantha MNN[1], Malalasekera NH[1], Malwatta MALD[1], Manthika HGGL[1], Mendis WPM[1], Menushi GDM[1], Mulgirigala EM[1], Liyanage PLAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Snakebite is a common and neglected public health problem in Sri Lanka, affecting people mainly of lower socioeconomic groups. Understanding awareness and perceptions on first aid for snakebites becomes crucial in designing snakebite prevention and control programmes. The aim of the study was to assess the knowledge, attitudes and practices on first aid for snakebites among the residents in Poddala area which was the commonest geographical location of the snakebite victims admitted to Teaching Hospital, Karapitiya.

Methods: A descriptive cross-sectional study was conducted among 245 residents of Poddala area, using a self-administered questionnaire. A predesigned scoring system was adapted to assess the knowledge, attitudes and self-reported practices on snakebites. Data were analysed using SPSS statistical software.

Results: Among 245 participants, 43.3% were males and nearly 60% belonged to higher social classes. Satisfactory knowledge on first aid for snakebites was identified in 71% while 96.3% had positive attitudes on first aid provision. Previous experience of attending to snakebite was reported by 56.7%. Among them, 48.9% had acceptable first-aid practices based on self-report. Application of tourniquet was considered as an acceptable first aid measure by 54%. A significant association was observed between the practice of first aid with both knowledge ($p<0.05$) and social class ($p< 0.05$).

Conclusions: Majority had satisfactory knowledge and positive attitudes regarding first aid for snakebites. However, half of the participants have erroneously considered the application of a tourniquet as an acceptable first aid measure. Community awareness programmes are recommended, simulating snakebites and highlighting first aid measures to follow and evade.

Keywords: First aid, knowledge, practice, attitudes, snakebites

SPP-07 Dietary practices, exercise behaviour and prevalence of self-reported non-communicable diseases among medical officers above 35 years attached to Teaching Hospital, Karapitiya

Chandrathilaka GSL[1], Chandrasiri EATM[1], Charuka KGW[1], Chathuranga LYR[1], Chathuranga AKG[1], Chinthaka HLM[1], Dahanayake TK[1], Ponnamperuma T[2], Wikramathilake CM[3]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

[3] Department of Biochemistry, Faculty of Medicine, University of Ruhuna

Introduction: Non-communicable diseases (NCD) are chronic diseases that carry a higher morbidity and mortality. They are known to be largely associated with behavioural factors such as diet, physical inactivity and stress. This study aimed to assess the dietary practices, exercise behaviour and prevalence of selected NCDs among medical officers (MOs) in Teaching Hospital, Karapitiya (THK).

Methods: A cross-sectional study was conducted among all MOs above 35 years of age (n=206) attached to THK. Data were collected using a self-administered questionnaire after obtaining the consent. Data were analysed using descriptive statistics and chi-square test was used to assess the association between variables.

Results: The sample included 206 medical officers with 46% males. A considerable proportion of MOs (n=35, 17%) reported to have NCDs. The most prevalent NCDs were diabetes mellitus (46%) and hypertension (14%). Consumption of tea/coffee with sugar for more than three times per day (p=0.018) and consumption of milk power more than three times per week (p=0.013) were positively associated with NCDs. The MOs with NCDs were found to engage in exercise significantly (p=0.022) compared to the MOs without NCDs.

Conclusions: Of the selected NCDs among medical officers in THK, diabetes mellitus predominates. Engagement in physical exercise by medical officers with NCD is a life-style modification. Reduction of consumption of milk powder and tea/coffee with sugar could be beneficial in the prevention of selected NCDs.

Keywords: Dietary practices, exercise behaviour, Non-communicable diseases, doctors

SPP-08 Knowledge, practices and attitudes regarding inhaler usage among adult patients attending medical clinics, Teaching Hospital, Karapitiya

Liyanage AKG[1], Lakshan KD[1], Lakshan JMH[1], Liyanage ELHP[1], Loshani UKC[1], Maddumage MKKT[1], Madhubhashini JP[1], Liyanage GC[2], Ponnamperuma T[3]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Pharmacology, Faculty of Medicine, University of Ruhuna

[3] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Asthma is a chronic airway disease, which needs treatment for prolonged duration. Inhalers play an important role in the treatment of asthma. Effectiveness of inhaled medications depends on proper inhaler techniques and adherence to the treatment regimen, which is directly influenced by beliefs, feelings and opinions of the patients. Though many studies have been conducted in this aspect worldwide, there is a paucity of studies in Sri Lanka. Hence, this study was designed to assess knowledge, attitudes and practice of patients with asthma on inhaler therapy, attending medical clinics, Teaching Hospital, Karapitiya (THK).

Methods: This descriptive study involved 268 patients above 18 years who were on inhaler therapy for asthma attending the medical clinics, THK. Their knowledge, attitudes and practice on inhaler therapy were assessed using a self-administered questionnaire. Data were analysed using SPSS statistical software.

Results: Of 268 participants, 39.6% had a good knowledge on inhaler therapy whereas 25.4% and 35.1% had average and poor knowledge respectively. Knowledge was significantly high among younger patients (<50 years) than the old (p<0.001), and among educated patients (>O/L) more than the less educated (<O/L) patients (p<0.001). Among the good practices, oral rinsing, device cleaning and recapping were done by almost all. Although all were aware about their diagnosis and considered inhalers as a mode of treatment, only 89.2% used inhalers regularly. Regarding attitudes, fear of addiction (22%) and social stigmatization (8%) were noted.

Conclusions: Current study revealed a considerable prevalence of lack of knowledge, malpractices and misbeliefs about inhalers and its use, emphasizing the necessity of educational programs to improve the treatment outcome.

Keywords: Asthma, knowledge, attitude, practice, inhaler devices, inhaler technique, Metered Dose Inhaler

SPP-09 Attention paid on non-communicable diseases care through person centered primary care by general practitioners in Galle Municipality area

Ramawikrama NS[1], Ranasinghe IGMH[1], Ranawaka TD[1], Ranpatabandi GS[1], Ransarani GN[1], Rasanjali NCL[1], Rathnayaka RMYJ[1], Ponnamperuma T[2]

[1] *38th Batch, Faculty of Medicine, University of Ruhuna*
[2] *Department of Community Medicine, Faculty of Medicine, University of Ruhuna*

Introduction: The non-communicable diseases (NCD) prevalence is rising daily and it has become the greatest challenge to the health care system globally and locally. General practitioners (GP) providing Person Centered Primary Care (PCPC) have been identified as a feasible and effective approach to address NCD care in the community. Therefore, this study was designed to assess the PCPC provided and attention paid on NCD prevention and management by the GPs in Galle area.

Methods: A cross-sectional study was conducted in June 2020 involving 384 patients who attended five conveniently selected general practitioners' clinics in Galle. Data were collected using a self-administered questionnaire. PCPC was measured by the standard PCPC questionnaire which was translated into the local language. The total score ranged between 0-33 and PCPC received was categorized as not adequate (0-11), average (12-22) and adequate (23-33). Data were analysed by SPSS software. The associations between variables were tested using chi-square test, independent sample *t* test and Pearson correlation coefficient. A p value <0.05 was considered significant.

Results: Approximately 49% (n=189) patients presented to GPs had NCD. Most of the patients (74%) reported that the PCPC provided by the GPs were adequate. A majority (n=170, 90%) of the patients with NCD had a good follow-up by the GPs. Nearly 65% (n=127) of the patients who were not diagnosed with NCD were directed for screening by the GPs. However, only a few of the patients had been referred to the NCD screening clinics conducted by the government public health services (20% to healthy lifestyle clinic and 9% to well women clinic). Patient's assessment on received PCPC had a mean score of 24.54, (SD=5.94). PCPC score was not associated with patients' age, gender or education level (all p> 0.05), but associated with patient's income (χ^2 19.700, p = 0.003).

Conclusions: The quality of the PCPC provided by GPs is at satisfactory level. GPs care on NCD prevention and management is also fairly adequate. However, utilization of freely available government NCD screening services should be encouraged.

Keywords: Patient centered primary care, General practitioner, Non-communicable diseases

SPP-10 Awareness on first aid measures for foreign body impaction in ear, nose and throat among primary caregivers of children below six years attending paediatric clinics in Teaching Hospital, Karapitiya

Rathnayake MK[1], Ruhaima MIF[1], Rupasinghe IDJW[1], Samadhi KU[1], Samarawickrama MP[1], Sandaruwan VGM[1], Sandeepani IDS[1], Wickramatilake CM[2], De Silva KKWJC[3]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Biochemistry, Faculty of Medicine, University of Ruhuna

[3] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Paediatric foreign body (FB) related ear, nose, throat (ENT) injury is a significant preventable cause of morbidity and mortality, especially among children less than six years. This study aimed to assess awareness of first aid measures for FB impaction in ENT among primary caregivers (PCG) of children less than six years attending paediatric clinics in Teaching Hospital, Karapitiya (THK).

Methods: A descriptive cross-sectional study was carried out among conveniently selected 272 PCGs of children less than six years attending paediatric clinics in THK. The awareness of first aid measures for FB impaction in ENT was assessed using a self-administered questionnaire. Data were analysed using appropriate statistical tests. Participants who scored ≥80% were considered as having a satisfactory level of awareness.

Results: Majority of the PCG were mothers, 223 (82%) with a median age of 35 years (range: 22–75 years). A significant proportion of them had a satisfactory level of awareness on first aid measures (n=272, 65.4%). Mean percentage scores of awareness on ear, nose and throat were, 80.1% (95% CI = 77.9–82.2), 84.3% (95% CI = 82.1–86.6) and 73.8% (95% CI = 71.5–76.1) respectively. The average score on the overall level of awareness was 79.4% (95% CI = 77.6–81.2).

Majority of PCGs (n=272, 68.4%) were aware of first aid measures and most (n=186, 59.7%) had received knowledge from parents or elders. The overall level of awareness was associated with a past experience (p<0.05) and higher monthly income (p<0.05) while age (p=0.082), gender (p=0.583), ethnicity (p=0.648), resident district (p=4.63), number of children (p=0.993) and level of education (p=0.371) were not associated with it.

Conclusions: The PCGs of children below six years attending paediatric clinics in THK had a satisfactory level of awareness on first aid measures for FB impaction in ENT. Routine education of PCGs is an important measure to minimize the risk, although the majority had a satisfactory level of knowledge.

Keywords: First aid, foreign body, ENT, primary caregivers

SPP-11 Awareness and attitude towards cervical-smear screening for cervical carcinoma among female teachers in Galle educational division

Sanjeewa KKAK[1], Sanjeewani GL[1], Senevirathna PKHP[1], Senevirathna ASRR[1], Sewwandi JM[1], Shanaka KGL[1], Shashimali WAKS[1], De Silva KKWJC[1]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Though cervical carcinoma has become the second commonest cancer among females in Sri Lanka, the associated morbidity and mortality can be largely prevented through effective cervical-smear screening. This study aimed to assess the awareness and attitude towards the cervical-smear screening among female teachers in Galle educational division.

Methods: A cross-sectional study was carried out among randomly selected 323 female teachers in 30-60 years age group in national schools in Galle educational division. A self-administered questionnaire was used to assess the awareness and attitude towards cervical-smear screening. The level of awareness was calculated using a scoring system and converted into percentages. Chi-square test was used to detect the associations for awareness on cervical-smear screening. Data were analysed using SPSS version 20.0 and $p<0.05$ was considered as the level of significance.

Results: Mean age of study sample was 43.9 years (SD = ±8.0 years). The mean score for awareness on cervical-smear screening was 86.2%. A satisfactory level of awareness (a score of >70%) was shown by 83.9% (n=271) of the participants. Mass media was found to be the major source of information (n=165, 51.1%). Nearly 90% (n=280) of the participants showed a positive attitude stating the willingness to undergo cervical-smear screening. Age <45 years was found to be associated with a better awareness on pap-smear screening ($p<0.05$).

Conclusions: A considerable proportion of school teachers in Galle educational division have a high level of awareness on cervical-smear screening. It is needed to assess the proportion of teachers undergoing cervical-smear screening and then to take measures to direct them to undergo cervical-smear screening.

Keywords: Cervical-smear screening, Galle educational division, teachers

SPP-12 Factors leading to pursuit of postgraduate studies among Preliminary Grade Medical Officers in Teaching Hospitals and Base Hospitals in Galle district

Pathirana PBG[1], Perera AATD[1], Perera SM[1], Perera BAAC[1], Piyaraj WAI[1], Piyasinghe PMTN[1], Prabhath SAK[1], Darshana ILAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Pursuing a postgraduate (PG) study will decide the field of specialization for medical professionals and it has a great impact on the health care delivery systems of the country. This study was conducted to assess factors associated with the pursuit of PG studies and their field of choice among Preliminary Grade Medical Officers in Teaching Hospitals (THs) and Base Hospitals (BHs) in Galle District.

Methods: A cross-sectional study was conducted among 160 Preliminary Grade Medical Officers working at THs and BHs in Galle district. Data was collected using a Google form. Factors associated with the pursuit of PG studies were assessed under sociodemographic and academic related factors. Chi-square test was used to assess factors associated with pursuit of PG studies at a significance level of 0.05.

Results: The study sample consisted with 63(39.4%) intern medical officers, 39(24.4%) post intern medical officers, 32(20.0%) medical officers and 26(16.2%) registrars. Majority of respondents were either planning to pursue (n=88, 55.0%) or were currently pursuing PG studies (n=26, 16.3%). Most (n=100, 87.7%) of the individuals in the sample preferred to pursue Doctor of Medicine degree (MD) study while MD Medicine (n=35, 30.7%) was the preferred field. Medical officers who were working in THs and had influence from graduated faculty to pursue PG were more likely to pursue or planning to pursue PG studies (p<0.001). None of the socio-demographic factors were associated with decision for pursuing or planning to pursue PG studies.

Conclusions: Majority of Preliminary Grade Medical Officers were either planning to pursue or were currently pursuing PG studies. Socio-demographic factors did not affect with decision for pursuing or planning to pursue PG studies while academic related factors had great impact. Motivation for pursuing or planning to pursue PG studies during undergraduate stage is recommended from the study.

Keywords: Postgraduate studies, associated factors, preliminary grade medical officers

SPP-13 Patients' satisfaction and associated factors with acute pain management among adult patients admitted to Teaching Hospital, Karapitiya

Angammana AAU[1], Anjana ALGK[1], Athulya HLK[1], Ayesha LNGI[1], Bandara ISS[1], Basnayake SY[1], Bhagya WHAP[1], Darshana ILAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna
[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Management of acute pain is considered as one of the challenging incident globally in modern medicine irrespective of health care facilities. This study assessed patient's satisfaction and associated factors with acute pain management among adult patients admitted to Emergency Treatment Unit (ETU) at Teaching Hospital, Karapitiya (THK).

Methods: A descriptive cross-sectional study was conducted among a convenient sample of 155 adult patients with acute pain admitted to ETU of THK. Data was collected using interviewer-administered questionnaire. Acute pain was measured using "Visual Analogue Scale" (VAS) before and after pain management. Chi-square test was used to assess factors associated with pain management. Effectiveness of pain management was assessed using Pearson r and paired t test at a significance level of 0.05.

Results: Majority were suffered from acute pain following road traffic accidents (n=47, 30.30%). Severe pain was reported among 80.64% (n=125) patients. Oral analgesics (n=90, 58.10%) was the commonest method used in management. Majority of the patients (n=122, 78.7%) were satisfied with pain management they received. Pain score before and after management had shown statistically significant positive intermediate correlation (r=0.490, p<0.001). Statistically significant reduction in pain score was reported after pain management compared to pain score on admission (t154=28.24, p<0.001).

Conclusions: Majority of the patients were satisfied with the pain management they received. Significant reduction in pain level after management was noted. However, more quality pain management system is recommended to deliver better care for patients with acute pain at ETU.

Keywords: Acute pain, pain management, associated factors, patients' satisfaction

SPP-14 Sleep habits and sleep quality among Advanced Level science stream students in selected national schools in Galle Municipality area

Wijerathne AMWN[1], Wijesinghe KMGIV[1], Wijesinghe VP[1], Wijesinghe AWS[1], Wijewardhana KPGRK[1], Wijeweera GU[1], Yasoda MG[1], Zamana MZF[1], Darshana ILAN[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Sleep is a basic human need and essential to maintain healthy and quality life. Sleep deprivation leads to adverse physical and mental effects and academic impairment. This study aimed to assess sleep habits and sleep quality among Advanced Level science stream students in selected schools in Galle Municipality area.

Methods: A cross-sectional study was conducted among 406 Advanced Level Science stream students in selected schools in Galle municipality area. A pretested, judgmentally validated, self- administered questionnaire was used through a Google form for data collection. Sinhala version of Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. Chi-square test at 0.05 significance level was used to assess factors associated with sleep habits and sleep quality.

Results: Out of 406 students, majority were Sinhalese (n=362, 89.2%), Buddhists (n=360, 88. 7%) and females (n=267, 65.8%). Most students had taken naps (n=209, 73.6%) and had used caffeine, electronic devices or exercises before sleep (n=375, 92.4%). Prone position was the commonest sleep position among students (n=148, 36.5%). Female gender (p<0.05) had statistically significant association with taking naps. Nearly half (n=226, 55.7%) of the students had poor sleep quality (global score above 5) based on PSQI score. Drinking coffee, using electronic devices and engaging in exercises before sleep had statistically significant associations with poor sleep quality (p<0.05). Unsatisfactory academic performances had statistically significant association with poor sleep quality (p<0.05).

Conclusions: Sleep habits and sleep quality varied among the study participants and had affected their academic performances. Raising awareness among students regarding proper sleep habits to ensure quality sleep is recommended from the study.

Keywords: Sleep habits, sleep quality, Advanced Level students, academic performances

SPP-15 Quality of life and associated factors among patients with type 2 diabetes mellitus attending the diabetic clinic of Teaching Hospital, Karapitiya

Fernando MCL[1], Fernando MLS[1], Gajanayake TR[1], Galappaththi HGKN[1], Gamage KMKM[1], Gunarathne SGMM[1], Gunaratna LVT[1], Gunathilaka PGKA[1], De Silva PV[2]

[1] *38th Batch, Faculty of Medicine, University of Ruhuna*

[2] *Department of Community Medicine, Faculty of Medicine, University of Ruhuna*

Introduction: Diabetes mellitus (DM) is one of the commonest non-communicable diseases worldwide, a chronic debilitating condition influencing the person's quality of life (QOL) and known to have a reflective impact on life expectancy. This study aimed to assess the QOL and its associated factors among the type 2 DM patients who are attending to diabetic clinic in Teaching Hospital, Karapitiya (THK).

Methods: A descriptive, cross-sectional study carried out among 355 type 2 DM patients diagnosed for more than 3 years, between ages of 30 to 75, attending diabetic clinic at THK using convenience sampling method. Data collected via interviewer-administered WHOQOL-BREF and another detailed questionnaire, analysed by the standard calculation using point scales for WHOQOL-BREF, transformed scores, 0.05 taken as cutoff p-value to check associations.

Results: Response rate was 100% in which 68.7% (n=244) females. Mean age was 58.7 ± 0.95 years, majority (38.9%, n=138) educated up to Ordinary level, dwelling in rural areas (79.2%, n=281). Scores of QOL for all four domains were above average. The highest and lowest values were obtained for psychological (mean 64.7 ± 1.31), and for social (mean 57.3 ± 1.86) domains. Associated factors that negatively impacted on physical, psychological, social and environmental domains of QOL were years of illness and DM related complications. Comorbidities; hypertension affected social domain, dyslipidemia affected physical and social domain. Diet, use of medication and occupation affected physical domain. Financial burden affected psychological and environmental domains.

Conclusions: Use of multimodal drug therapies, comorbidities (hypertension, dyslipidemia), diabetes related complications (visual impairments, upper/ lower limb numbness) had a significant negative impact on QOL. Management should focus on controlling comorbidities, preventing complications, treating with minimal modes of drug therapies.

Keywords: Type 2 diabetes mellitus, associated factors, quality of life, WHOQOL-BREF, domain

SPP-16 Knowledge, attitudes and practices among mothers of children under 14 years on diarrhoea and associated factors in selected PHM areas of Sri Lanka

Muthukumarana SA[1], Nadeesha PGD[1], Navoda HMH[1], Nishakara WCW[1], Nishani HSN[1], Nuwandi WADS[1], Ovitigala OVCEK[1], Pathirage TT[1], De Silva PV[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna
[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Diarrhoea remains the second leading cause of death among children under five years globally. Mothers play a central role in its management and prevention. This study aimed to assess knowledge, attitude and practices on diarrhoea and its associated factors among the mothers with children under 14 years of age.

Methods: A community based cross-sectional study was conducted in selected seven PHM areas of Sri Lanka involving 175 mothers of children under 14 years. PHM areas and mothers were selected by convenience sampling. Data was collected using a pre-tested, interviewer-administered questionnaire and analysed using descriptive summary statistics such as mean, standard deviation and inferential statistics such as chi-square test.

Results: Out of all respondents (n=161) 92% had 1-3 children and 50.3% were educated up to Advanced level. 88% of the sample had good knowledge on signs, symptoms and complications of diarrhoea. Of all mothers, 68% stated that they preferred "Jeevani" as Oral Rehydration Therapy (ORT) commonly. Majority (89.7%) wanted medical management during a diarrhoeal episode of their child and 82.3% had a healthy attitude towards six months of exclusive breast feeding. Out of the respondents, majority (81.71%) had good practices towards home-based management and prevention of diarrhoea. Moreover, the study revealed that the maternal age, was significantly associated with the knowledge of mothers' about diarrhoea (p=0.02). Also their age, was significantly associated with their practices towards prevention and treatment of diarrhoea (p=0.017). Maternal education level was significantly associated with their attitudes toward breast feeding to prevent diarrhoea (p=0.048).

Conclusions: Knowledge on awareness regarding diarrhoea, its causes, signs and symptoms, prevention and ORT were found to be good among mothers. Attitude towards diarrhoeal prevention and home-based management was good and has translated to good practice which was seen in this community. Maternal education, in particular health education should be used as an effective tool to promote good knowledge and good practices regarding diarrhoeal illnesses.

Keywords: Knowledge, attitude, practices, associated factors, diarrhoea

SPP-17 Pattern of transfer of patients from General, Base and Divisional Hospitals to Teaching Hospital, Karapitiya and its association with their clinical outcomes

Sumanathilaka TGHK[1], Silva GS[1], Sudeshika WKH[1], Sulochana GAI [1], Sumanadasa UWNM[1], Suriyaarachchi DMAHS[1], Tharindi MDN[1], Wijesinghe CJ[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna

[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Proper patient transfer to a tertiary care hospital has proven benefits over patient's outcome. However, transfers with various deficiencies lead to wastage of resources resulting in a burden to both the patient and the health care system. This study assessed the pattern of transfers of patients from General, Base and Divisional Hospitals to Teaching Hospital, Karapitiya (THK) and its association with their clinical outcomes

Methods: In a hospital based, cross-sectional study, a consecutive sample of 503 transfers received by the THK was selected retrospectively. Relevant data were extracted from the patients' records using a pre-tested data extraction sheet. Data were analysed using SPSS statistical software. Associations between study variables were assessed using chi-square test.

Results: Majority of the transfers were of male patients (65%) and were in the age category between 51-60 years (16.3%). Transfers from Base and Divisional hospitals accounted for 41% and 38%, respectively. Nearly 42% of the transfers were due to medical problems and 41.6% were surgical problems. In 13.8% of the transfers, THK was informed prior to transfer and 17.1% has been transferred without obtaining consent. In 22% of the transfers, patients had not received initial management at the originating hospitals. Interestingly, 13.2% of the transfers could be considered as unnecessary transfers (defined as *'transfers that resulted in no intervention or those that are discharged to home within 72 hours'*). Considering the outcome of the patients three days after admission, nearly 31% were discharged, 11% were transferred back and only 1.3% died. There was no association between outcome of transfer and the initial management (p>0.05) or the necessity of transfer (p>0.05).

Conclusions: This study revealed the patterns of transfers and the deficiencies in the current patient transfer process such as lack of initial management, pre-transfer communication errors and defective consent. Conduction of awareness programmes at the originating hospital is recommended to minimize these errors.

Keywords: Patient transfers, outcome, transfer pattern, consent

SPP-18 Prevalence, characteristics and management of febrile seizures among children under five years attending Teaching Hospital, Karapitiya

Kavindi VGD[1], Kodikara SS[1], Kodithuwakku KALK[1], Kulathilake PMW[1], Kumaradasa PMJK[1], Kumarasinghe KVDHL[1], Kushni KHA[1], Wijesinghe CJ[2]

[1] 38th Batch, Faculty of Medicine, University of Ruhuna
[2] Department of Community Medicine, Faculty of Medicine, University of Ruhuna

Introduction: Febrile seizures are the commonest neurological disorder observed in the paediatric age group and may be associated with epilepsy in later life. Identifying the characteristics of febrile seizures and affected groups is useful in its management and prevention. This study assessed the prevalence, characteristics and management of febrile seizures among children under five years admitted to Teaching Hospital, Karapitiya (THK), Sri Lanka.

Methods: A cross-sectional study was conducted retrospectively using secondary data extracted from the bed head tickets of 258 children aged 6-60 months with a diagnosis of febrile seizures admitted in all paediatric wards of THK between May 2019 and June 2020. Data were analysed using SPSS statistical software. Chi-square test was used to assess the associations between study variables.

Results: Prevalence of febrile seizures out of all admissions in this age group was 2.3%. Mean age of occurrence of febrile seizures was 24 months and the male to female ratio was 1.4:1. Approximately 80% were tonic-clonic seizures with 9% non tonic-clonic seizures. Majority (66.1%) had simple febrile seizures while 32.9% had complex seizures. Upper respiratory tract infection was the commonest trigger factor for febrile seizures. Around 40% had a family history of febrile seizures and 7% had a family history of epilepsy. Acute management was done in 19.8% of children with febrile seizures while prophylaxis with anti-epileptics was given to 24.8%. Children with recurrent admissions due to febrile seizures were more likely to receive prophylactic drugs (p<0.01) and those presented with the first episode of seizure were more likely to have simple febrile seizures (p<0.05) and a positive family history (p<0.05).

Conclusions: Febrile seizures account for only a minority of the admissions and most were simple seizures. Children with complex febrile seizures were more likely to have recurrent hospital admissions, acute management with drugs at hospital and prophylactic drug usage. Proper education of the caregivers is necessary to prevent recurrent seizures in high risk children.

Keywords: Febrile seizures, prevalence, characteristics, management, Sri Lanka

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