PAKISTAN PHYSIOLOGICAL SOCIETY
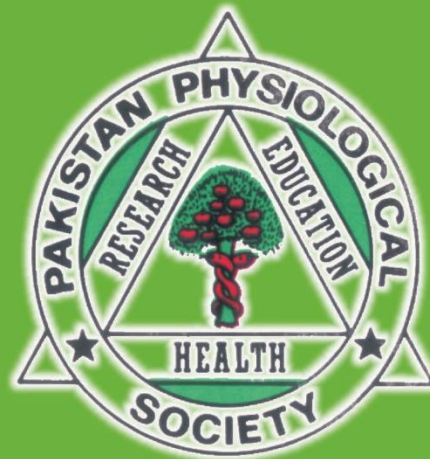
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CONTENTS

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EDITORIAL
OPEN DIFFERENT ROUTES TO GET A PhD —NEED OF THE HOUR

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The only source of knowledge is experience —Albert Einstein

Pakistan is badly in need of PhD teachers in basic medical sciences (BMS). The rate of production of PhD, especially in Physiology in our country is very low. There are many internationally accepted ways to get a PhD, some are suitable for international students. France, a developed European country, started VAE program in 2002 to incentivize productive and effective people in any field through awarding higher degrees, even PhDs, on the basis of their work and experience in the relevant field. To compensate for the acute shortage of faculty in BMS subjects, we should discover some out of the box solution. Higher Education Commission (HEC) and Pakistan Medical and Dental Council (PMDC) should recognize the internationally accepted degrees in BMS subjects with a lenient policy. Medical Universities should legalize, even if on one-time basis, awarding PhDs to the senior M. Phil Professors. Universities should formulate some criteria, e.g., an M. Phil Professor with 20 years teaching experience and 20 research papers may be granted PhD in his subject. Seats of PGRs may be reserved for students of PhD in different BMS subjects in CIP induction policy in Punjab. Two PGRs may be allocated to each PhD teacher for teaching, training, and guidance in research and thesis writing while the university should conduct examinations and thesis defence of these students.
Keywords: Basic Medical Sciences, PhD Physiology, PhD by Publication, VAE, CIP

Pakistan is badly in need of PhD teachers in basic medical sciences especially in Physiology. The rate of production of PhD Physiology in our country is very low and, at the present pace, we need more than fifty years to have the required number of PhD teachers in our medical colleges. As an example, University of Health Sciences was founded in 2002 and it has produced only three or four PhDs in Physiology. Similar is the situation for other medical universities and for other basic medical science (BMS) subjects. This is a bitter fact that over the years basic medical sciences remained a neglected part of the medical field and because of this, we are now facing a dire deficiency of teachers in these subjects. Current COVID-19 pandemic has also highlighted the importance of basic medical sciences especially pathology, pathophysiology, immunology, biochemistry etc. This is the time to wake up and open different, internationally accepted, routes to get a PhD, at least in BMS subjects.

There are many internationally accepted ways to get a PhD. Daniel Higginbotham, editor Prospects, states that studying a standard PhD by thesis is not the only means of getting a Doctorate degree. Here are four other ways to achieve this prestigious qualification:[1]

Integrated PhD which is also known as the New Route PhD that involves studying a one-year research Master's degree (M. Res) before progressing onto a three-year PhD by thesis.

Professional Doctorate is primarily for current professionals in vocational sectors such as healthcare, teaching and education, and engineering and manufacturing. This type of Doctorate includes a significant taught component and, therefore, a smaller research project.

PhD by Publication involves submitting previously published work such as books, book chapters and journal articles which together form a coherent body of work and show evidence of an original contribution to a particular field of study.

Distance Learning PhD. If you have family or work commitments, or are an international student, this gives you the chance to undertake a PhD without having to live close to your chosen university. As PhDs are based primarily on independent research rather than time spent in lectures and seminars, distance learning is a viable route for many students.[1]

An honorary degree is an academic degree for which a university (or other degree-awarding institution) waives off all of usual requirements, such as matriculation, attendance, course credits, a dissertation or thesis, and the passing of comprehensive examinations. The degree is typically a doctorate or, less commonly, a master's degree, and may be awarded to someone who has no prior connection with the academic institution or no previous post-secondary education.[2] PhD degrees awarded to political figures and other celebrities is a well-known example of honorary degrees, even known to Pakistanis too.

France, a developed European country, started VAE program in 2002 to incentivize productive and effective people in any field through awarding higher degrees, even PhDs, on the basis of their work and experience in the relevant field. In English, you may call this program as 'Validation of Acquired Experience' which awards a degree to people who have significantly

contributed to their area of work and to the society. As somebody said "Knowledge is theoretical whereas experience is practical. All things being equal, experience is more useful than knowledge since the real world often behaves differently than the textbook."[3] Now-a-days, online life experience degree programs are available at most accredited colleges. Using them can help you earn your distance degree more quickly and at considerably low cost.[4] BMS teachers are advised to get a PhD through one of these programs.

Societies always appreciate and honour people who are working efficiently in their field and are useful for the society at large. Awarding degrees on the basis of experience and work to productive and useful people is not new to Pakistan. In medical field, Fellow of College of Physicians and Surgeons (FCPS) degrees were awarded to many senior Professors, in clinical as well as BMS subjects, only on the basis of their work and experience and without examination. Internationally, Member of the Royal College of Physicians (MRCP) is the degree earned through passing an examination but Fellow of the Royal College of Physicians (FRCP) and Fellow of the American College of Physicians (FACP-US) are the degrees awarded only on the basis of work and experience. Skill Development Council in Pakistan is also awarding degrees on the basis of work and experience. There are many other examples to quote.

To compensate for the acute shortage of faculty in BMS subjects rapidly, we should discover some out of the box solution. A three step approach in this regard is suggested. As a first step the Higher Education Commission (HEC) and Pakistan Medical and Dental Council (PMDC) should recognize the internationally accepted BMS degrees, e.g., PhDs in BMS subjects with a lenient policy. Secondly, our Medical Universities should legalize, even if on one-time basis, awarding PhDs to the senior M. Phil Professors who are willing to train PhD students of the University. For this purpose, Universities should formulate some criteria, e.g., an M. Phil Professor with 20 years teaching experience and 20 research papers may be granted a PhD in his subject. A Diploma Holder teacher, e.g., in Forensic Medicine, Pathology or Community Medicine, with 10 years of experience and 10 research papers may be granted an M.Phil in his subject. In this way, shortage of faculty in BMS subjects will be rapidly overcome, and further the faculty will be available to train prospective M.Phil and PhD students. Thirdly, for example in Punjab, 30 seats of PGRs may be reserved for students of PhD in different BMS subjects in CIP induction policy. Medical Universities may admit these students and out of them two PGRs may be allocated to each PhD teacher at their place of posting for teaching, training, and guidance in research and thesis writing while University should conduct examinations and thesis defence of these students. This will also create an environment of healthy competition.

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ORIGINAL ARTICLE
SERUM TESTOSTERONE LEVELS IN DEPRESSIVE MALE PATIENTS

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Background: Testosterone exerts a wide range of functions in males including behavioural traits like aggression, libido and sexual motivation. The objective of this study was to estimate serum Testosterone levels in Depressive male patients. **Methods:** This was a case control study performed at Islamic International Medical College, and Armed Forces Institute of Mental Health, Military Hospital Rawalpindi. The study comprised a total of 96 male participants having age of 18–60 years. They were divided into two groups: Group A consisted of 24 adult healthy males and Group B consisted of 72 male depressive patients diagnosed on the basis of Siddiqui Shah Depression Scale. Serum Testosterone of Group A was compared with that of Group B. **Results:** Serum Testosterone (7.98±1.03 ɳg/ml) levels of Group A have shown no significant differences as compared to serum Testosterone levels (8.92±0.56 ɳg/ml) of Group B. **Conclusion:** Serum testosterone levels were not found to be low in depressive patients.
Keywords: Depression, Libido, Testosterone

INTRODUCTION

Depression is a state of low mood along with disturbances in biological and cognitive activities.[1] It is a psychiatric illness with prevalence of 10–15% worldwide and 10–34% in Pakistan.[2] A variety of biological and social factors can lead to development of depression which includes genetic susceptibility, disrupted mood regulation by brain, medications, medical problems, familial environment, cultural norms, poor coping ability and stressful life events.[3] Chemical disturbances in levels of serotonin, cortisol, inflammatory mediators, vitamin D and neurotrophic factors also predispose an individual to develop depressive illness.[4]

It is a psychiatric disease that negatively affects the person's thoughts, feelings and behaviour. In addition to cognitive and behavioural abnormalities, difficulty in maintaining intimate sexual relationships and loss of sexual desire is an important manifestation of depression which compromises the family life of an individual.[5] Reduced sexual activity further complicates the severity and management of depressive illness. Sexual activities are regulated by hormones secreted by hypothalamic pituitary testicular axis which is a complex neuroendocrine network.[6] In this axis, Gonadotropin Releasing Hormone (GnRH) secreted from hypothalamus in a pulsatile manner is responsible for secretion of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) from the pituitary gland.[7] FSH acts on the Sertoli cells of testes thus, releasing Androgen-binding protein (ABP), P-450 aromatase, Growth factors, Inhibin and Anti-mullerian hormone which are considered essential for synthesis and action of steroid hormones.[8] But the LH released from pituitary gland is the primary source of testosterone production in males which principally targets the interstitial Leydig cells of testes.[9] Testosterone exerts a wide range of functions in males which include development of secondary sexual characteristics, spermatogenesis and behavioural traits like aggression, libido and sexual motivation.[10]

In depression, researches have demonstrated the disruption of neurogenesis and neuroserpin expression causing the shrinkage of various brain areas such as hippocampus, amygdala, thalamus, prefrontal areas, parietal lobe and striatum.[11] Among all these areas, hippocampus undergoes remarkable volume reduction which is an important site for the presence of androgen receptors.[12] At the level of these androgen receptors, activity of the hypothalamic-pituitary-gonadal axis and hypothalamic-pituitary-adrenal axis can influence each other thus affecting gonadotropins (FSH and LH) and ultimately testosterone levels.[13]

This study is intended to estimate serum testosterone levels in depressive male patients which may help in the management of loss of sexual functions in depressive patients.

SUBJECTS AND METHODS

It was a case control study conducted from April 2016 to March 2019 after approved by Ethics Review Committee of Riphah International University Islamabad. The study was conducted at the Department of Physiology and Multidisciplinary Research Laboratory, Islamic International Medical College, in collaboration with Armed Forces Institute of Mental Health, Military Hospital Rawalpindi.

Total participants of our study were 96 males having age 18–60 years which were divided into two

groups. Group A (control) comprised of 24 normal healthy males. Purposive sampling method was used to include 76 cases of depression in Group B (cases) which were diagnosed on the basis of Siddiqui Shah Depression Scale with a body mass index (BMI) of <30 and no physical deformity or chronic illness. Patients undergoing Electroconvulsive Therapy (ECT), drug and alcohol abusers, and those suffering from chronic illness and obvious physical deformities were excluded from the study.

Age and BMI of the participants were recorded and duration of illness of the cases in Group B was noted. Blood samples were taken and serum was separated after centrifugation of samples at 3,000 RMP for 10 minutes and stored at -20 °C. Serum testosterone levels were estimated using ELISA Kit manufactured by Bios USA.

Data was statistically analyzed using SPSS-21. All results were documented as Mean±SEM. Comparison of serum testosterone levels between Group A and Group B were done using independent sample *t*-test, and *p*<0.05 was considered as significant.

RESULTS

Ninety-six (96) male participants were divided into 2 different groups: Group A and B. Group A served as the control group while Group B comprised of diagnosed cases of depression.

Comparing Mean±SEM of ages, Group A (34.12±1.49 years) showed no significant difference as compared to Group B (35.19±1.18 years). On comparing Mean±SEM of BMI of Group A (25.02±0.23) and Group B (23.85±0.25), no significant difference was observed. Duration of depressive illness of group B was 1.60±0.17 years.

On comparison of Mean±SEM of serum testosterone level of group A (7.98±1.03 ηg/ml) with that of Group B (8.92±0.56 ηg/ml), no significant differences (*p*=0.41) were observed (Table-1).

Table-1: Age, BMI, duration of depressive illness and serum testosterone levels of Group A and B

Parameter	Group A (Controls) (n=24)	Group B (Patients) (n=72)
Age (Years)	34.12±1.49	35.19±1.18
Body Mass Index (BMI)	25.02±0.23	23.85±0.25
Duration of illness (Years)	-	1.60±0.17
Serum testosterone level (ηg/ml)	7.98±1.03	8.92±0.56

DISCUSSION

We compared serum testosterone levels between depressive and healthy individuals as testosterone is associated with sexual desire which is affected in case of depression.[14] Our results have shown no significant difference of serum testosterone levels between depressive and healthy individuals. Monteagudo et al[15]

conducted a study on obese male patients having age of 19–60 years. An association was observed between more severe depressive symptoms and low testosterone levels with no significant correlation between these parameters. Our findings are in agreement with their results but we included participants with normal body mass index (BMI).

In a study conducted by Delhez et al[16] on males aged 50–70 years it was observed that free testosterone was associated with more depressive symptoms. They concluded that correlation between depression and testosterone should be interpreted with caution as it was weak, and old age was a confounding factor present in their study. Contrary to our findings, it was observed in a study conducted by Westley et al[17] that men referred for borderline testosterone levels to endocrinologists had higher rates of depressive symptoms and depression Monteagudo et al[15] came up with correlation of depression with low testosterone levels in elderly having controversial results. Old age is associated with decrease testosterone synthesis. We have chosen relatively younger age group and patients who were under treatment and this could be the reason of different outcome of current study.

CONCLUSION

Testosterone levels were high in depressed patients as compared to healthy subjects but the difference was insignificant.

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ORIGINAL ARTICLE
HAEMATOLOGICAL AND IMMUNOLOGICAL PARAMETERS AMONG DIACETYLMORPHINE ADDICTS

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Background: Chronic usage of diacetylmorphine has significant impact on different physiological processes of the body. Haematological parameters are reported to alter in diacetylmorphine addiction leading mainly to various signs and symptoms of anaemia and infection. This study was designed to investigate for haematological and immunological parameters in diacetylmorphine (heroin) addicts. **Methods:** This was a case control study. We recruited forty-one male heroin addicts aged 25–46 years along with forty-one male healthy subjects as controls. The subjects were assessed clinically through history and physical examination. Complete blood count (CBC) was done by Celldyne Ruby, Multiparameter Automated Haematology Analyser. Data was presented as Mean±SD. Independent sample t-test was used to compare differences between the two groups on SPSS-22, and $p<0.05$ was considered significant. **Results:** There were decreased haemoglobin levels, haematocrit, mean corpuscular volume, mean corpuscular haemoglobin concentration ($p<0.01$) and marginal increase in WBC count in diacetylmorphine addicts. Rest of the haematological parameters were normal. **Conclusion:** Diacetylmorphine addiction showed significant changes in haematological parameters compared to control group.
Keywords: Diacetylmorphine, addiction, haemoglobin, white blood cells, haematological parameters

INTRODUCTION

Worldwide, diacetylmorphine (DAM) addiction also known as 'heroin' addiction is a common social problem along with devastating effects on the economy as well.[1] It also seriously affects the mental and physical health of the abusers.[2] The world drug report of 2016 showed that there are 17 million diacetylmorphine addicts worldwide.[3] In Pakistan 0.8% of the adult population are reported to be diacetylmophine users.[4] Khyber Pakhtunkhwa (KP) province has the highest prevalence of drug abuse in Pakistan. According to United Nations Office of Drugs and Crime (UNODC) 2013 report, there are 140,000 active heroin abusers in Khyber Pakhtunkhwa.[4] This high burden of heroin addiction in KP has been because of easy supply through western border which is the main manufacturer of diacetylmorphine worldwide.[5]

Chronic use of opium derived drugs particularly diacetylmorphine addiction has significant Impacts upon homeostasis of the body and haematological system is one of them. Diacetylmorphine addicts had significant changes (increase or decrease) in blood parameters including elevated neutrophil count, haematocrit, Mean Corpuscular Volume, decreased lymphocytes and red blood cell count, Mean Corpuscular Haemoglobin Concentration, and Mean Corpuscular Haemoglobin Content.[6] Mean Platelet Volume was also observed to be affected.[7]

Diacetylmorphine induced macrocytosis (heroin macrocytic anaemia) is shown, related with increased red blood cell distribution width (RDW) in chronic diacetylmorphine users. Hematopoietic cells are affected directly or indirectly as a result of interaction with blood immune cells causing changes in their morphology and function.[8] Low haemoglobin concentration in heroin addicts was also reported.[9] This results in anaemia which is due to insufficient food consumption and poor nutrition in diacetylmorphine abusers.[10] Another study shows significant increase in WBC count after diacetylmorphine administration in albino rats.[11]

The objective of this study was to see the effects of diacetylmorphine on haematological and immunological parameters through complete blood count (CBC).

METHODOLOGY

This case control study included a total of 82 male subjects. Forty-one (41) male diacetylmorphine addicts were taken from Dost Foundation, Peshawar which works for the welfare and rehabilitation of the addicts. The subjects having history of active diacetylmorphine addiction for more than 6 months were included in the study. Another 41, age and BMI matched healthy subjects, without any addiction, infection or metabolic abnormality were taken as controls. The study was conducted from Sep 2016 to Mar 2018 after getting approval from Ethical Committee of Khyber Medical University, Peshawar, Pakistan.

Written informed consent was obtained from all participants. Detailed history was taken from all subjects along with complete physical examination. Non-probability random sampling technique was applied for subject recruitment. Blood samples for complete blood count (CBC) were taken after an overnight fast at early morning (7–8 AM) for biochemical profile analysis. Celldyne Ruby, Abbott Laboratories USA multi parameter automated haematology analyser was used for CBC. Thin layer chromatography of urine was used to confirm diacetylmorphine addiction.

The data was analysed on MS Excel and SPSS-22. Mean±SD was calculated for all subjects. Independent sample t-test was used to compare the two groups (controls vs addicts), and $p < 0.05$ was considered significant.

RESULTS

This study included 82 male subjects having mean age of 35.24±7.4 years in addicts and 36.46±6.3 in controls. BMI was 20.5±7.4 in drug addicts, and 20.6±1.7 in controls.

There was decreased haemoglobin levels, HTC, MCH, and MCHC in addicts as compared to controls. The WBC count, Neutrophil count, and Percentage of Neutrophils and Eosinophils were less in addicts. However, the relation was not significant. Lymphocytes and monocytes percentage was a little high in addicts, but the differences were non-significant.

Table-1: Comparison of haematological and immunological parameters between diacetylmorphine addicts and normal subjects (Mean±SD)

Variables	Normal	Addicts	p	Normal Lab ranges
WBC (10^3 cells/µl)	7.23±2.32	6.63±8.5	0.120	4–11
RBC (million cells/µl)	4.81±0.55	4.20±0.32	<0.001*	3.8–4.8
Haemoglobin (gm/dl)	14.73±0.91	13.44±0.78	<0.001*	12–16
Haematocrit (%)	45.27±2.76	41.0±2.41	<0.001*	36–46
MCV (fl)	93.69±6.76	90.94±6.61	0.067	80–95
MCH (pg)	31.04±2.17	30.00±1.91	0.024*	27–31
MCHC (gm/dl)	32.35±0.65	31.52±1.03	<0.001*	32–36
Platelets (10^5 cells/µl)	3.38±6.61	2.27±6.61	0.125	1.4–4.25
Neutrophils (cells/µl)	4,615.29±1,960.7	4,138.01±801.1	0.155	2,500–7,000
Neutrophils (%)	62.95±8.40	62.32±7.91	0.726	50–70
Lymphocytes (%)	31.66±7.85	32.15 ±7.83	0.779	25–40
Monocytes (%)	2.12±0.842	2.46±1.027	0.104	2–10
Eosinopils (%)	3.07±1.60	2.73±1.34	0.299	0–4

*Significant

DISCUSSION

The results of this study reported decreased haemoglobin concentration, MCH, haematocrit and MCHC in diacetylmorphine addicts ($p < 0.01$). Studies previously done also reported decreased haemoglobin concentration in diacetylmorphine abusers in human beings.[9] Decreased MCH and MHCH is also reported by previous studies.[6] The resultant anaemia may be because of insufficient food intake and diet poor in both macro- and micronutrients in diacetylmorphine users.[10] In contrast to our study another study reports no alteration in haemoglobin levels after diacetylmorphine injection in albino rats.[11] This difference might be because of the fact that our subjects were humans addicted to diacetylmorphine for at least 6 months and Bhoir et al[11] gave injections to albino rats for one month.

The immune system of human beings maybe effected by diacetylmorphine in two ways. It may directly act on opioid receptors, macrophages and lymphocytes or indirectly through the nervous system.[12] The immune system is important for opioid users because diacetylmorphine abusers are at high-risk for infectious diseases such as Hepatitis B and C and HIV.[13] Needle sharing and immune dysfunction results in increase in infections which results in increased leukocyte count in diacetylmorphine addicts.[14]

Diacetylmorphine inhibits numerous functions of leukocytes like chemotactic response, phagocytosis and cytokine production.[15] The total number of leukocytes (TLC) in the blood are reported to decrease with a single injection of diacetylmorphine.[16] The chances of infection are increased in diacetylmorphine abusers due to decreased efficiency of the immune system.[15] Long term use of opioids immensely suppresses the immune system which enhances the risk of infections such as tuberculosis, cold and pneumonia in diacetylmorphine abusers.[17] Repeated infections also lead to secondary immune dysfunction.[17]

Our study also reports slight decrease in white blood cells (WBC) count. Gizel et al[18] also reported marked decrease in WBC count in diacetylmorphine users. In contrast, increase in WBC count can be due to infections resulting from needle sharing and dysfunction of immune system resulting from diacytylmorphine addictions.[14] This increase in white blood cells maybe be due to activation of inflammatory cascade in the bronchial tree. The increase in WBC count is also a valuabe marker of damage done to the tissues by these drugs leading to atherosclerosis and cardiovascular diseases.[19,20]

There was no significant difference in neutrophil count (*p*=0.155) and neutrophil percentage (*p*=0.726) between diacetylmorphine abusers and healthy participants of our study; same is reported in the world drug report 2013.[21] Yet another study reports increase in neutrophil significantly (*p*=0.005) in diacetylmorphine abusers.[6]

CONCLUSION

Diacetylmorphine addiction showed significant decrease in some haematological parameters as compared to control group.

LIMITATIONS OF THE STUDY

Female subjects could not be included in the study due to cultural restrictions. This is a single center study which needs future studies with large sample size and results taken multicentres for varification of the present results. The follow-up of the sujects could not be done in our study because of financial constraints and time limitation. We recommend prospective studies on the same subjects during their treatment and after complete recovery to see if the haematological parameters return to normal.

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ORIGINAL ARTICLE

DECIPHERING ADIPONECTIN-INSULIN RESISTANCE NEXUS IN NORMAL PREGNANT VERSUS NON-PREGNANT WOMEN

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Background: Insulin resistance in pregnancy and gestational diabetes is an important cause of mortality and morbidity. We aimed to compare serum insulin, Homeostatic Model Assessment of Insulin Resistance (HOMA-IR) and serum adiponectin between normal non-pregnant and pregnant women to see the correlation between adiponectin and insulin resistance in normal pregnant women. **Methods:** This case control study was conducted at Army Medical College and Centre for Research in Experimental and Analytical Medicine (CREAM) and Military Hospital, Rawalpindi. Sixty subjects were recruited. Group I had 30 normal healthy women. Group II consisted of 30 age and BMI matched 2nd trimester pregnant women with normal glucose tolerance. Women with diabetes, history of miscarriage or inflammatory disease were excluded. ELISA was used to measure serum insulin and adiponectin levels. Glucose levels were measured with glucometer. HOMA-IR was used to assess the insulin resistance (IR). Mean values were calculated. Independent samples *t*-test was used to compare the means of the parameters. Pearson correlation test was applied to evaluate the correlation between variables in the groups, and $p<0.05$ was considered as significant. **Results:** Serum Insulin and HOMA-IR levels were significantly different between group I and group II ($p=0.000$), however, serum adiponectin levels in both groups were not significantly different. Small, non-significant negative correlation was observed between serum adiponectin and HOMA-IR in group II ($p>0.05$). **Conclusion:** Non-significant negative correlation between serum adiponectin and HOMA-IR reveals that there might be factors other than serum adiponectin leading to IR in pregnant women.
Keywords: HOMA-IR, (Homeostatic Model Assessment of Insulin Resistance), Adiponectin, Gestational diabetes mellitus, Type 2 Diabetes Mellitus

INTRODUCTION

Impaired glucose tolerance is one of the most commonly observed complications of pregnancy that leads to adverse consequences within the mother and neonate.[1] During normal pregnancy, insulin resistance (IR) gradually starts developing from the first trimester and as the pregnancy progresses, the insulin sensitivity declines to almost 50% of the normal. Studies indicate that this progressive decline in the insulin sensitivity is mainly due to increasing placental hormones including progesterone, human placental lactogen and estrogen.[2] The other significant factor in causing IR in normal pregnancy is change in the levels of adipocytokines. Literature shows that adiponectin and tumour necrosis factor-α are inversely related to insulin resistance, however, the exact metabolic pathway leading to this resistance is still under study. The increased insulin resistance caused by these factors is counteracted by a significant increase in the release of insulin from maternal β-cell islets in order to maintain a normoglycaemic state.[3]

The adipose tissue is considered as a metabolically active compartment which is responsible for the regulation and maintenance of a number of biological processes within the human body. Adipokines form the main link between the adipose tissues and other biological processes.[4] Alterations in the levels of adipocytokines especially adiponectin can lead to development of a pro-inflammatory state in the body of the mother.[5]

Adiponectin performs multiple roles in the human body such as insulin sensitization of target tissue, and promotes glucose uptake in skeletal muscle, decreases production of hepatic glucose, and also has an anti-inflammatory role.[5] The adiponectin levels are negatively linked with body adiposity that implies a negative feedback control of adipose tissue on the levels of adiponectin. There is an association of the levels of maternal adiponectin with pregnancy as it causes to decline its amount as the pregnancy continues.[6] It is established that adiponectin levels are inversely related to insulin resistance. Moreover hypoadiponectinemia has been confirmed in obesity and type-2 diabetes mellitus. Besides, this is also noticed that the condition of hyperinsulinemia that is recognized during the time of pregnancy may cause to interact with the insulin resistance. This condition may lead to a significant reduction in the adiponectin plasma concentration as insulin can reduce the levels of plasma adiponectin.[7] A study indicated that the risk of gestational diabetes mellitus (GDM) is considered to be 5–6 times more in women with low levels of adiponectin in comparison to those with elevated levels.[3] In the first trimester of

pregnancy, the reduced levels of adiponectin are considered as the single most important indicator of developing GDM[8], by augmenting the inflammatory response and reducing insulin sensitivity. There is an inverse relationship between the levels of serum adiponectin and the levels of serum insulin along with the development of insulin resistance. This measurement is considered as a reflection of insulin sensitivity of the whole body.

This study was conducted to examine the levels of serum adiponectin among pregnant women without recognized insulin resistance and non-pregnant healthy women, and the correlation among the levels of adiponectin and insulin resistance among pregnant women in their second trimester.

METHODOLOGY

This case-control study was conducted at the Department of Physiology, Army Medical College, and Centre for Research in Experimental and Analytical Medicine (CREAM) in association with Military Hospital, Rawalpindi, Pakistan. The research was formally approved by the ethical review committee of the Army Medical College and Military Hospital. Consent form was written in Urdu language and was signed by all subjects who took part in the study. There were a total of 60 study subjects selected according to the inclusion and exclusion criteria by convenient non-probability purposive sampling. Group I included 30 healthy non-pregnant women and served as control group. Group II included 30 age and BMI matched pregnant women in their second trimester. Women having diabetes, on insulin therapy, with history of recent miscarriage, or suffering from inflammatory diseases like rheumatoid arthritis, pre-eclampsia, and eclampsia were excluded.

Blood samples of all subjects were collected by peripheral venipuncture after a fasting period of at least 8 hrs and transferred to the gel separator tube and centrifuged at 2,200–2,500 rpm for 5 min at room temperature. Pipetted serum was transferred to the polypropylene tubes and stored at -20 °C.

Insulin levels were assessed by Sandwich ELISA technique using Human Insulin (INS) ELISA kit, Catalogue No. 10811, Elabscience, Inc. Fasting blood glucose levels were measured with a glucometer (Accu-Chek[®]) after at least an 8 hr fasting, and the upper limit for normoglycemia was taken as 5.1 mmol/L.[9] Fasting levels of serum insulin and blood glucose were used in order to calculate HOMA-IR.

Serum adiponectin levels were measured by Human ADP/Acrp30 (Adiponectin) ELISA Kit, Elabscience Co., Ltd, USA. Catalogue No. E-EL-H0004. This ELISA kit uses sandwich technique for measurement of quantitative levels of adiponectin in the samples.

Data was entered on and analysed using SPSS-22. Mean and standard deviation was measured for all the quantitative variables including fasting glucose levels, HOMA-IR values, and serum adiponectin levels. Independent Samples t-test was used to compare the means of the parameters. Pearson correlation test was applied to evaluate the correlation between variables in the groups, and $p<0.05$ was considered as significant.

RESULTS

The data was normally distributed (Shapiro-Wilk Test, $p>0.05$), no outliers were found as assessed by box-plots and homogeneity of variances was found as assessed by Levene's Test for Equality of Variances ($p>0.05$). There was a statistically significant difference in mean serum insulin (μU/ml) between non-pregnant and pregnant women, with mean insulin levels higher in pregnant women ($t= -13.771$, $p=0.000$). A statistically significant difference was also found in mean serum HOMA-IR between non-pregnant and pregnant women, with mean HOMA-IR levels higher in pregnant women ($t= -11.953$, $p=0.000$). (Table-1).

There was a statistically non-significant, small negative correlation between HOMA-IR and Serum Adiponectin level, ($r= -0.182$, $p=0.336$). Pearson's correlation was run to assess the relationship HOMA-IR and Serum Adiponectin levels in pregnant women (n=30). A linear relationship was found between the two variables (Figure-1).

Table-1: Comparison of mean values of fasting serum glucose, serum insulin HOMA-IR and serum adiponectin (n=60)

Parameters	Group I (n=30)	Group II (n=30)	t	p
Fasting blood glucose (mmol/L)	4.36±0.60	4.31±0.51	0.372	0.711
Serum insulin (μU/ml)	4.301±0.39	12.79±3.04	-13.771	0.000*
HOMA-IR	0.841±0.34	2.446±0.65	-11.953	0.000*
Serum adiponectin (ng/ml)	13.99±2.8	13.91±2.37	0.133	0.894

*Significant
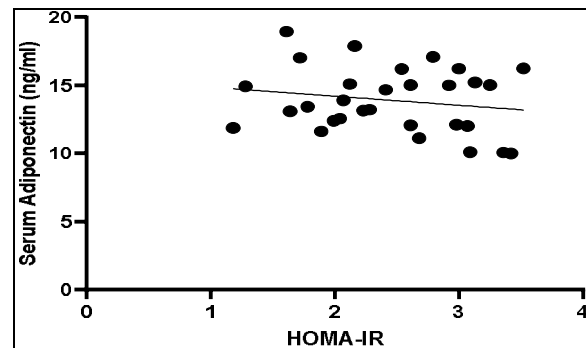
Figure-1: Linear correlation between HOMA-IR and serum adiponectin levels in pregnant women (n=30)

DISCUSSION

The present study was aimed to compare serum insulin, HOMA-IR and serum adiponectin between non-pregnant and normal pregnant women in their second trimester and to find out the correlation between adiponectin and IR in normal pregnant women.

Kampmann et al[10] elucidated in their study that maternal insulin resistance increases gradually as the pregnancy progresses, even in normal pregnant women. Insulin sensitivity decreases 50–60% even in healthy pregnant women. Our study effectively endorses this fact as the serum insulin levels were significantly higher in group II subjects compared to group I. This increase in serum insulin helps to counteract the insulin resistance caused by several placental hormones along with adipocytokines.[10]

The severity of insulin resistance was assessed using HOMA-IR index, values being significantly different in the two groups. Alptekin et al stated that HOMA-IR levels >2.08 represent considerable insulin resistance and decreased insulin sensitivity.[11] Pregnant women in Group II of our study showed normal fasting glucose but raised serum insulin levels which lead to insulin resistance. Significantly raised HOMA-IR in group II suggests the customary pattern of hyperinsulinemia and IR characteristically present in the mother's body to fulfill the requirements of foetus.[12] In our study, group I non-pregnant women showed normal fasting serum glucose and serum insulin levels. Therefore, HOMA-IR values in group I were less than the cut-off value suggesting absence of IR in the healthy non-pregnant subjects. In the normoglycemic pregnant women, the pancreatic beta cell reserve compensates for the insulin resistance that is present during normal pregnancy. As insulin resistance is linked with decreased sensitivity of cells to insulin, it is counteracted by the proliferation of beta cells up to 50% to increase insulin release.[13] Therefore significantly raised levels of insulin are expected in insulin resistance which can lead to gestational diabetes.

We observed that serum adiponectin levels were not significantly different between non-pregnant and healthy pregnant women. Fuglsang et al[14] enrolled eleven healthy pregnant women in their study and concluded that serum adiponectin levels kept changing during pregnancy peaking during mid-pregnancy and then decreasing through the third trimester but these changes were not significantly different from normal healthy non-pregnant women. Our findings are in agreement with Fuglsang et al[14].

The role of adipokines in development of GDM is gaining strength over the years. Adiponectin is considered the most significant one, which is a physiologically active polypeptide secreted by adipocytes. It shows anti-inflammatory and insulin-sensitizing actions. Serum adiponectin levels of group I came out to be in the normal range in the present study. Women with higher levels of serum adiponectin have 30% lesser risk of developing GDM or T2DM.[15]

In our study, group I and group II did not show a significant difference in serum adiponectin levels. A possible explanation for this alleged inconsistency of normal serum adiponectin and raised insulin resistance can be in the fact that serum adiponectin is subjected to regulation by various hormones of pregnancy like estrogen, progesterone and testosterone etc.[16] The results of our study are consistent with a research carried out by Mazaki et al[17] who reported that the mean serum adiponectin levels in normal pregnant women in their first and second trimester are not significantly reduced. Moreover, serum adiponectin levels in normal pregnant women were not significantly different than non-pregnant healthy women. Another possible explanation for the normal levels of adiponectin in prescence of IR in healthy pregnant women can be the changes in regulation of adiponectin during pregnancy. These alterations are mainly due to effect of pregnancy hormones on the secretion and expression of serum adiponectin.[17]

CONCLUSION

Non-significant negative correlation between serum adiponectin and HOMA-IR reveals that there might be some other factor other than serum adiponectin leading to insulin resistance in pregnant women.

LIMITATIONS

Small sample size is a limitation of the present study. Future studies are suggested to be conducted with a larger sample size to establish a significant correlation between parameters, if any.

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ORIGINAL ARTICLE

CLINICAL COMPLICATIONS AND OUTCOME OF FEBRILE NEUTROPENIA IN CHILDREN AT A TERTIARY CARE HOSPITAL

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Background: Febrile neutropenia is well-known complication in patients on chemotherapy. Despite the improvement in managements, infections are still major cause of morbidity and mortality. This study was done to determine the various clinical complications in children with febrile neutropenia and outcome during the hospital stay in a resource limited setup. **Methods:** This study was conducted in Paediatrics Department, Ayub Teaching Hospital, Abbottabad from 2017 to 2019. Children with diagnosed case of acute lymphoblastic leukaemia (ALL) of age 2−15 years, getting chemotherapy, presented with fever and neutropenia were included. Clinical complications included thrombocytopenia, mucositis, profound neutropenia, ANC $<100/mm^3$ and lower respiratory tract infection. Outcome was taken as improvement (afebrile for 72 hours) or death. **Results:** Out of 136 patients, 84 (61.8%) were males and 52 (38.2%) were females. Mean age was 6.58±3.49 years. Weight ranged from 5–58 Kg with mean weight 17.89±8.54. Improvement was in 107 (78.7%) patients while 29 (21.3%) died. Mucositis was in 67.6% patients and lower respiratory tract infection in 57.4% patients. Platelets count $<20,000/mm^3$ was present in 85 (62.5%) patients. **Conclusion:** Lower respiratory tract, mucositis and profound neutropenia are the major complications associated with high mortality in febrile neutropenia children.
Keywords: Fever, neutropenia, chemotherapy, acute lymphoblastic leukaemia, ALL

INTRODUCTION

Fever and neutropenia are well-known complications along with infections in paediatric patients with malignancies including ALL getting chemotherapy and are about 29%.[1] In children with febrile neutropenia, presenting characteristics and outcome differ significantly from those found in adult oncology patients. Children should be admitted and started on intravenous antibiotics.[2] Despite the improvement in mortality due to infections who present with febrile neutropenia, infections are still major cause of morbidity and mortality in children presenting with malignancies receiving chemotherapy. The empirical use of antibiotics has greatly improved the outcome of fever in a neutropenic patients.[3] The current standard of management of paediatric patients with febrile neutropenia is broad spectrum antibiotics and hospitalization.[4] Patients with febrile neutropenia have different range of mortality and morbidity, depending up on available resources and hospital settings.

This study was done to determine the variety of clinical complications in children with febrile neutropenia and their outcome during hospital stay. There is very limited data about febrile neutropenia and associated complications in children in Pakistan. Pakistan is resource limited country; this study was done in a hospital with limited resources. Other centres with limited resources can also focus on treatment of complications associated with febrile neutropenia and help in decreasing the morbidity and mortality.

PATIENTS AND METHODS

This was a retrospective descriptive study conducted in Paediatrics Department, Ayub Teaching Hospital, Abbottabad from May 2017 to September 2019, after getting approval from ethical review committee. The cases were taken from the record of the patients. Children diagnosed case of acute lymphoblastic leukaemia (ALL) of age 2 year to 15 years, who were getting chemotherapy at Institute of Nuclear Oncology and Radiotherapy (INOR) and presented with fever to Paediatric Department, Ayub Teaching Hospital, were included in the study. On complete blood count, the patients having neutropenia were included in study. All patients were high risk cases who were having age above 10 years or less than 2 years, initially presenting with total leucocyte count more than $50,000/mm^3$, T-cell immunepheno type, chromosomal abnormalities including MLL gene, hypodiploidy, Philadelphia chromosome, and slow response to initial treatment. Children with other malignancies were excluded.

Fever was taken as axillary temperature of 38 °C and above. Neutropenia was taken as absolute neutrophil count (ANC) $<1,500/mm^3$, with profound neutropenia taken as ANC $<100/mm^3$. Platelet count $<100,000/mm^3$ was taken as thrombocytopenia and platelet count $<20,000/mm^3$ were transfused platelets, as these patients were at risk of bleeding. Mucositis was

labelled on examination by inflammation of oral mucosa. Lower respiratory tract infection was diagnosed by history of fever, cough, shortness of breath and clinical examination having decrease air entry, bronchial breathing, or crackles and chest X-ray showing infiltrates or lobar pneumonia. Patients' age and weight was documented on proforma. When patient remained afebrile for 72 hours, it was taken as improvement. Improvement or death were taken as outcome.

Data was analyzed on SPSS-20. Outcome and complications including mucositis, lower respiratory tract infection, ANC <100/mm^3 and platelets <20,000/mm^3 were documented on proforma and data analysed as frequency. Chi-square test was applied and results were taken significant with $p < 0.05$.

RESULTS

There were total 136 patients, 84 (61.8%) males and 52 (38.2%) females. Patients' age ranged from 2 to 15 years with mean age 6.58±3.49 years. Weight of patients ranged from 5 to 58 Kg with mean weight 17.89±8.54 Kg. Out of 136 patients, 107 (78.7%) patients improved and 29 (21.3%) patients died. Mucositis was present in 92 (67.6%) while 44 (32.4%) were not having mucositis. Lower respiratory tract infection was present in 78 (57.4%) cases. Abnormal findings on chest X-ray were found in 86 (63.8%) patients. Platelets count <20,000/mm^3 was present in 85 (62.5%) patients. ANC <100/mm^3 was present in 101 (74.3%) patients. There was significant relationship between sex and outcome with $p = 0.034$ (Table-1).

Platelet count <20,000/mm^3 had a significant correlation with outcome ($p = 0.001$) (Table-2). With ANC <100/mm^3 there was significant correlation with the outcome (Table-3). Patients with lower respiratory tract infections had significant relationship with outcome, ($p < 0.001$) (Table-4). There was also significant correlation between outcome and mucositis along with ANC <100/mm^3 with $p = 0.016$ and 0.005 respectively. In patients with ANC <100/mm^3 there was presentation with lower respiratory tract ($p = 0.016$) (Table-5). The patients with platelet count <20,000/mm^3 and ANC <100/mm^3, and patients with extreme neutropenia were more prone to bleeding.

Table-1: Gender versus outcome [n (%)]

Gender	Improved	Death	Total	p
Male	71 (66.4)	13 (44.8)	84 (61.8)	0.034
Female	36 (33.6)	16 (55.2)	52 (38.2)	

Table-2: Platelets count versus outcome [n (%)]

Platelets count <20,000	Improved	Death	Total	p
Yes	59 (55.1)	26 (89.7)	85 (62.5)	0.001
No	48 (44.9)	3 (10.3)	51 (37.5)	

Table-3: Absolute Neutrophil Count <100 versus outcome [n (%)]

ANC <100	Improved	Death	Total	p
Yes	73 (68.2)	28 (96.6)	101 (74.3)	0.002
No	34 (31.8)	1 (3.4)	35 (25.7)	

Table-4: Lower Respiratory Tract Infection versus outcome [n (%)]

Lower respiratory tract infection	Improved	Death	Total	p
Yes	51 (47.7)	27 (93.1)	78 (57.4)	0.000
No	56 (52.3)	2 (6.9)	58 (42.6)	

Table-5: ANC <100/mm^3 versus lower respiratory tract infection [n (%)]

ANC <100	Lower Respiratory Tract Infection		Total	p
	Yes	No		
Yes	64 (82.1)	37 (63.8)	101 (74.3)	0.016
No	14 (17.9)	21 (36.2)	35 (25.7)	

DISCUSSION

Morbidity and mortality in paediatric cancer patients depends highly on the infections and complication due to febrile neutropenia. The treatment strategy is determined by the aetiology of febrile neutropenia, time to establish the diagnosis and risk of related complications. Advancement in field of medicine has also altered the management of patients with ALL. Management for ALL has become more intensive. It is associated with more severe complications like oral mucositis; diarrhoea with damage to mucosal barrier and opportunistic infections of respiratory tract. Even oral flora causes infection.

The diagnosis of the complications in children on chemotherapy is significantly associated with ten-fold increase in risk of death. Despite availability of strong antibiotics and their use, sepsis is the most important prognostic marker of mortality. Pneumonia is associated with eight times more risk of death and fungal infections have five-fold increased risk. Many of these complications are associated with a long stay during the course of treatment and death.[5]

Study conducted by Narayanan MP et al[6] showed that Coagulase-Negative Staphylococci and Methicillin Resistant Staphylococcus aureus along with Klebsiella and Acinetobacter species and Pseudomonas aeruginosa are the most common pathogens causing infection in children with febrile neutropenia. Another study showed fungal pathogens as cause of infection in children on chemotherapy. Akhtar et al[7] included 94 ALL patients and about 39% developed febrile neutropenia. Out of these patient blood cultures were positive in 25% patients with Klebsiella being the most common microorganism, i.e., 44.4%, followed by Pseudomonas aeruginosa and Staphylococcus aureus being 33.3% and 22.2% respectively.

In one specialized centre of Ethiopia a study conducted by Assefa *et al*[8] included children with malignancies, ALL to solid tumours getting chemotherapy and presented with febrile neutropenia. Of 60 patients 60% were male as our study male proportion is also 61.8%. In Assefa *et al* study mortality was 20% as compare to our study which has mortality of 21.3%. In their study the ANC $<100/mm^3$ and thrombocytopenia along with sepsis was the major cause of mortality.

In one meta-analysis done by Phillips RS *et al*[9] showed relationship between microbiologically defined infection and lower white cell counts. As in our study the patients with profound neutropenia were having more mortality with significant relationship between outcome and profound neutropenia (*p*=0.002). Anderson K, *et al*[10] identified the two main factor as delay in initial assessment and start of treatment as hindrance in optimal management of children getting chemotherapy presenting with febrile neutropenia. Paolino J, *et al*[11] in their study made protocol and managed low risk cases of febrile neutropenia either as outpatient or those admitted with short stay admission with no mortality or intensive care unit admissions. But all of our patients were high risk cases including age above 10 years, initial presenting total leucocyte count more than $50,000/mm^3$, T-cell immunopheno type, and slow response to initial treatment. They were getting intensive chemotherapy and their presentation was with severe symptoms in need of admission.

Madney Y *et al*[12] in their study reported hepato-splenic fungal infection in paediatric patients with acute leukaemia on intensive chemotherapy. Majority of the patients got fungal infection during induction phase of chemotherapy and these infections had huge impact on outcome and delay in treatment. Meena JP *et al*[13] included patients with febrile neutropenia having viral infections and found prevalence of viral infections as 76.5%. Rhinovirus and respiratory syncytial virus were the most prevalent types and associated with prolong stay and antibiotic use. We could not ascertain the cause of infection in our study due to lack of supporting investigations in our setup. Mahmud S *et al*[14] included 50 paediatric patients with febrile neutropenia with Staphylococcus aureus and E. coli as the most common gram positive and gram negative micro-organism respectively. Infection related mortality was 22% as compare to our study having mortality of 21.3%. It is almost equal to our centre.

Naqvi SMA *et al*[15] included 35 children with 64 consecutive episodes of febrile neutropenia with ALL being the most common malignancy and reported mortality of 12% in Aga Khan University Hospital, Karachi. As AKUH is one private centre with adequate resources, their mortality rate is almost half as compare to our study. Our study included children with high risk ALL on chemotherapy. Rana ZA *et al*[16] did study in Children Hospital Complex Multan and their study outcome mortality was 18% due to sepsis and febrile neutropenia. It is comparable to our findings.

Hussain F *et al*[17] in Paediatrics Department of Lahore General Hospital included a total of 121 patients, 56 (46.28%) male and 65 (53.72%) females. In their study 12.40% children had pneumonia with febrile neutropenia as compare to our study where 57.4% patients were having lower respiratory tract infection. This is too high as compare to study by Hussain *et al*[17].

There were limitations in our study as we did it retrospectively. Other hindrance is that due to lack of proper microbiological and culture/sensitivity services, the blood cultures were not sent and this study did not show the microorganism and their antimicrobial sensitivity pattern. Our centre does not have paediatric oncology department, so we might have not been able to get the actual number of patients with febrile neutropenia and associated complications. Well-equipped tertiary care centre studies are needed to define the complications and management strategies in specific paediatric haematology/oncology unit.

CONCLUSION

Lower respiratory tract, mucositis and thrombo-cytopenia along with profound neutropenia are the major complications of febrile neutropenia in children. There is high mortality in children with febrile neutropenia.

RECOMMENDATIONS

Larger studies are needed to define the complications and management strategies in specific paediatric haematology/oncology unit. It is need of the time to develop sub specialty units in the country for proper documentation and management of children with haematological malignancies.

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ORIGINAL ARTICLE

TREATMENT OUTCOME AND ADVERSE EFFECTS OF DRUG RESISTANT TUBERCULOSIS PATIENTS AT LARKANA AND SUKKUR TUBERCULOSIS CENTRES

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Background: Anti-tuberculosis drug resistant is a major public health problem worldwide. It arises due to improper use of anti-tuberculous drugs in susceptible TB patients. The objectives of this study were to evaluate treatment outcomes and adverse effects of drug resistant tuberculosis patients. **Methods:** A descriptive cross-sectional study was conducted in two Programmatic Management of Drug Resistant Tuberculosis (PMDT) sites of Sukkur and Larkana. The sociodemographic data was obtained by a set of questionnaire following WHO guidelines. Adverse drug effects and treatment outcome data was gathered from their medical files. **Results:** Of a total 938 patients, 535 (57.1%) were male and 403 (42.9%) were female. Their mean age was 35.95±14.4 years in Sukkur and 35.46±11 years in Larkana. Married patients were 69%, illiterate were 46.3%, farmers 36.8%, lower class 60.4%, and rural were 68.8% patients. Previously treated cases were 83%. The MDR-TB cases were 82.8%. Diabetes mellitus as co-morbidity was 11.2%, and 41.3% were smokers. The adverse effects developed in 68.4% patients. Overall successful treatment outcome rate was 53.9%. **Conclusion:** Treatment outcome of drug resistant TB patients was quite low, and 68.4% patients developed adverse effects. Artharlgia was the most common adverse effect.

Keywords: Tuberculosis, Drug Resistant Tuberculosis, Adverse drug effects, Treatment failure

INTRODUCTION

Pakistan is ranked 5th among high burden countries worldwide which accounts 61% of the TB burden in the WHO Eastern Mediterranean region. Pakistan has an estimated 510,000 new TB cases and approximately 15,000 of them are developing drug resistant TB cases emerging every year. The drug resistant TB is a re-emerging threat worldwide as the number of cases is increasing every day.[1] Drug resistant tuberculosis, especially multi drug resistant tuberculosis cases are increasing most frequently. The World Health Organization defines the Multidrug Resistant TB (MDR-TB) as a type of TB which is resistant to both Isoniazid (INH) and Rifampicin (R). The most important anti-tuberculosis first line drugs according to the classification of TB drugs.[2−4] The MDR-TB develops due to the genetic mutation of Mycobacterium Tuberculosis because of the improper treatment with first line anti-tuberculosis drugs and most importantly non-adherence and non-compliance of patients to treatment.[1,5,6] This drug resistant TB has been always a reason of burden over the National TB Control Program (NTP).[7,8] It has been observed from several studies that reoccurrence of multi drug resistant tuberculosis after successful treatment has become a widespread observable fact. It has been reported that occurrence of MDR-TB after successful treatment is from 3.2% to 4.4% every year.[3-4] Majority of MDR-TB patient have not end up with successful treatment outcomes.[9] Some of drug resistant TB (DR-TB) patients have failed in treatment or they lost the follow-up of treatment.[10] Those retreated cases of drug resistant TB who had exposure with second line drugs are actually posing the challenges because of very close contacts with previously treated drug resistant TB patients.[11,12] The patients who are under long term treatment are facing adverse drug effects and chances of successful outcomes rates are critically low.[13]

The current study was proposed to evaluate the overall treatment outcome rate as well as adverse drug effects experienced during the long course of treatment therapy on second line drugs of drug resistant Tuberculosis patients enrolled in two Programmatic Management of Drug Resistant Tuberculosis (PMDT) sites of Larkana and Sukkur tuberculosis centres.

MATERIAL AND METHODS

This descriptive, cross-sectional study was conducted in two PMDT sites working under National TB Control Program (NTP) Pakistan, located in TB centres of Gullam Muhammad Mahar Medical College (GMMMC) Sukkur, and Chandka Medical College (CMC) Larkana respectively. All bacteriological and Drug Sensitivity Testing (DST) confirmed DR-TB patients enrolled from January 2015 to December 2017 were included in this study. The socio-demographic

characteristic and previous medical history records data was obtained from patients by interview through a well-structured questionnaire following the WHO/NTP guidelines. The data of clinical investigations, pattern of drug resistance, adverse drug reaction, and overall treatment outcomes of patients were obtained from drug resistant tuberculosis register, medical record files, and some data was extracted from Electronic Numerical Recording System (ENRS) that is a uniform format for data storage provided by WHO/NTP across all PMDT sites. Data was analyzed using SPSS-16.

RESULTS

Out of 938 confirmed DR-TB patients, 616 (65.7%) were from PMDT site Sukkur including 345 (56.0%) males and 271 (44.0%) females, whereas 322 (34.3%) were from PMDT site Larkana including 190 (59.0%) males and 132 (41.0%) females (p=0.209). The mean age of patients was 35.95±14.41 years in Sukkur and 35.46±11 years in Larkana TB canters (p=0.528).

Among socio-demographic characteristics, 68.8% patients were from rural and 31.2% from urban areas. Married patients were 69%, Single 28.2% and 2.8% were widowed/divorced. Majority (46.3%) of the patients were illiterate followed by Primary level (29.6%), Matriculation level (15.1%), Intermediate (5.3%), and 3.6% were graduates (p=0.006). Majority (36.8%) of patients were Farmers, followed by House-wives (30.5%), Un-employed (16.1%), Businessmen (6.6%), Government servants (3.2%), and others (6.8%).

Majority (60.4%) of patients were placed in lower socioeconomic class, 29.0% in middle class, and 10.6% were upper class (Table-1).

New drug resistant TB cases that had no exposure to anti-TB drugs before were 17%, and 83% cases had previously been treated (p=0.001). There were 82.8% MDR-TB patients followed by Mono resistant (6.2%), MRTB/RIF on Gxpert (5.1%), Poly resistant (4.6%), and 1.3% were XDR-TB cases. Among the DR TB patients 69.4% had no co-morbidity, 11.2% had Diabetes Mellitus, 7.5% had Chronic Obstructive Pulmonary Disease, 5.4% had Chronic Liver Disease, 3.2% had Cardio Vascular Disease, and others co-morbidities were seen in 3.3% (p=0.003). Ninety-five percent patients had pulmonary disease and 5% had extra-pulmonary disease. Smokers were 41.3% and non-smokers were 58.7% (p=0.000). HIV reactive patients were 2.6%, non-reactive were 93%, and 4.4% patients had no data of HIV (p=0.000). Adverse drug effects were seen in 68.4% patients whereas 31.6% patients did not experience adverse effects (Table-2).

The most common adverse effect observed amongst patients was Artharlgia in 33.0% patients followed by Gastrointestinal tract disorders (17.7%), CNS disorders (14.4%), Respiratory disorders (8.0%), Ototoxicity (6.4%), Hepatotoxicity (5.8%), Skin allergic

reactions (3.2%), and others (3.4%) produced in drug resistant patients with Second Line Drugs (Table-3).

The overall successful treatment outcome was (53.9%) which includes treatment completed (6.9%) and cured (47%); whereas unsuccessful treatment outcome was (46.1%) which includes death (1.9%), treatment failed (21.2%), lost to follow-up (21.2%) and transfer out (1.8%) (Table-4).

Table-1: Socio-demographic characteristics of Drug Resistant Tuberculosis patients [n (%)]

Characteristics	Sukkur (n=616)	Larkana (n=322)	Total (n=938)	p
Age (Mean±SD)	35.95±14.41	35.46±11	35.95±14.4	0.528
Gender				
Male	345 (64.5)	190 (35.5)	535 (57.1)	0.209
Female	271 (67.2)	132 (32.8)	403 (42.9)	
Marital Status				
Single	165 (26.7)	100 (31.0)	265 (28.2)	
Married	433 (70.3)	214 (66.5)	647 (69.0)	0.167
Widowed/ divorced	18 (3.0)	8 (2.5)	26 (2.8)	
Educational status				
Illiterate	261 (60.1)	173 (39.9)	434 (46.3)	
Primary Level	191 (68.7)	87 (31.3)	278 (29.6)	
Matriculation	104 (73.2)	38 (26.8)	142 (15.1)	0.006*
Intermediate	39 (78.0)	11 (22.0)	50 (5.3)	
Graduation	21 (61.8)	13 (38.2)	34 (3.6)	
Occupational status				
Govt: Servant	18 (3.0)	12 (3.7)	30 (3.2)	
Private Business	20 (3.2)	42 (13.0)	62 (6.6)	
House Wife	242 (39.3)	44 (13.7)	286 (30.5)	
Unemployed	74 (12.0)	77 (24.0)	151 (16.1)	0.000*
Farmer	233 (37.8)	112 (34.8)	345 (36.8)	
Others	29 (4.7)	35 (10.8)	64 (6.8)	
Socio-economic status				
Lower class	385 (62.5)	182 (56.5)	567 (60.4)	
Middle class	172 (28.0)	99 (31.0)	271 (29.0)	0.051
Upper class	59 (9.5)	41 (12.5)	100 (10.6)	
Locality of patients				
Rural	416 (64.5)	229 (35.5)	645 (68.8)	0.147
Urban	200 (68.3)	93 (31.7)	293 (31.2)	

*Significant

Table-2: Clinical characteristics and medical history of drug resistant TB patients [n (%)]

Characteristics	Sukkur [n=616]	Larkana [n=322]	Total [n=938]	p
Type of DR-TB patients				
New cases	101 (16.4)	58 (18.0)	159 (17.0)	0.001*
Previously treated cases	515 (83.6)	264 (82.0)	777 (83.0)	
Types of drug resistant TB				
Mono resistant	37 (6.0)	21 (6.25)	58 (6.2)	
Poly resistant	28 (4.5)	15 (4.7)	43 (4.6)	
MDR TB	511 (83.0)	266 (82.6)	777 (82.8)	0.012
XDR TB	8 (1.3)	4 (1.2)	12 (1.3)	
MTB/RIF on Gxpert	32 (5.2)	16 (5.0)	48 (5.1)	
Co-morbidities with DR-TB				
No co-morbidity	452 (73.4)	199 (61.8)	651 (69.4)	
COPD	44 (7.1)	26 (8.1)	70 (7.5)	
DM	58 (9.4)	47 (14.6)	105 (11.2)	
CLD	24 (3.9)	27 (8.4)	51 (5.4)	0.003*
CVD	20 (3.2)	10 (3.1)	30 (3.2)	
Others	18 (2.9)	13 (4.0)	31 (3.3)	
HIV status				
Reactive	4 (0.6)	21 (6.5)	25 (2.6)	0.000*
Non reactive	611 (99.2)	261 (81.1)	872 (93.0)	

Not record	1 (0.2)	40 (12.4)	41 (4.4)	
Smoking habit				
Smoker	194 (31.5)	193 (60.0)	387 (41.3)	0.000*
Non/ex-smoker	422 (68.5)	129 (40.0)	551 (58.7)	
Site of disease				
Pulmonary	574 (64.4)	317 (35.6)	891 (95.0)	
Extra-pulmonary	42 (89.7)	5 (10.6)	47 (5.0)	
Adverse drug effects				
Yes	411 (66.7)	231 (71.7)	642 (68.4)	0.116
No	205 (33.3)	91 (28.3)	296 (31.6)	

Significant

Table-3: Adverse drug effects experienced by patients [n=938]

Adverse drug reactions	Frequency	Percentage
Gastrointestinal disorders	114	17.8
Hepatotoxicity	37	5.8
Nephrotoxicity	30	4.7
CNS disorders	91	14.2
Respiratory disorders	50	7.8
Joint pain	211	32.8
Cardiovascular disorder	25	3.9
Skin allergic reactions	21	3.2
Ototoxicity	41	6.4
Others	22	3.4

Table-4: Treatment outcome of DR-TB patients [n (%)]

Treatment outcomes	Sukkur [n=616]	Larkana [n=322]	Total [n=938]
Successful outcomes	317 (51.5)	189 (58.7)	506 (53.9)
Treatment completed	40 (6.5)	25 (7.8)	65 (6.9)
Cured	277 (45.0)	164 (51.0)	441 (47.0)
Unsuccessful outcomes	299 (48.5)	133 (41.3)	432 (46.1)
Death	10 (1.6)	8 (2.5)	18 (1.9)
Failed	151 (24.5)	48 (14.9)	199 (21.2)
Lost to follow up	129 (21.9)	69 (21.4)	198 (21.1)
Transferred out	9 (1.5)	8 (2.5)	17 (1.8)

DISCUSSION

Pakistan ranks fifth among high burden TB countries and little is known about treatment outcome and serious adverse effects of anti-tuberculosis drug resistant TB. The overall treatment outcome of Drug Resistant TB patients as *successful,* which was found to be 53.9%, comprised of (*cure* 47% and *treatment completed* 6.9%), and *unsuccessful* 46.1% consisting of (*dead* 1.9%, *treatment failed* 21.1%, *lost to follow-up* 21.2% and *transferred out* 1.8%) observed in present study. Similar results have been reported from numerous studies carried out in Malaysia, Kenya and Pakistan, but less than WHO global plan to end TB epidemic.[6,10,14–17] The rate of unsuccessful treatment outcome found in present study is comparatively higher than the study carried out in India by Nair *et al*.[18]

The adverse drug reactions were found higher among the drug resistant TB patients. The artharlgia was the most frequent among adverse effects found in the current study. Similar results have been reported in a cohort study conducted at Lady Reading Hospital Peshawar, Pakistan[19], and in India[20]. Numerous studies reported in India with high percentage and prevalence of adverse drug effects, joints pain the most frequently

occurring among adverse effect are comparatively more than those in the present study.[21–23] The root causes of poor treatment outcome of drug resistant TB in the region of Sukkur and Larkana should be identified on propriety basis. Early identification, prompt management and standardized reporting of adverse drug reactions at all levels of healthcare system are needed to overcome adverse effects and enhance overall favourable outcome of DR-TB patients.

CONCLUSION

The successful treatment outcome of drug resistant TB patients was found unacceptably low and does not meet the requirement of WHO End TB strategy. The adverse drug effects were high. Artharlgia was most common adverse drug effect. The drugs regimen for DR-TB patients poses hazardous effect and needs to alter with new and effective drugs regimen.

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KU: Data collection
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ORIGINAL ARTICLE

INTRODUCING 'SOCRATIVE' AS A FORMATIVE ASSESSMENT TOOL IN UNDERGRADUATE MEDICAL CURRICULUM

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Objective: This study aims to introduce Socrative (an online audience response system) as a formative assessment tool in undergraduate medical curriculum and to assess the attitude and perceptions of the students regarding the same. **Methods**: It was a questionnaire based cross sectional study conducted for 6 months in 2019 using a free version of Socrative. Quizzes were prepared and used as formative assessment to assess students' learning of the physiology content delivered in the modules of Special senses (Year II), Respiratory system (Year I) and Cardiovascular System (Year I) at Shifa College of Medicine. Students' survey was carried out online, at the end of the quiz to record the perceptions of Socrative as an assessment tool. Data was analysed using SPSS-21. Descriptive statistics were applied, $p<0.05$ was considered significant. For qualitative variables, frequency and percentage were determined and for quantitative variables, mean and standard deviation were determined. Test of association applied was independent sample t-test (for quantitative variables). **Results:** Students reported a higher mean scoring preference for Socrative based exam (50%) compared to the traditional paper based exam (37.1%). Majority (83.9%) of the students evaluated Socrative as a user friendly tool, saves time and resources (86.6%) and provides immediate feedback (88.7%). A good number of students suggested conducting more Socrative based assessments in future (75.8%). **Conclusion:** Using Socrative as a tool for formative assessment helps in providing timely and effective feedback, thereby enabling the students to reflect on their performance and focus on important concepts.
Keywords: Formative assessment, medical education, Pakistan, Socrative, technology.

INTRODUCTION

Formative assessment, which has been regarded as the assessment for learning, is increasingly being emphasized in the field of education.[1] It is intended to facilitate the learning process by providing feedback on performance and assisting students to progress under circumstances that are non-threatening.[2] Formative assessment can be carried out in many ways, including the traditional paper-and-pencil tests or assessments using modern technology, e.g., online quizzes.[1] One of the challenges faced by many institutions in higher education including the medical education is improving students' involvement, which is essential for accomplishing the learning outcome; therefore remarkable efforts have been put in this research area over the past few years.[3]

New technological advances have often been accredited with the potential to have a large influence on the field of education. Mobile technology has progressed very fast in the past few decades with the reduction in cost of ownership and improvement in user-friendliness. This has resulted in a dynamic increase in the acceptance rate of mobile devices amongst higher education students over the years. Mobile devices are believed to renovate the way, the students learn in the future and to make learning more enjoyable.[4] Furthermore, the higher education environment is becoming accustomed to the mobile technologies with the better provision of Wi-Fi coverage. This has made the incorporation of such technology into the classroom more practical compared to the early years.[5]

Using mobile technology particularly online platforms have become more common in education over the last decade. The platforms that apply game-based learning theories such as Kahoot!, Quizziz, Quizlet and Socrative, are being researched as formative assessment tools to promote student learning.[6] Socrative is a cloud based audience response system. It is a free package (with paid option for added features), that permits instructors to gather timely response from students in the form of multiple choice, true/false, or short answer questions. The service is accessible across platforms and devices (laptops, tablets, and/or smartphones) and is feasible for instructors to engage students and gather feedback by connecting the mobile technologies that students bring to class.[7]

The purpose of this study was to introduce Socrative as a formative assessment tool in undergraduate medical education at Shifa College of Medicine and to assess the attitude and perceptions of the students regarding the same.

METHODOLOGY

The study was approved by the Institutional review board and ethics committee of Shifa International Hospitals Ltd and Shifa Tameer-e-Millat University.

It was a questionnaire based cross sectional study which started in August 2019 and ended in January 2020 (6 months). A total of 186 students enrolled in undergraduate medical degree, MBBS (Bachelors of Medicine and Bachelor of Surgery) at Shifa College of Medicine, Shifa Tameer-e-Millat University, Islamabad were included in the study. Amongst them 92 students belonged to first year and 94 to second year, students belonging to rest of the years were excluded.

A free version of Socrative was used in this study. It comprises of two main modules, which are Socrative Student and Socrative Teacher modules. The teacher module permits instructor to register, create an account and to make and manage quizzes and visualize reports. The student module enables students to participate in the activities. It can either run on an internet connected web browser or can be installed as native application on any mobile device. Socrative offers ease of use by excluding the requirement for students to create account; they can join a simulated classroom via a room code generated by the instructor without prior registration.

Quizzes were prepared and uploaded on the Socrative and were used as formative assessment to assess students' learning of the Physiology content delivered in the modules of Special senses (Year II), Respiratory system (Year I) and Cardiovascular System (Year I). Students were briefed before the quiz about the Student login procedure. The quiz was launched with the settings of student immediate feedback, shuffle question order and shuffle answer order. The shuffling setting ensured different question and answer sequence for each student which can be effective in reducing the chances of plagiarism. During the quiz, students' progress and scores were monitored in real-time, which allowed the instructor to have a better control. All the three report types available in Socrative, i.e., Whole Class Excel, Individual Student(s) PDF and Question Specific PDF were generated at the end of quiz for analysis purpose.

Students' Survey was carried out, online, at the end of the quiz. In the survey, students were asked to fill-up questionnaire, which included the questions to compare the perceptions of students regarding the traditional paper based exam and online assessment using Socrative, evaluate the tool as a method of formative assessment, assess the acceptance of assessment tool, and additional comments from the students. Informed consent was taken from the students and faculty to use the data for research purpose.

Data were analysed using SPSS-21 and $p<0.05$ was considered significant. Descriptive statistics were used. For qualitative variables, frequency and percentage were determined and for quantitative variables, mean and standard deviation were determined. Test of association applied was independent sample t-test (for quantitative variables).

RESULTS

Table-1 shows the results of the survey questions which were meant to compare the perceptions of students regarding the traditional paper based exam and online assessment using Socrative. Likert scale was used for scoring with 0= strongly disagree, 1= disagree, 2= uncertain, 3= agree, 4= strongly agree.

Students reported a higher mean scoring preference for the Socrative based exam compared to the traditional paper based exam in terms of being able to work in a structured manner (3.02 *vs* 2.66, $p<0.001$) and having a good overview of their progress in exam (3.3 *vs* 2.63, $p=0.001$). Although, the students reported a higher mean score preference for the Socrative in terms of being able to concentrate well but the difference was not statistically significant (3.01 *vs* 2.87, $p=0.297$)

Table-2 shows the results of the students' survey questions to evaluate the tool as a method of formative assessment. Likert scale was used for scoring with 0= strongly disagree, 1= disagree, 2= uncertain, 3= agree, 4= strongly agree.

A total of 83.3% students either strongly agreed or agreed that they found the activity intriguing, and 83.9% of the students strongly agreed or agreed that this method of assessment is reasonable and user-friendly. A reasonably good percentage (86.6%) either strongly agreed or agreed that this mode of subject evaluation saves time and energy. Regarding logistics, 74.2% strongly agreed or agreed it was appropriate for conducting this activity. A vast majority of the students (88.7%) either strongly agreed or agreed that the feedback on assessment was timely and appropriate; 62.9% strongly agreed or agreed that this e-assessment method is better than the conventional assessment method. And 44.6% of the students either strongly agreed or agreed that all the conventional assessments should be replaced by e-assessments.

Figure-1 shows the results of the students' survey questions to assess the acceptance of assessment tool.

Table-1: Comparison of traditional paper based exam and online assessment using Socrative

Questions	Traditional (Paper based) Mean±SD	Socrative (Computer based) Mean±SD	p
I am able to work in a structured manner	2.66±0.882	3.02±0.967	**<0.001**
I have a good overview of my progress in exam	2.63±0.99	3.3±0.808	**0.001**
I am able to concentrate well	2.87±0.844	3.01±0.989	0.297

Table -2: Results of the students' survey questions to evaluate Socrative as a method of formative assessment

Questions	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)	Mean±SD
I found this activity intriguing	1 (0.5)	13 (7)	17 (9.1)	89 (47.8)	66 (35.5)	3.11±0.876
This method of assessment is reasonable and user-friendly	2 (1.1)	15 (8.1)	13 (7)	106 (57)	50 (26.9)	3.01±0.873
This mode of subject evaluation saves time and resources	2 (1.1)	8 (4.3)	15 (8.1)	85 (45.7)	76 (40.9)	3.21±0.847
Logistics for conducting this activity were appropriate	5 (2.7)	18 (9.7)	25 (13.4)	98 (52.7)	40 (21.5)	2.81±0.973
Feedback on assessment was timely and appropriate	2 (1.1)	2 (1.1)	17 (9.1)	91 (48.9)	74 (39.8)	3.25±0.754
This e-assessment method is better than conventional assessment method	11 (5.9)	18 (9.7)	40 (21.5)	63 (33.9)	54 (29)	2.7±1.16
All conventional assessments should be replaced by e-assessments	20 (10.8)	40 (21.5)	43 (23.1)	37 (19.9)	46 (24.7)	2.26±1.332
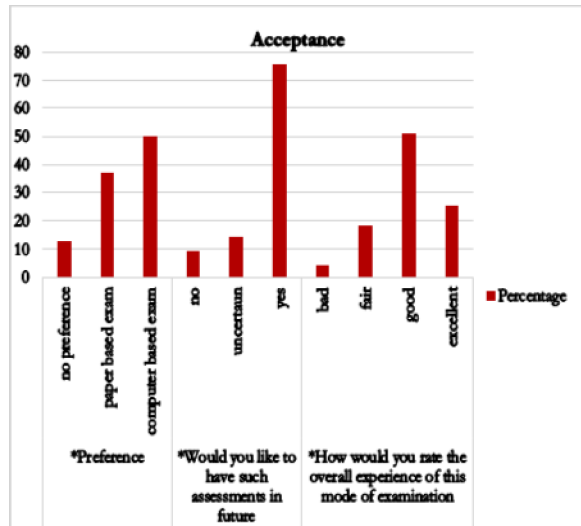
Figure-1: Results of the students' survey questions to assess the acceptance of Socrative as an assessment tool

Fifty percent of the students preferred a computer based examination, while 37.1% reported preference for paper-based examination, and 75.8% agreed that they would like to have such assessments in future. About a quarter (25.3%) of the students rated their overall experience of this mode of examination as excellent while 51.1% rated it as good.

Table-3 shows the comparison of the perceptions of the Socrative tool between first year and second year students. The results of only those questions are mentioned in the table for which the difference in the opinions between first year and second year students were statistically significant.

The results are suggestive of the finding that there was an overall greater degree of satisfaction and a higher rate of acceptance for the Socrative tool among the second year students.

Table-3: Comparison of the perceptions of Socrative between first year and second year students

Questions	Class	Mean±SD	p
In this computer based exam I was able to concentrate well	1st Year	2.64±1.001	<0.001
	2nd Year	3.36±0.841	
In paper based exam I am able to work in a structured manner	1st Year	2.98±0.902	<0.001
	2nd Year	2.64±0.914	
I found this activity intriguing	1st Year	2.98±0.838	0.046
	2nd Year	3.23±0.897	
Feedback on assessment was timely and appropriate	1st Year	3.42±0.579	0.002
	2nd Year	3.09±0.863	
This e-assessment method is better than the conventional assessment method	1st Year	2.41±1.131	0.001
	2nd Year	2.99±1.122	
All conventional assessments should be replaced by e-assessments	1st Year	1.95±1.354	0.001
	2nd Year	2.57±1.240	
I prefer a No preference (0) Paper based exam (1) Computer based exam (2)	1st Year	1.24±0.685	0.011
	2nd Year	1.50±0.699	

*(Likert scale (with 0 being strongly disagree and 4 being strongly agree) for scoring all questions except the last question where the scoring theme is mentioned in the table

DISCUSSION

The importance of formative assessments in strengthening the students' capacity to monitor and improve their own performance is evident from the literature. Different methods have been used in the past for formative assessment which include traditional paper and pencil based tests and technology based online quizzes. As millennials continue to exhibit preference for use of technology in the classroom, the strengths and weaknesses of various methods must be considered before implementation. The purpose of the current study was to determine the effectiveness of using a technology based, online audience response system, Socrative as a tool for formative assessment. Socrative was introduced for the first time as a mode of formative assessment to the first and second year students studying at Shifa College of Medicine. In

general students displayed a positive attitude towards the Socrative.

In the current study the students showed an overall preference for Socrative based exam over traditional paper based exam. This is in concordance with another study conducted by Guarascio *et al*[8], in 2016 in the United States where the students reported higher rates of preference for Socrative application compared to traditional student response systems in various categories which included active participation in the class, ease of use and general format enjoyment.

In the present study, students reported that they found the activity intriguing and rated Socrative based assessment to be reasonable and user-friendly which provides timely and appropriate feedback also. A study conducted by Balta *et al*[9], in 2015 in Turkey showed similar results where most of the students reported that taking exams/quizzes with Socrative is more enjoyable, comfortable, interesting, easy and more functional. Students were also of the view that Socrative enables immediate feedback and results of exams/quizzes can be seen in real time. As mentioned by Molloy and Boud (2014), 'feedback is widely viewed as an intervention to improve learner performance and feedback is most effective when delivered immediately post task engagement'.[10]

Regarding the acceptance of Socrative as an assessment tool, a vast majority (76.4%) of students in our study rated their experience to be good or excellent and 75.8% reported that they would like to have such assessments in future. These findings are similar to another study conducted by Lim WN in Malaysia in 2016 where the majority of the students were satisfied with the use of Socrative in classroom. They reported that their learning experience with Socrative was good and they recommended that other lecturers should also use this tool.[7] In their study a good number of students agreed or strongly agreed that Socrative should be used in all subjects and that they would like Socrative to be used permanently. Another study conducted by Wash *et al* also revealed similar results where majority of the students were of the view that Socrative helps provide instant feedback and it should be used more often in the university classes.[11] Results of a study conducted by Dervan *et al* in Dublin in 2013 are also very promising where 96% of the students reported that Socrative is easy or very easy to use, 92% agreed or strongly agreed that Socrative improved their engagement while 76% suggested using Socrative more or significantly more in the next semesters.[12] Liu *et al*[13] and Piatek *et al*[14] also found Socrative to be helpful and useful for their students' engagement, understanding and learning. These findings can be explained by the fact that students entering their professional education (medical in our case) come from different social and academic backgrounds. It

requires time for the students to accommodate to the prevailing teaching and assessment methodologies in a particular institution. Since the use of latest technology based tools is always encouraged and practiced in the Shifa College of Medicine, the second year students are better accustomed to the prevailing practices and therefore reported higher rate of satisfaction and acceptance of the modern tool as an assessment methodology.

CONCLUSION

Using Socrative as a tool for formative assessment helps in providing timely and effective feedback, thereby enabling the students to reflect on their performance and focus on important concepts. The ease of use and interactive features of the tool help in improving the engagement of students at the same time. The platform can be considered promising for implementation of active teaching and learning strategies in the classroom particularly facilitating formative assessment.

LIMITATIONS

This qualitative study was carried out in a single institute; therefore, the results cannot be extended to other populations.

FUTURE SUGGESTIONS

Further studies are needed to determine the effects of conducting Socrative based formative assessments on the academic performance of the students.

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ORIGINAL ARTICLE

FREQUENCY OF VARIOUS RISK FACTORS AND THEIR CORRELATION WITH OUTCOME IN COMPLETE HEART BLOCK PATIENTS COMING TO A TERTIARY CARE HOSPITAL

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Objective: To determine the frequency of various risk factors and their correlation with outcome in patients having complete heart block. **Methods:** This Prospective cohort study was conducted at Rawalpindi Institute of Cardiology, Rawalpindi for a duration of six months. A total of 153 patients from both genders having complete heart block coming to Rawalpindi Institute of Cardiology were recruited in the study. The patients included in the study were evaluated for aetiology of complete heart block by history, physical examination, electrocardiography, blood tests, chest X-ray and echocardiography. A proforma was designed and filled by duty doctor for each patient. The proforma included demographic details, risk factors, presenting complaints, vitals and other parameters. The outcome of these patients (pacemaker implantation/medical treatment/death) was determined in the later part of the study and recorded on proforma. **Results:** Hypertension was the most common risk factor (43.8%) observed in patients of complete heart block in our study. There was no significant difference in the outcome in patients having risk factor of hypertension and smoking. However, a significant difference was observed in frequency of pacemaker implantation in diabetics as compared to non-diabetics (*p*=0.039). **Conclusions:** Hypertension was present in majority of complete heart block patients. The outcome however was not affected by most of risk factors. Only in diabetic risk factor group, significantly fewer numbers of patients were implanted with pacemaker. Death was also not significantly correlated with any particular risk factor.
Keywords: correlation, risk factors, outcome, complete heart block, pacemaker

INTRODUCTION

In the present world, most deaths occur due to cardiovascular diseases. It is estimated that annually 17.5 million people die due to cardiovascular diseases.[1] Various preventive programs are designed to decrease the burden of cardiovascular diseases by reducing the risk factors. These programs comprise of various measures that make the 'ABCs' (appropriate use of Aspirin, control of Blood pressure, check on blood Cholesterol) better. They also aim to reduce sodium intake and smoking and to increase physical activity.[2]

One of the significant cardiovascular disorders includes heart block. Heart block in the increasing order of severity is first degree heart block, second degree heart block and third degree or complete heart block. In the most severe type, the atria and ventricles show complete dissociation. No atrial impulse is successful to reach ventricles. Heart block can be congenital or acquired and acquired cases can be due ischemia or without ischemia.[3] Atrioventricular blocks are common in general population; first degree being most frequent followed by second and third degree. Although complete heart block is the least common, but is most serious and can be fatal at times. Its incidence in general population is around 0.02% to 0.04%.[4] Diagnosis of complete heart block depends on absolute dissociation

between atria and ventricles together with an increased atrial rate than ventricular rate. Patients of complete heart block usually present with symptoms due to occurrence of severe bradycardia.[5]

There are various risk factors that engage in development of cardiovascular diseases; diabetes mellitus, hypertension and smoking being more common. According to world health organization, every eleventh adult in this world is suffering from diabetes and the number is on a rise and will reach 592 million by 2035.[6,7] In individuals having type 2 diabetes mellitus, the endothelium gets damaged resulting in atherothrombosis that increases the possibility of cardiovascular events.[8] The persistent hyperglycaemia affects hearts and the person can end up in coronary artery disease, myocardial infarction, or may die suddenly due to arrhythmias. Review of literature also reveals association of type 2 diabetes mellitus with complete heart block.[9]

Hypertension is considered as a vital public health issue. It is a chronic health problem and in United Kingdom one third of population suffers from this problem. The risk of cardiovascular and cerebrovascular accidents increases in the presence of hypertension. Preventing hypertension is a supreme health challenge of modern world.[10,11] Despite the known adverse effects

of hypertension this serious problem remains undermined because many patients either remain undiagnosed, do not receive proper treatment or do not comply to the treatment.[12] Cigarette smoking also adversely affects health. Every 6th second a person dies due to consequences of smoking. Smoking practice is more common in low income countries. It increases body mass index which complicates and aggravates the damage due to smoking, resulting in increased mortality in East Asian countries due to cardiovascular diseases.[13]

The present study was designed to see the association of various risk factors with complete heart block in in patients coming to a tertiary care hospital and their outcome.

PATIENTS AND METHODS

The study was Prospective cohort study and was conducted at Rawalpindi Institute of Cardiology, Rawalpindi. The duration of study was six months. The study was started after formal approval from ethical committee of Rawalpindi Institute of Cardiology, Rawalpindi. Sample size was calculated using WHO sample size calculator assuming confidence level of 95%, alpha error of 5%, study power of 80%, anticipated population proportion with AMI of 8% and desired precision of 4%.[14] A total of 153 (93 male and 60 female) patients (mean age: 63 years) having complete heart block were included in the study. Patients presenting to emergency with complaints of chest pain, vertigo, dizziness or loss of consciousness and having electro-cardiographic manifestations of complete heart block were included in the study. Patients having congenital heart block, immunocompromised state, malignancy or serious comorbid condition were excluded from the study.

Complete history, general physical examination, baseline investigations, electrocardiography (for confirmation of complete heart block), chest X-ray (to observe cardiomegaly) and echocardiography (to observe size, structure, and function of different parts of heart) of included patients were carried out. On a predesigned proforma the consent, demographic details and risk factors were identified.[15] The proforma included the risk factors of diabetes, hypertension, smoking and absence of risk factor. The patients were monitored daily for their vitals and ECG and followed until the time of their discharge from hospital for their outcome. The outcome was classified into three categories (pacemaker implantation/ medical treatment/death)

Data was analysed by using SPSS-22. Value of quantitative variables was expressed as exact numbers and frequencies as percentages. Outcome among various risk factor groups was compared using Pearson Chi-Square test. The correlation between various risk factors and their outcomes were assessed by Pearson's Correlation and $p<0.05$ was considered statistically significant.

RESULTS

A total of 153 patients were assessed for the risk factors for development of complete heart block and each risk factor was then investigated for the outcome, i.e., whether the pacemaker was implanted/not implanted or the patient died. In our study population, the most frequent risk factor observed was hypertension (43.8%), followed by diabetes (34.6%) and smoking (20.3%). In three patients (1.96%), there was no mentioned risk factor (Table-1).

The patients after assessment for risk factors were followed for their treatment plan/outcome. Out of 53 diabetic patients, 21 were implanted with a pacemaker, 26 were given medical treatment and 6 patients died. Out of 67 patients having hypertension as a risk factor, 36 were implanted with a pacemaker, 26 were given medical treatment and 5 patients died. Out of 31 patients having smoking as a risk factor, 18 were implanted with a pacemaker, 10 were given medical treatment and 3 patients died (Table-2).

On comparison of outcome in various risk factor groups, it was found that outcome was not affected by most of risk factors. Only in diabetic risk factor group, significantly fewer numbers of patients were implanted with pacemaker. Death was also not significantly correlated with any particular risk factor (Table-3).

Pearson's correlation values show that none of the correlations are significant. Positive and negative signs represent positive and negative correlation respectively but are not significant ($p>0.05$) (Table-4).

Table-1: Frequency of various risk factors in patients of complete heart block presenting to a tertiary care hospital

Risk factors	No. of patients	Percentage
Diabetes	53	34.6
Hypertension	66	43.8
Smoking	31	20.3
No risk factors	3	1.96
Total	153	100

Table-2: Outcome of complete heart block patients having various risk factors

Risk factor	Outcome		
	Pacemaker	No pacemaker	Death
Diabetes (n=53)	21	26	6
Hypertension (n=67)	36	26	5
Smoking (n=31)	18	10	3

Table-3: Pearson Chi-square test for comparison of outcome in various risk factor groups (p-values)

Risk factor	Outcome		
	Pacemaker	No pacemaker	Death
Diabetes (n=53)	0.039*	0.102	0.196
Hypertension (n=67)	0.281	0.360	0.563
Smoking (n=31)	0.223	0.178	0.454

*Significant

Table-4: Pearson's Correlation between risk factors and outcome

Risk factor	Outcome					
	Pacemaker		No pacemaker		Death	
	p	Correlation	*p*	Correlation	*p*	Correlation
Diabetes (n=53)	0.054	-0.156	0.151	0.117	0.247	0.094
Hypertension (n=67)	0.461	0.060	0.602	-0.043	0.878	-0.012
smoking (n=31)	0.338	0.078	0.261	-0.091	0.673	0.034

DISCUSSION

In our study, the frequency of various risk factors in complete heart block patients were studied. The most common risk factor found was hypertension (43.8%), followed by diabetes (34.6%) and smoking (20.3%). Complete heart block was also found in 1.96% patients without any risk factor. Pacemaker implantation was more common among the smokers (58.06%) as compared to hypertensive (53.73%) and diabetic patients (39.62%) Majority of deaths occurred in the diabetic risk factor group (11.3%) than in smokers (9.67%) or hypertensive patients (7.46%).

In a retrospective observational cohort study conducted by Sundhu *et al*, the most common risk factor for complete heart block corresponds with the results of our study. In this study only new cases of complete heart block coming to Fairview hospital United States of America were included. The most frequent risk factor observed among the patients was hypertension (79%). Smoking was also a major risk factor as (51.6%) patients were former smokers and (11.3%) were current smokers. Diabetes was relatively less prevalent among the study population (37%).[3] Hindi *et al*, reported a case where the patient who was an active smoker had uncontrolled hypertension due to stenosis of renal artery on both sides. This condition resulted in hypertensive cardiomyopathy and complete heart block. The suggested mechanism was hypertension caused cardiomyopathy that induced abnormalities in conducting system of heart. Implantation of a permanent pacemaker was considered to be essential for treating complete heart block due to hypertensive cardiomyopathy. In our study 53.7% of patients having hypertension as risk factor were implanted with a pacemaker. Hypertensive cardiomyopathy however was not present in all hypertensive patients.[16] Lionakis *et al*, also presented a case of uncontrolled hypertension. The patient presented with very high arterial blood pressure. ECG revealed complete AV block and imaging showed presence of type B dissecting aneurysm of aorta. The proposed mechanism was that prolonged hypertension can cause fibrosis of myocardium that interferes with the normal conducting system of heart.[17]

Review of literature reveals a strong association of diabetes with complete heart block. Although in our study it was the second most common risk factor found. Agarwal *et al*[9], presented a case report where a 62 years old man with type 2 diabetes mellitus for one year lost his consciousness. History,

examination and ECG led to diagnosis of complete heart block. The patient had a strong family history for both diabetes and complete heart block. Patient's two brothers and mother were also diabetics and suffered from complete heart block. Hyperglycaemia in diabetics is suggested to cause endothelial damage and result in adverse cardiovascular outcome. Agarwal *et al*[18], suggested a positive correlation between diabetes and CHB in another study. A cross-sectional study where 100 diabetic patients with cardiac arrhythmias were included in the study. It was found that CHB occurred in 20% of patients. It was proposed that diabetes causes chronic micro- and macro-vascular damage resulting in cardiovascular system deterioration.

Movahed *et al*[19], also found diabetes as the common risk factor in CHB patients. Using multivariate analysis, they observed a strong association of diabetes with third degree heart block (odds ratio came out to be 3.1; with a confidence interval of 95% ranging from 3.0 to 3.3; and a *p*<0.0001). Presence of complete heart block in diabetics may be a cause of high death rate in diabetics due to cardiovascular complications.

The risk factor of smoking was also included in our study. This risk factor was found to be present in 20.3% of our patients. Gepner *et al*, conducted a study to see whether the damage caused by cigarette smoking is reversible or not. Three years of abstinence from smoking in subjects who were chronic smokers in the past did not reverse the cardiac abnormalities as reflected by ECG. Hence smoking is thought to cause irreversible cardiac changes. Measures should be adopted to prevent smoking in early years, before a person is used to it and smokes greater number of cigarettes per day.[20] Yusuf *et al*, studied the effect of various risk factors in development of cardiovascular diseases and smoking was found to one of the important factors that increased the risk for cardiovascular dysfunction.[21] Dinas *et al*, suggested the mechanism by which smoking is injurious to cardiovascular system. Active and passive smoking both are harmful. Smoking indirectly causes cardiovascular disturbances by affecting autonomic nervous system that enhances the sympathetic nervous system drive and reduces heart rate variability.[22]

Contrary to the results of most researches, where the risk factors were found to affect cardiovascular functioning, Hashmi *et al*, found no significant association of age, sex, smoking, hypertension, diabetes mellitus and other factors with the development of complete heart block.[23]

CONCLUSION

The most frequent risk factor observed in complete heart block patients in our study was hypertension. No correlation was found between the risk factors and outcome except for diabetic patients. In patients having diabetes, pacemaker implantation was done in significantly fewer numbers of patients. The correlation between any particular risk factor and death was also not significant. Further studies should be carried out to see the long-term consequences of these risk factors. Therapies should be designed with the aim of prevention of these risk factors and hence putting a halt to adverse outcomes.

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ORIGINAL ARTICLE
PEER ASSISTED LEARNING (PAL): VIEWS AND PERSPECTIVES

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Background: Peer Assisted Learning (PAL) is a student-centric learning method in which selected students (peer leaders, PLs) assume the role of teachers after proper training to teach their fellow-mates. Aim of this study was to know viewpoints of facilitators, PLs and peer learners (Pls) about PAL model introduced in Gastrointestinal module for year 1 medical students at Aga Khan University. **Methods:** Three focused group discussions (FGDs) were conducted to acquire opinion of facilitators, PLs and Pls. Written informed consent was acquired from all participants, FGDs were conducted for 40 to 60 minutes, audio recorded and transcribed. The opinion was acquired from 3 faculty members, 9 Pls and 10 PLs. **Results:** All participants agreed to usefulness of PAL for teaching and learning. The model developed better understanding and clarification of different concepts and flourished leadership and communication skills in PLs. The Pls were indeed more comfortable and less hesitant in asking questions from the PLs compared to faculty members. They got engaged in open discussions with PLs and cleared their concepts much more effectively. The PLs were very enthusiastic about the project and mentioned that the training sessions and mock labs helped them to clear their own concepts. **Conclusion:** This mode of teaching promoted active engaged learning, better understanding of knowledge and active participation between both groups of students. The model developed professional attitude and leadership qualities in PLs. It enhanced psychomotor skills and cognitive development not only in PLs but also stimulated that in the learners.
Keywords: Peer Assisted Learning (PAL), Peer leaders, Peer learners

INTRODUCTION

One of the most highlighted transformation in the education system regarding teaching and delivering the relevant content to students has been the introduction of a technique called peer assisted learning (PAL).[1] PAL model has widened its horizon of practice from United States since 1990s to institutions of United Kingdom and now is being practiced in most of the institutions worldwide.[2]

PAL is an extension of the empirical and independent learning in which concepts are applied practically by the process of constructivism.[3] This model has been used in Monash University as part of their vertical study programs for medical students.[4] It has opened a pathway to deal with the limitation of cost-effective teaching methods and highlights the lacking in the part of the curriculum being taught[5]. It fulfils aim of providing a comfortable environment for productive discussion where clarity of concepts can be acquired through questioning.[6,7]

This methodology has been implemented in dental education,[3] and 'Skills Lab' in German sessions in universities with productive results.[8] Birjand University of Medicine applied this technique in the discipline of pharmacology, and concluded this to be a better learning method as compared tolectures.[9] A peer assisted case study done in University College London Medical School, aimed at filling the gaps in the preclinical curriculum and deduced that the tutorials were well received and there was significant improvement in the knowledge of the tutees.[10]

PAL has been used as a teaching method for history-taking by medical students which improved their history-taking skills.[11] Implementation of PAL in evidence based medicine had a significant impact on the learning of the students involved in the study done at the University of Glasgow.[12] A research done in Sri Lankan medical universities cites the importance of PAL in filling gaps by formal teaching and its beneficial impacts specifically on second year students.[13]

A PAL environment can be more fruitful in universities, specifically medical ones as it opens up routes for the students to develop their communication and practical skills, which are an important asset of their profession. We aimed to analyse the usefulness of PAL in terms of viewpoints of facilitators, peer leaders (PLs) and peer learners (Pls) about PAL model of teaching introduced in lab sessions of gastrointestinal module for year I medical students at Aga Khan University.

METHODOLOGY

A mixed method design was adopted on PAL model of teaching introduced for year I medical students at Aga Khan University after approval from Ethical Review Committee of Aga Khan University (ERC#: 4585-BBS-ERC-16). The qualitative arm of the research was acquired by Focused Group Discussions (FGDs) involving faculty, PLs and Pls. It assessed responses of faculty, PLs and Pls by three distinct FGDs. In the

faculty FGD, three faculty members participated. Ten PLs contributed to the PLs FGD which was moderated by three same faculty members. In the Pls FGD, nine students took part, moderated by the 2 same faculty members. Each FGD continued for 40 to 60 minutes, on specific questions (annexures no. 1, 2 and 3), were audio recorded and transcribed with consent. The data was subjected to NVivo for qualitative content analysis and identifying recurring themes. Faculty was labelled from alpha (α), beta (β) and gamma (γ), PLs were demarcated from: 1-10 whereas labelling of Pls: A-I.

RESULTS

Following themes and subthemes emerged after analysis of data from all FGDs:

1. PAL in Teaching and Learning Sessions

There was consensus among the faculty members, PLs and Pls on the usefulness of PAL sessions. Faculty members, α and β agreed that: "*core ideas were integrated with the practical aspect of the concept*". The PLs, 1 and 2 stated that contrary to their expectation, they received less naughtiness from the group and there was a sense of unified co-learning. "*And we are the same rank and we went through the process just a week ago so we knew where we'll get stuck and which areas require greater explanation and via which path*". The application of PAL by PL#3 was further augmented by the statement; "*In the lab skills people are usually not that much interested in those skills because they are not tested. So maybe the areas that are tested, if we can help them in those areas, that might give a good outcome*".

2. PAL for small group discussions:

Pls commented: **"***Starting off with lab sessions was a deal since the class is divided into smaller groups and is therefore better to handle. Moreover, as compared to an LCF which has around 10−12 objectives, a lab has 3−4 which again is manageable by the PL*". Faculty α: They all agreed up on "*smaller groups are better to learn in and wanted to continue with the small group format*".

a. PAL and Team Based Learning

In the FGD with PLs it was heard that: "*The entire group worked as a team with unity*". Overall, they felt a strong sense of community develop amongst them. **"A"** Pl responded: "*I think this is a good project and its working out and we're learning as a team and afterwards after lab is done if we have a few questions we can just go up and just talk about and discuss*"

b. PAL and Educational Environment

Facilitators, β and γ commented: "*Active learning was facilitated in PAL sessions*", while one Pl "C" also called it "*the best part about the project.*" The Pls were very content with the fact that the PLs were available and accessible even after class hours; "*We didn't have to hesitate to contact them at all as a result, there was a sense of comfort in the group*", Pl "C". They added

"*were not afraid of asking questions without the fear of sounding stupid.*" Moreover, PL were happy (3, 4) because; "*Pls listened to us with greater interest and seriousness*".

PLs 2 and 3 mentioned: "*Our friends were very curious as to how would the project go about since it is a one of a kind projects and they hadn't experienced anything similar before*". The PLs also felt that "*some of the questions addressed to them were asked for the sake of asking questions*" so they felt that their peers were trying to test their knowledge to see how well prepared the PLs are. Faculty γ responded that: "*Direct interaction improved the active and enabled a conducive learning environment, where the Pls were comfortable to ask questions, feel involved*", "*PLs were constantly on their feet*" and "*They all were genuinely engaged and enjoyed learning*".

c. Learning by Fun

There was also the element of fun and curiosity. Students (Pl G and I) responded that "*when we learn from teachers, it gets boring; fun learning, when have our own batch mate who's doing this and our batch mate was explaining this they have an interest in explaining it in the best way possible*". One of the PLs (PL8) replied: "*we're in the same age group, we can understand each other and that is how we can communicate and become more accessible to one another*". Faculty member β observed that: "it *was a very nice way I saw the whole group's attention being captured*".

3. PAL and Skills

a. Leadership and PAL

PAL project was a great learning experience for PLs "*I learnt better as well but also we learnt to teach other people and grow as leaders ourselves*". The Pls perceived the project as an excellent way of instilling in the class the idea of helping each other. The faculty (all) unanimously agreed that they could sense a renewed spirit of leadership amongst the PLs cohort post the training and mock experiments. PL 3 responded: "*I feel this actually helped us try to get what we know out and try to explain it to others because it's one thing learning it yourself which is very easy to do but then there's one thing teaching other's.* Moreover, referring to a system crash at one desk, one faculty member mentioned that PLs developed skills of problem solving and troubleshooting. The faculty also recognized skills of time management and punctuality to training sessions and experiments.

b. Art of expression and Writing Skills:

The faculty β, mentioned that apart from using the PLs for labs, they have also utilized them for data entry and were very impressed by their compassionate work; "*We are looking into using them for article writing and publications as well*". They believed that the skill set

they will gain through these endeavours will help them conduct their own independent projects.

c. Communication Skills

Indeed, the PLs learnt the valuable skill of effective communication F γ responded: "*while communicating this knowledge to the Pls, of course they learn the communication skills*". She (F γ) stated that it is "*crucial for trust to be built between the student and the teacher*". The PLs shared "*We had to be extra prepared and learn things outside the domain of the lab just in case a question related to it is asked*".

4. Interaction of PLS with Pls

PLs found the Pls to be "very *respectful, well behaved and keen on learning*". However, one PL mentioned; "*some students in my group were least bothered about who was teaching them and were generally very disinterested*". PLs (4 and 5) mentioned: "*we had to exhibit tolerance towards the Pls and acknowledge that they too are learning*". The PLs (5 and 6) learnt to impart knowledge rather than keep it with them for selfish purposes. "*I believe it's not only important for us to understand the concept, it's good to help people*" was heard from PL7.

5. Future of PAL

The faculty was very enthusiastic about expanding this project in other labs and modules like Respiration and Circulation and Renal Physiology. The Pls were very keen on continuing PAL and suggested that this should be expanded in Anatomy Demonstrations and not restricted to labs only. The PLs 5 and 7 also mentioned "*PAL is already being practiced in some PBL groups wherein each day one person acts as a facilitator and leads the discussion*". The PLs 7 and 8 were very much in the favour of introducing PAL as an inter-batch activity wherein seniors teach juniors. They believed that this would not only save up on time since the seniors would already know about the topic, "*would also help in developing a relationship with the senior whom you can approach even after PAL is over what personal and academic issues both*".

6. Interest/concerns in becoming a PL

There was unanimous agreement upon interest in becoming a PL. Even though all Pls expressed their interest in becoming a PL, they did have some concerns regarding "*the time and effort that needs to be invested into it*". One of the Pls was even concerned if they would have to come on Saturdays if they become PLs.

DISCUSSION

There was consensus amongst the faculty members, PLs and Pls regarding the effectiveness of PAL in integration of theory and the practical application of the knowledge. A unified sense of co-learning was also reported. A finding which was sonorous with the findings of other studies which reported that Pls had a better understanding of the concepts, felt comfortable clarifying their confusions and felt that they needed lesser time to revise at home.[14] The provision of an open environment for peer-to-peer feedback, has also been reported by many researchers.[15]

Being age matched it was convenient for both the learners and leaders to communicate in terms of clarifying queries about confusing concepts or theories with transfer of knowledge from PLs to Pls. Knowing the Pls personally along with their weaknesses and strengths, PLs adapted their method of teaching and achieved the objectives of the session with an element of fun. Peers communicate in a language that Pls are likely to understand and can relate to, since their mental level and environment of learning is similar in many ways, therefore they can retain information more readily.[16] Pls gained knowledge during the session and grasped that concept in a very proficient manner.[17]

The familiarity factor played a very significant role in learning capabilities of Pls and they felt existence of a two-sided communication especially when all the concerns and queries. The most appreciated factor amongst the Pls was the idea of approaching the PLs outside of PAL sessions, where they could converse and learn in further informal and fun atmosphere. However, other studies reported that Pls were more comfortable and confident when being taught by a senior student or graduate.[18] Many studies strongly supported this finding wherein Pls felt the environment to be conducive for discussions, active learning was promoted, mistakes were not feared, and breaks were taken as peer need.[14] Some studies reported Pls to score equivalent scores in comparison to students' expert assisted learning.[16,19]

We observed that the PAL model was an excellent way on inculcating the hidden curriculum and soft skills of leadership and teamwork within the group. The element of fostering team work has been reported by various other studies too.[5] PAL inculcated the idea of individuals taking ownership and responsibility for their own learning.[20] There was unanimous agreement amongst the participants regarding the small group format of PAL being suitable for the sessions which was supported by many studies done elsewhere.[20] These studies also reported that tutorial based PAL sessions were effective for more targeted, individualized sessions which was in accordance to our findings too.[20,21]

PAL permits peers to make use standards of practice, gain a deeper understanding of them, and develop skills of positive and constructive criticism.[15,19] Our study also exhibited how PAL could promote a fun learning environment wherein there is autonomy and ownership of the knowledge being imparted. The findings that the students were genuinely engaged is supported by many studies,[18] while in one study, the Pls rated both competence and fun to be higher with faculty members than PLs.[5]

Post training, the PLs felt more confident about the content, ended up with a good command on the content however some studies reported that the PLs felt anxious for being held responsible for their peer learning and were apprehensive of their own grades dropping.[22] As an extension of the responsibility on their shoulders, the PLs exhibited time management skills and worked on their troubleshooting skills which many studies mentioned would help them in clinical problem solving.[19] Other studies reported PLs developing people skills of social management.[18] Many studies[5,18,19] reported an enhancement in the communication skills of the PLs, which were in line with our findings.

PLs were of the opinion that the substance for teaching in the PAL model was limited and they would have given a much better yield if the content were more detailed.

CONCLUSION

This mode of teaching promoted active engaged learning, better understanding of knowledge and active participation between both groups of students. The model developed professional attitude and leadership qualities in PLs. It was unique in the domain of the extensive utilization of the PLs and their competencies who also benefitted by being an active part of data entry, literature review and manuscript writing which further developed their skills.

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ORIGINAL ARTICLE
COMPARISON OF ULNAR AND MEDIAN NERVE CONDUCTION PARAMETERS BETWEEN MALES AND FEMALES

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Background: Nerve conduction study (NCS) is a tool to assess the integrity of peripheral nervous system. It helps in diagnosis, planning of treatment, and prognosis of diseases of peripheral nerves. NCS parameters are affected by several physical factors like temperature, demography and ethnicity besides age, gender, height, weight, BMI etc. The present study was targeted at finding out the differences between male and female NCS parameters. **Methods:** This was a cross-sectional study with a total of 75 participants, 40 males and 35 females. Baseline investigations were performed to exclude any co-morbid conditions. Individuals with normal investigations were subjected for nerve conduction studies on ulnar and median nerves. Independent sample t-test was done to compare NCS parameters of male and female participants. **Results:** There was no significant differences between male and female median motor, ulnar motor, and median sensory NCS parameters. Only ulnar sensory NCS parameters latency and amplitude were significantly different in males and females, latency being more in males ($p=0.043$) while amplitude being more in females ($p=0.019$). **Conclusion:** No significant gender-based differences were found in median motor, ulnar motor, and median sensory NCS parameters and only ulnar sensory NCS parameters had significantl differences between males and females.
Keywords: Nerve conduction study, NCS, Sensory, Motor, Median nerve, Ulnar nerve, male, female

INTRODUCTION

Electro diagnostic studies (EDX) are an important tool for diagnosis and evaluation of peripheral motor and sensory nerves integrity.[1] These studies include nerve conduction studies (NCS) and needle electromyography (EMG).[2] Electrical stimulation of the nerve initiates an impulse that travels along the motor or sensory nerve fibres. The assessment of conduction characteristics depends on the analysis of compound evoked potentials.[3] They are recorded from the muscle and the nerve in the study of the motor fibres and the sensory fibres. The NCS parameters include CMAP (compound muscle action potential), SNAP (sensory nerve action potential), latency, duration and nerve conduction velocity.[4] All these NCS parameters are greatly affected by demographic and physiologic factors like age, gender, height, weight, BMI, skin temperature and ethnicity. The diameter of nerve and degree of myelination also affect the values of NCS parameters.[5]

EDX can be used for assessment of degree of axonal loss/demyelination, for determining disease severity, prognosis and assessment of duration of neuropathy whether it is acute, sub-acute or chronic.[6]

The proportion of elderly population over 50 years is rising especially in developed countries due to improvement in life expectancy, it is therefore important to identify the neurological diseases early and screen for curable causes.[7] Polyneuropathy affects about 7% of elderly population and NCS is the most important tool to diagnose polyneuropathy. Therefore early identification of changes in nerve function may be able to forecast strength decline leading to timely intervention which may be helpful in preventing disability.[8] In previous studies, it has been shown that incidence ratio of polyneuropathy between males and females is 2:1.[9]

It is thus important to take these factors into consideration while recording NCS. Currently we are using the reference values set by Europe/USA; we must have our own reference values for males and females for comparing NCS parameters in various neuropathic disorders. The findings of our study may serve as a basis of large scale studies. The present study was targeted at finding out the differences in NCS parameters of men and women of 40−70 year age.

METHODOLOGY

It was a cross-sectional study with a sample size of 75 selected through convenient sampling. The sample size was calculated through STAT (UBA) by keeping the power 0.80 and α value 0.05. The study was approved from ASRB and Ethical Board of Khyber Medical University. People having no confounding medical or surgical illness and no history of previous upper limb injury/myopathy/neuropathy were included in the study if their fasting blood sugar (FBS), urea, creatinine, liver function tests (LFTs) and Erythrocyte Sedimentation Rate (ESR) were within normal limits. Pregnant women, people of age <40 or >70 years, those with bleeding disorders or on anticoagulant therapy, and

patients with compression symptoms of median or ulnar nerve were excluded from the study. A detailed history and informed consent were taken from all participants by using a questionnaire.

The nerve conduction studies were performed on Nihon Kohden Neuropack M1 EP/EMG measuring system MEB-9200/MEB-9300. The sensory and motor nerve conduction studies were recorded for both median and ulnar nerves both proximally (elbow) and distally (wrist) in the forearm. A standard technique was used to obtain and record action potentials for sensory and motor functions by using NCS data acquisition system. All electrodes were placed on specific and measured distances from each other according to the standard technique given by AANEM.[2] The proximal and distal latency was automatically calculated by machine. In case of motor studies, it automatically took out the difference between proximal and distal latencies. The distance between stimulation sites (mm) was measured and manually entered in Dist. column in conduction study measurement table window.[10] The sensory conduction velocity was calculated by dividing the distance between the stimulating (active) and recording (reference) electrodes by Latency of that nerve (using formula V=S/t). All these parameters were then organized, and imported into SPSS-22. The nominal variables were looked for frequencies and percentages while numerical variables were analysed for Mean±SD. The two groups were compared using independent sample t-test and $p<0.05$ was taken as significant.

RESULTS

There were 40 males and 35 females included in this study. Demographic parameters are described in Table-1. There was no significant difference between male and female demographic parameters except for height, which was more in men than women ($p=0.02$).

The nerve conduction study parameters were compared for gender-based differences by using independent sample t-test. Mean latency and mean amplitude was more in males (Mean±SD of latency was 3.49±0.37 in men vs 3.33±0.39 in women while mean amplitude was 9.62±2.40 in men vs 9.00±2.11 in women). Mean NCV was more in women (57.08±3.72) compared to men (54.68±3.49).

Mean latency was 2.61±0.23 in men and 2.25±0.21 in women. Mean amplitude was 9.29±1.76 in men and 8.79±1.46 in women. Mean NCV was 58.09±4.46 in women vs 56.57±4.83 in men) (Table-3).

Mean latency was more in men (2.61±0.35 in men vs 2.47±0.36 in women) while mean amplitude was more in women (2.47±0.36 in women vs 28.30±10.35 in men). Mean NCV was more in men (56.23±7.24 in men vs 56.07±7.44 in women) (Table-4).

The ulnar sensory parameters showed remarkably significant differences between male and female NCS parameters. The mean latency was longer in males than females (2.24±0.31 in males vs 1.86±0.23 in females, $p=0.043$). The mean amplitude was more in females than males (41.07±17.32 in females vs 28.97±10.51 in males, $p=0.019$). Mean NCV was more in females than males with a mean value of 62.01±7.05 in females and 55.69±6.98 in males (Table-5).

Table-1: Demographic parameters of male and female participants (Mean±SD)

Parameters	Male n=40	Female n=35	p
Age (Years)	54.23±8.13	53.37±8.64	0.23
Height (Cm)	167.44±7.1	157.23±4.58	0.022*
Weight (Kg)	75.74±11.81	68.98±9.83	0.16
BMI (Kg/m^2)	26.87±3.47	27.82±3.88	0.52

*Significant

Table-2: Comparison of male and female NCS parameters for median motor nerve (Mean±SD)

	Male n=40	Female n=35	p
Median motor nerve conduction parameters (wrist)			
Current (mV)	30.69±5.46	31.07±4.51	0.60
Latency (mSec)	3.49±0.37	3.33±0.39	0.786
Amplitude(mV)	9.62±2.40	9.00±2.11	0.309
Median motor nerve conduction parameters (elbow)			
Current (mV)	34.37±4.99	34.71±5.93	0.387
Latency (mSec)	7.94±0.56	7.25±0.51	0.642
Amplitude(mV)	9.27±2.41	8.32±2.18	0.433
Wrist-elbow distance (mm)	242.50±12.40	223.71±10.38	0.665
Wrist-elbow interval (mSec)	4.45±0.32	3.92±0.26	0.288
NCV (m/Sec)	54.68±3.49	57.08±3.72	0.766

NCV: Nerve Conduction Velocity

Table-3: Comparison of male and female NCS parameters for ulnar motor nerve (Mean±SD)

	Male n=40	Female n=35	p
Ulnar motor nerve conduction parameters (wrist)			
Current (mV)	30.81±3.46	29.07±4.50	0.219
Latency (mSec)	2.61±0.23	2.25±0.21	0.939
Amplitude (mV)	9.29±1.76	8.79±1.46	0.592
Ulnar motor nerve conduction parameters (elbow)			
Current (mV)	33.37±2.68	31.07±4.03	0.155
Latency (mSec)	6.86±0.51	6.06±0.41	0.115
Amplitude (mV)	8.49±1.89	8.24±1.57	0.716
Wrist-elbow distance (mm)	238.00±12.23	219.28±11.25	0.901
Wrist-elbow interval (mSec)	4.24±0.42	3.79±0.32	0.173
NCV (m/Sec)	56.57±4.83	58.09±4.46	0.858

NCV: Nerve Conduction Velocity

Table-4: Comparison of male and female NCS parameters for median sensory nerve (Mean±SD)

Nerve conduction parameters (wrist)	Male n=40	Female n=35	p
Current (mV)	21.18±3.34	19.42±3.93	0.363
Latency (mSec)	2.61±0.35	2.47±0.36	0.590
Amplitude (µV)	28.30±10.35	35.32±13.70	0.093
Wrist-elbow Distance (mm)	144.25±6.75	135.14±5.87	0.554
Wrist-elbow Interval	2.61±0.35	2.49±0.36	0.462
NCV (m/Sec)	56.23±7.24	56.07±7.44	0.739

NCV: Nerve Conduction Velocity

Table-5: Comparison of male and female NCS parameters for ulnar sensory nerve (Mean±SD)

Nerve conduction parameters (wrist)	Male n=40	Female n=35	*p*
Current (mV)	21.12±3.71	19.35±3.99	0.905
Latency (mSec)	2.24±0.31	1.86±0.23	0.043*
Amplitude (µV)	28.97±10.51	41.07±17.32	0.019*
Wrist-elbow distance (mm)	123.37±12.97	114.14±7.42	0.000*
Wrist-elbow interval (mSec)	2.24±0.31	1.86±0.22	0.043
NCV (m/Sec)	55.69±6.98	62.01±7.05	0.788

*Significant, NCV: Nerve Conduction Velocity

DISCUSSION

Regarding differences in motor NCS between males and females in present study it was observed that there were no significant differences between males and females. For ulnar sensory parameters, it was found that males had longer sensory mean latencies, while sensory mean amplitude was higher in females. This observation is in accordance with the study conducted by Gakhar *et al*[11] and Hennessey *et al*[12]. The more SNAP amplitude in females may be due to more skin thickness in males and the shorter distal latency may be due to shorter height and hence limb length in females. Shehab *et al*[13] also found that gender affected SNAP amplitude of median and ulnar nerves, this is favouring our findings. Similarly, Pawar *et al*[14] found out differences in SNAP amplitude and distal latency of both median and ulnar nerves between males and females. Alemdar *et al*[15] observed that female SNAP latency was more in males while amplitude was more in females; our study is in agreement to their findings. Kumar *et al*[16] observed that median motor CMAP amplitude and NCV was more in males as compared to females while latency was slightly increased in females. It is not true in case of our study. The gender-based differences in NCS parameters can be due to differences in anatomical and physiological factors between males and females like height, limb length, etc.

A study by Ovais Karnain *et al*[17] showed that both the ulnar and median sensory nerve action potential (SNAP) amplitude was significantly greater in females than in males. In our study, only ulnar SNAP amplitude was significantly high in females than males which may be due to demographic, ethnic, or any other factor between the two populations. Fujimaki *et al*[18] also found that females had greater SNAP amplitude than males which favours our study.

The larger SNAP amplitude in females may be due to less subcutaneous tissue nearby the recording electrode. More resistance offered by thick skin in males and distance between recoding electrode and the nerve might be the reason for more SNAP amplitude in females than in males. Our results which don't go in accordance with other studies may be due to ethnic differences, different environmental or skin temperature at the time of study, due to instrument to instrument variations, or other technical factors.

CONCLUSION

There was no significant difference between male and female ulnar and median motor NCS parameters and median sensory NCS parameters. Ulnar sensory latency was significantly high in males as compared to females while ulnar sensory amplitude was significantly high in females than males. Further studies are needed to look for association of height, weight, BMI, skin thickness, nature of work and other parameters with NCS parameters in both males and females so that the amount of difference between male and female NCS parameters can be quantified.

LIMITATIONS OF THE STUDY

Our findings should be interpreted with some caution given the limitations of our design. Our findings may be subject to selection bias as it was a single-centre hospital-based study rather than a community-based or a multi-centre study.

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MS: Concept, data collection, literature review, proof reading
SHH: Abstract, review
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QMQ: Results and tabulation
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ORIGINAL ARTICLE
PREVALENCE OF DYSLIPIDEMIA IN HYPERTENSIVE AND DIABETIC PATIENTS

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Background: Hypertension and diabetes play a major role in development of cardiovascular disorders. Dyslipidemia also plays a central role in the progression of atherosclerotic disease. This study aims to assess the association of dyslipidemia in diabetic and hypertensive patients as this population is at a higher risk of ischemic heart diseases. **Methods:** A cross-sectional study was conducted at the Pathology Department of Pakistan Institute of Medical Sciences, Islamabad. Using WHO calculator, a sample size of 130 was calculated. All participants were above 18 years of age. The patients with previous history of myocardial infarction, stroke, type 1 diabetes, with fasting blood glucose >126 mg/dl, and who did not give consent were excluded from the study. Fasting lipid profiles of all the participants were carried out. Study outcome was measured in terms of percentages of diabetic and hypertensive patients having dyslipidemia. **Results:** The mean age of the patients was 44.9±9.4 years. Out of 130 cases, 48.4% participants were diabetic and 51.6% had hypertension. Dyslipidemia was found in 68.1% diabetic and 71.6% hypertensive patients and this association was significant (*p*<0.001). **Conclusion:** Dyslipidemia is directly associated with diabetes and hypertension. Strict monitoring of diabetic and hypertensive patients with dyslipidemia should be done to avoid development of cardiovascular disorders.
Keywords: Dyslipidemia, diabetes, hypertensive, prevalence, cardiovascular

INTRODUCTION

Dyslipidemia is an abnormally high level of non-high density lipoprotein cholesterols (HDL-C) in the body. It has been observed that dyslipidemia is strongly associated with other metabolic diseases like hypertension and diabetes. In addition, these three diseases further contribute to the development of atherosclerotic heart diseases.[1]

The overall burden for atherosclerotic diseases is on the rise worldwide.[2] Controlling risk factors for cardiovascular diseases will eventually lead to decreased mortality. If one knows about the prevalence of dyslipidemia in hypertensive and diabetic patients, there would be lesser mortalities as better strategies could be designed to cope with the problem.[3]

Although studies have found association between dyslipidemia, hypertension and diabetes mellitus, the data from South Asian population from epidemiological point of view is scant.[3] In this study, we have tried to find out the prevalence of dyslipidemia in population of Islamabad, Pakistan. The study aimed to find the prevalence of dyslipidemia in diabetic and hypertensive patients.

MATERIAL AND METHODS

A cross-sectional study was conducted at the Pathology Department of Pakistan Institute of Medical Science, Islamabad. Using WHO calculator, a sample size of 130 was calculated. Informed consent was taken from all study participants after explaining the procedure. All participants were either hypertensive or diabetic. The participants labelled as hypertensive were those who had their blood pressure greater than 140/90 mmHg. On the other hand, diabetic patients were chosen on the basis of fasting blood glucose levels of greater than 126 mg/dl and HbA1c levels of greater than 6.5%. The participants with a history of stroke or ischemic heart disease, type-I diabetes mellitus, smoking history, age less than 18 and those who did not give consent were excluded from the study. Blood samples were taken and analysed in Beckman Coulter AU680 Chemistry Analyser for different cholesterol measurements. Cholesterol measurements included low density lipoproteins cholesterol (LDL-C), triglycerides (TG), high density lipoproteins cholesterol (HDL-C) and free fatty acids (FFAs). The data was collected and analysed for Chi-square test using SPSS-21.

RESULTS

The mean age of the participants was 44.9±9.4 years. Total numbers of diabetic and hypertensive patients are shown in Table-1.

Dyslipidemia was found prevalent in majority (68.1%) of the diabetic cases. Those participants were considered dyslipidemic who had triglyceride levels greater than 150 mg/dl, higher levels of low density lipoproteins, (greater than 130 mg/dl) and low levels of high density lipoproteins (less than 60 mg/dl) (Table-2).

Dyslipidemia was also present in more than half of hypertensive population. Around 71.6% hypertensive patients had abnormal lipid measurements (Table-3).

Table-1: Distribution of diabetic and hypertensive participants

Disease Type	Number	Percentage
Diabetes mellitus	63	48.4
Hypertension	67	51.6
Total	130	100

Table-2: Dyslipidemia in diabetic cases

Disease Type	Number	Percentage	*p*
Diabetic patients with dyslipidemia	43	68.1	<0.001
Diabetic patients without dyslipidemia	20	31.9	<0.001
Total diabetic patients	63	100	<0.001

Table-3: Dyslipidemia in hypertensive cases

Disease Type	Number	Percentage	*p*
Hypertensive patients with dyslipidemia	48	71.6	<0.001
Hypertensive patients without dyslipidemia	19	28.4	<0.001
Total hypertensive patients	67	100	<0.001

DISCUSSION

Hypertension, diabetes and dyslipidemia or deranged lipid profile play a central role in development of cardiovascular disorders.[1] This study aimed to find the prevalence of dyslipidemia in diabetic and hypertensive patients.

The mean age of participants in this study was 44.9±9.4 years. A study done by Sherpa *et al*, had almost the same age group, i.e., 48 years in their study.[4] The late age of onset could be due to the lifestyle of individuals.

South Asian population is the most vulnerable to development of dyslipidemia due to cultural norms and unhealthy diet consisting of saturated fats.[5] The prevalence of dyslipidemia in general has been studied by many authors. A notable mention is Zaid and Hasnain (2018) who found out that the major form of dyslipidemia exists in the form of low HDL-C levels in 17.3% of the study population followed by high triglyceride levels in 11.2% individuals.[6] However, their study was limited only to dyslipidemia and other factors like diabetes and hypertension were not taken into account.

We found that 68.1% of diabetic patients had dyslipidemia. As per the study of Taskinen and Boren (2015), and Low Wang *et al* (2016) the prevalence of diabetic patients with dyslipidemia falls somewhere between 30–60%.[7,8] Studies have also shown that people even with better control of circulating glucose are at risk of developing dyslipidemia.[9] So this population should be given special attention as people having atherosclerotic diseases have more than one factors at play. In addition, Ginsberg and MacCallum concluded that the main lipid abnormality usually found in the diabetic dyslipidemic patients was increased levels of very low density lipoproteins (VLDL) and intermediate density lipoproteins (IDL).[9] However, our study did not particularly focus on the type of lipid abnormality. This lipid abnormality seen in diabetic patients might be due to the fact that Asians consume more fatty food as compared to the western people.

On the other hand, the prevalence of dyslipidemia in hypertensive patients came out to be 71.6%. This prevalence is alarming and should be paid special attention. A study by Dalal *et al*[3] noticed a lesser prevalence of 31%. This significant difference between the prevalence could be once again attributed to sluggish lifestyle. The research of Otsuka *et al*[1] labelled dyslipidemia a cause of hypertension instead of a consequence in Japanese population. They argued that deranged lipid profile plays two roles. First, they impair the endothelial cells function causing decreased production of nitric oxide which in return causes disruption in blood pressure regulation. Second, they reduce the sensitivity of baroreceptors.[1,10] It can be said that either hypertension is a cause or consequence, this population should be routinely checked for dyslipidemia.

CONCLUSION

The prevalence of dyslipidemia in diabetic and hypertensive patients is alarming in our population. Physical inactivity as well as high fat diet remained the main culprits of high prevalence of metabolic disorders. More comprehensive study should be done to enhance the scope of the metabolic disorders within the region.

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MZ: Data collection, revision
SW: Data analysis
SA: Discussion, proof reading
AH: Literature review
SK: Statistical analysis and results

ORIGINAL ARTICLE
SCREENING OF EATING DISORDERS USING SCOFF QUESTIONNAIRE IN MALE DIABETICS IN DISTRICT HYDERABAD, SINDH, PAKISTAN

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Background: Eating disorders (EDs) are very common disorders in the society, nonetheless, underestimated. It is a group of heterogeneous diseases/disorders associated with abnormal eating habits/eating behaviours found in all ages, race and sexes, and are more common in females than males. EDs could possibly be more common in diabetic patients. This study aims to examine the prevalence of eating disorders (using SCOFF questionnaire) in diabetics type I/II and its association with anthropometric indices. **Methodology:** A cross sectional study was conducted with the known cases of diabetes I or II. Subjects suffering from any other disease are excluded from the study. A self designed questionnaire indicating the anthropometric indices and a well-known SCOFF questionnaire for the purpose of screening of EDs was used. SPSS-21 was used to analyze the data. Fisher's exact test was employed as an appropriate for qualitative data. **Results:** The overall prevalence of likelihood of EDs was reported highest (99%), the frequency of EDs in diabetic type II groups was 66.6% and Type I was 32.4% respectively, The prevalence of EDs was significantly more in type II ($p=0.03$) as compared to type I. **Conclusion:** High prevalence of eating disorders was observed in diabetics, more common in Type II diabetic patients. Non-significant fluctuated anthropometric indicators were seen in diabetics type I and II and patients with eating disorders.

Keywords: Eating disorders, Diabetes, Anthropometric indicators

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INTRODUCTION

Eating disorders (EDs) are the heterogeneous group of conditions that describe the insufficient or/and excessive eating sometime followed by an attempt to compensate it by purging, fasting, exercise or by having laxatives.[1] Anorexia nervosa (AN) is characterized by self limitation of food intake and extreme fear of getting weight.[2] Bulimia nervosa (BN) is characterized by excessive eating and then an attempt to compensate it either by purging, fasting or even exercise.[3] The eating disorders not otherwise specified (EDNOS) neither meet the diagnostic criteria of anorexia nervosa nor bulimia nervosa.[4] EDs as a non-communicable disorder[5] could possibly co-occur with many other abnormal conditions and have been seen in different classes and races of the world: recently the prevalence was observed in drug addicted people.[6] Bulimia nervosa is linked with gastric ulcer and gastric dilation in many studies[7,8]. EDs generally affect gastrointestinal system in two ways: mechanical and paralytic events; mechanically it could be due to duodenal compression whereas paralytic ally it could be because of atrophy of intestinal smooth muscles, delayed intestinal transit or delayed gastric emptying. The relationship between EDs and cancer has been established.[9] The risk of oesophageal adenocarcinoma could be increased due to damage caused by acidity in oesophageal mucosa in bulimia patients.[10] The link between EDs and coronary artery disease has also been reported.[11]

One of the most important disease is Diabetes mellitus (type I/II) in which the quality (carbohydrates versus non-carbohydrates) and the quantity of food is compromised in order to keep the blood glucose level normal.[12,13] Thus diabetes could possibly co-occurs with abnormal eating behaviour. In young adults, disordered eating behaviours (DEBs) have been observed in 21.2% Type I and in 50.3% Type II diabetic patients respectively.[14] Recently, a significant correlations is reported in abnormal eating and type I diabetes in both gender[15]. The anthropometric indicators just as BMI, obesity or the thinness of body (or the perception of body structure), might be a big concern in EDs patients, thus could add fuel to fire if EDs co-occurs with type I/II diabetes. Binge eating is associated with obesity and weight gain and thus could lead to diabetes.[16]

The co-morbidities of eating disorders with diabetes could be apparent. This study aims to examine the prevalence of eating disorders (using SCOFF questionnaire) in diabetics type I/II and its association with anthropometric indices.

METHODOLOGY

A cross-sectional (survey based) study was performed from Jun to Nov 2019. All the experimentations were carried out in accordance with 1964 Helsinki Declaration and its later amendments for ethical standards. The sample was collected through a random sampling method from the Civil Hospital Hyderabad, and Liaquat Medical University Hospital, Jamshoro. The sample size was 302. All participants were known cases of type I/II diabetes mellitus, and were aged 20−50 years. A self planned questionnaire and a specific questionnaire for detection of likelihood of eating

disorder, SCOFF (Cronbach value=0.470)[17] was distributed during interview to the participants. The questionnaire comprised of five questions, an answer of 'Yes' to at least two questions was considered as ED positive. SCOFF questionnaire has sensitivity of 100% and specificity of 90%. While having measurements and interview it was taken care that all participants fully understand the questionnaire. The study group constituted single and/or unmarried male adolescents. The participants who were suffering from any disease like hypertension, coronary artery disease, cancer etc. or any disease other than diabetic mellitus I and/or II were excluded from the study.

Weight was measured by simple weighing machine with minimal and light weight clothes, and height on a stadiometer. Hip and waist circumferences were measured by flexible non-stretchable plastic measuring tape. Waist to hip ratio (WHR) and waist to height ratio (WHtR) and BMI were calculated using standard techniques.[18,19]

The results obtained were shown in percentage. The results were tested for significance using SPSS. Fisher's Exact Test or Chi-Square test was employed as appropriate for qualitative data.

RESULTS

Out of 305 participants, 302 returned complete questionnaire, representing the response rate of 99%. Out of 302 diabetic patients 98 were suffering from Type I while 201 were suffering from type II diabetes. The prevalence of EDs through SCOFF questionnaire was reported highest (99%), the frequency of EDs in diabetic type II groups was 66.6% and Type I was 32.4% respectively which is significantly more than in type I. The highest frequency of those who could suffer EDs was found in age group of 40–60. Screening through SCOFF found that patients whether live in rural or urban areas have equal chance of eating disorders, similarly likelihood of EDs was nearly equal in all BMI group slightly higher in normal and overweight participants.

According to WHR, the frequency in obese individuals (WHR >0.90) was 247 (81.7%), higher than those 52 (17.2%) whose WHR was normal (≤0.90), however, not reaching to the significant level. According to WHtR, 117 (38.7%) of the participants fell under the obese (≥0.58) group and 85 (28.1%) participants were under overweight (0.53–0.57) group. These two groups represented the huge number of those who have the chances of EDs.

The total number of 'Yes' reply (from SCOFF questionnaire) and the frequency of participants responded to 'Yes' is shown in Table-2. The frequency and significance level of 'Yes' or 'No' for each question of SCOFF questionnaire is indicated in both EDs positive and negative groups in Table-3.

Table-1: SCOFF results in relation to age, living area, diabetes, marital status, breakfast, junk food, exercise, BMI, WHR and WHtR [n (%)]

	SCOFF (+)	SCOFF (-)	Total	p
AGE				
20–30	7 (2.3)	–	7	
31–40	45 (14.9)	–	45	
41–50	96 (31.8)	1 (0.33)	97	0.4
51–60	84 (27.8)	–	84	
>60	67 (22.2)	2 (0.66)	69	
Total	299 (99)	3 (0.99)	302	
LIVING AREA				
Rural	240 (79.4)	2 (0.66)	242 (80.1)	0.4
Urban	59 (19.6)	1 (0.33)	60 (19.9)	
Total	299 (99%)	3 (1.0)	302	
DIABETES				
Type I	98 (32.4)	3 (0.99)	101 (33.4)	0.03
Type II	201 (66.6)	–	201 (66.6)	
Total	299 (99.0)	3 (1.0)	302	
MARITAL STATUS				
Single	6 (2.0)	–	6 (2.0)	1.00
Married	293 (97.0)	3 (0.99)	296 (98.0)	
Total	299 (99.0)	3 (0.99)	302	
BREAKFAST				
Yes	289 (95.7)	3 (0.99)	292 (96.7	1.00
No	10 (3.3)	–	10 (3.3)	
Total	299 (99)	3 (0.99)	302	
JUNK FOOD				
Yes	78 (25.9)	–	78 (25.9)	0.5
No	221 (73.1)	3 (1.0)	224 (74.1)	
Total	299 (99.0)	3 (1.0)	302	
EXERCISE				
Yes	181 (59.9)	1 (0.33)	182 (60.2)	0.5
No	118 (39.0)	2 (0.66)	120 (39.8)	
Total	299 (99)	3 (0.99)	302	
BMI				
Severely underweight	6 (1.98)	–	6 (1.98)	
Underweight	8 (2.6)	–	8 (2.6)	
Normal	131 (43.4)	2 (0.66)	133 (44.0)	
Overweight	116 (38.4)	1 (0.33)	117 (38.7)	0.1
Obese Class I	34 (11.2)	–	34 (11.2)	
Obese class II	4 (1.3)	–	4 (1.4)	
Total	299 (99.0)	3 (0.99)	302	
WHR				
Normal (≤0.90)	52 (17.2)	1 (0.33)	53 (17.6)	0.4
Obese (>0.90)	247 (81.7)	2 (0.66)	249 (82.4)	
Total	299 (99%)	3 (0.99)	302	
WHtR				
Thin (0.35–0.42)	4 (1.3)	–	4 (1.3)	
Healthy (0.43–0.52)	93 (30.8)	1 (0.33)	94 (31.1)	
Overweight (0.53–0.57)	85 (28.1)	1 (0.33)	86 (28.5)	0.2
Obese (≥0.58)	117 (38.7)	1 (0.33)	118 (39.0)	
Total	299 (99)	3 (0.99)	302	

Table-2: 'Yes' reply to SCOFF questionnaire

SCOFF questionnaire number of 'Yes' reply	Frequency of 'Yes' in SCOFF questionnaire
0	1
1	2
2	41
3	132
4	112
5	14

Table-3: Analysis of SCOFF questionnaire

Questions from Bulimia and Anorexia of SCOFF	Frequency of response of positive 299 individuals (YES/NO)	Frequency of response of negative 3 individuals (YES/N0)	p
1. Do you make yourself sick because you feel uncomfortably full?	275/24	0/3	0.0006
2. Do you worry you have lost control over how much you eat?	202/97	0/3	0.03
3. Have you recently lost more than one stone in a 3 month period?	254/45	0/3	0.003
4. Do you believe yourself to be fat when others say you are too thin?	225/74	0/3	0.01
5. Would you say that food dominates your life?	218/81	2/1	NS

DISCUSSION

In the present study, the overall percentage of likelihood of eating disorders in diabetic patients was 99%. The prevalence of EDs in type I diabetics was 32.4% and in type II diabetics it was 66.6% respectively. EDs are significantly more prevalent in type II diabetes (p=0.03) than type I. This study is showing the prevalence at alarming level. EDs are equally prevalent in both rural, urban, single, and married people and in all classes of BMI (slightly higher numbers were observed in normal BMI category. It is also nearly equal in patients whether having normal breakfast or junk food. According to a research conducted in Pakistan, the use of junk food could be a risk factor for diabetes type II patients.[20]

In a longitudinal study, carried out in type I female diabetics[21], EDs were found very common. A significant association was reported in type II diabetes and binge eating.[22] A meta-analysis of controlled studies showed a significantly higher prevalence of BN patients among the type I diabetics as compared to normal but no difference in the prevalence of AN in both groups.[23] Another meta-analysis showed 7.0% confirmed cases of EDs and 39.3% cases of disordered eating behaviour in type I diabetics.[24] Since in diabetes mellitus type I the metabolism is shifted, it could lead to altered neuroendocrine status and thus could lead to eating disorders. The current study could not find any association between diabetic patients whether taking breakfast or junk food. The SCOFF questionnaire was used to diagnose the likelihood of eating disorder. The SCOFF questionnaire is simple and rapid and useful screening tool to find out the risk of eating disorders.[25]

Further work is required in order to prevent, diagnose and treat EDs in this most vulnerable group. A detailed and comprehensive survey-based cross-sectional study is suggested in different nationalities in order to confirm the aforementioned prevalence of EDs co-morbid with diabetes type I or/and type II.

CONCLUSION

High prevalence of eating disorders was observed in diabetic patients, more common in Type II diabetics. Non-significant fluctuated anthropometric indicators were seen in diabetics type I and II and patients with eating disorders.

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JW: Conception of idea, data analysis, drafting, final approval
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ORIGINAL ARTICLE
TEACHERS' PERCEPTIONS ABOUT BEDSIDE TEACHING IN PUBLIC SECTOR MEDICAL COLLEGES OF LAHORE

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Background: The need for bedside teaching is very much documented in the literature providing extraordinary opportunity for modelling of professionalism. Objectives of this study were to explore the teachers' perceptions and issues, and recommend solutions to promote bedside teaching. **Methods:** The descriptive cross-sectional study was carried out in four public sector medical colleges located in the city of Lahore Pakistan from March to September 2018. The study included 116 teachers, 29 from each institution. **Results:** Average age of participants was 47.5 years, with male preponderance. Strong agreement on cordial relationship, motivation, professional behaviour, communication barriers because of time constraint, lack of awareness, and disagreement on noisy environment were found. **Conclusion:** Bedside teaching is a unique valuable, traditional, clinical instructional tool with remarkable benefits, yet being underutilised due to certain challenges which need to be addressed in order to revive this lost and dying art.
Keywords: Bedside Teaching, Professionalism, Medical Education, Medical Student, Training

INTRODUCTION

Bedside teaching (BST) is the fundamental and instrumental force in the present world of medicine. BST is considered to be a crucial component for learning of clinical and communication skills in medical education.[1,2] Medicine is learnt more at the bedside than by sitting and learning in the classroom.[3]

When the patients and students interact with each other, exchange of views and opinions may occur simultaneously during BST which improves the clinical reasoning, empathy and communication skills.[4–6] Learners usually believe and consider that BST always helps them to be skilled clinically in various disciplines. Therefore, they highly appreciate it and value BST more as compared to other forms of training.[6] The BST is an excellent opportunity for active learning and modelling of professional behaviour in real context and opportunity to learn more from the experienced learner.[7,8] The BST is in danger of decline as a lost art. With the progress of science, a swift decrease in humanistic aspects of professionals has become more evident which tremendously affects the relationship between the doctor and patient.[9] The same is stressed upon by Hegde in 1999, who warned that there was a downfall and dying of this art of BST under present circumstances of medical education where teaching is increasingly dependent on the use of advanced technology.[10] Nowadays, teachers do not put emphasis on learning the true art of medicine at bedside. The need of the hour is to realize the importance of BST and perception of medical teachers' in our local context so as to propose various strategies for introducing this high yield modality of clinical teaching in medical schools, institutes and universities. Aims and objectives of the study were:

1. To explore the teachers' perceptions about the value of bedside teaching.
2. To identify the current state of bedside teaching in public sector medical colleges in Lahore.
3. To recommend solutions to promote bedside teaching in the medical colleges of Pakistan.

SUBJECTS AND METHODS

This descriptive cross-sectional study was carried out in the renowned public sector medical colleges of Lahore with long history of bedside teaching and very expert teaching faculty serving for many years. These colleges included King Edward Medical University (KEMU), Fatima Jinnah Medical University (FJMU), Allama Iqbal Medical College (AIMC), and Services Institute of Medical Sciences (SIMS), Lahore. The study was conducted from March to September, 2017.

Study population was calculated through a formula used for descriptive studies (Prevalence, standard error, standard deviation). Minimum number of teachers was 114. This was made 116 for equal division among all the four institutions mentioned including 29 teaching faculty members from each hospital.

Standardized questionnaire was developed after careful literature review, interviews and focus group discussions, construct formation, item construction, which was validated by conducting pilot study on 20 teachers, five from each above mentioned institutions. Questionnaire was prepared in the light of AMEE guide No. 87. The reliability of the questionnaire was also determined by Cronbach's alpha which came out to be 0.702. Crohnbach's alpha based on the standardized items was 0.694.

The responses from the medical teachers

were measured through a 5-item Likert scales ranging from strongly agree, agree, neutral, to disagree and strongly disagree for the assessment of each item of the questionnaire. The responses on the 12-item questionnaire were quantitatively analysed through SPSS-20. For demographic analysis count, percentage, mean, and standard deviation were calculated, while for response analysis p was calculated to find out the test significance for differences among the responders.

RESULTS

Average age of the teachers included in the study was 47.5 years. Majority of the teachers were male as compared to female (F:M=85:31).

There was an agreement (SA/A) on cordial relationship with the students, motivation, communication, professional behaviour, rush of patient, time constraint as barrier, lack of awareness, use of technology as compared to disagreement (SD/D). Statistically significant difference was found regarding noisy environment, chance to answer the question, inconvenient time, priority of exam preparation, rush of patient, time constraints, lack of awareness, technology preference than real patients among the faculties of various public sector medical institutes of Lahore.

Majority of teachers believed that they can develop cordial relationship with students through BST (p=0.12). Regarding the noisy environments during BST, majority of teachers disagreed to this (p=0.045). As many as 71.5% of the responses included that students are motivated through BST and they get good chances to answer the questions (p=0.046). Many (72%) agree that the time settings for BST are usually inconvenient for students (p=0.032). Around 90% of the students give more priority to exam preparations rather than attending BST sessions was also a recorded notion from the respondents (p=0.045).

Learning communication with patients in the real scenarios was agreed by 94.8% of the teachers (p=0.548). Developing professionalism through bedside teaching was also agreed upon by majority (p=0.122). Rush of the patients and time constraints because of patient overload were regarded as the barriers to BST by 65.5% (p=0.05) and 63% (p=0.33) of the respondents respectively.

Majority of the teachers believed that students are not much aware of the significance of BST in curriculum (p=0.032) and 69% of them said that students probably prefer using technologies over real time patients for their learning (p=0.024). The results are tabulated in Table-1.

Table-1: Collective responses of the faculty of various institutions to questionnaire [n (%)]

Variable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	p
Cordial relationship	1 (0.9)	0 (0.0)	3 (2.6)	55 (47.4)	57 (49.1)	0.122
Noisy environment	11 (9.5)	56 (48.3)	7 (6)	31 (26.7)	11 (9.5)	0.045*
Motivation	1 (0.9)	2 (1.7)	2 (1.7)	66 (56.9)	45 (38.8)	0.324
Chance to answer question	15 (12.9)	12 (10.3)	6 (5.2)	47 (40.5)	36 (31.1)	0.046*
Inconvenient time	14 (12.1)	14 (12.1)	5 (4.3)	49 (42.2)	34 (29.3)	0.032*
Exam preparation priority	16 (13.8)	13 (11.2)	5 (4.3)	44 (37.9)	38 (32.8)	0.045*
Communication learning	0 (0.0)	3 (2.6)	3 (2.6)	54 (46.6)	56 (48.3)	0.548
Professional behaviour	1 (0.9)	2 (1.7)	3 (2.6)	67 (57.8)	43 (37.1)	0.122
Rush of patients	17 (14.6)	9 (7.8)	14 (12.1)	46 (39.6)	30 (25.9)	0.05*
Time constraints	14 (12.1)	21 (18.1)	17 (14.7)	59 (50.9)	14 (12.1)	0.33
Lack of awareness	15 (12.9)	12 (10.3)	11 (9.6)	45 (38.8)	33 (28.4)	0.032*
Preference of technology	12 (10.3)	11 (9.6)	13 (11.2)	49 (42.2)	31 (26.7)	0.024*

*Significant

DISCUSSION

The quality of relationships has significant effect on students' activity on learning various contexts of clinical education like BST.[11] In a study by Komarraju et al, various factors were explored with regards to student learning and they found that most important factors were care, respect and connectedness which form basis of positive teacher student relation.[12] Our study results are consistent with Komarraju et al. Clinical teaching is not just sharing of information, knowledge and experience with learners, but it is aimed to achieve environmental or/and contextual learning at the same time.[13]

Learning environment has significant effects on students' approach to learning and their success in academics.[14] The quality of comfort for learner and patient during bedside has confirmed the results of study by Dehghami et al[15] which is consistent with our study. Motivation is a psychological notion referring to willingness and readiness of a person to accomplish his educational goals. Self-directed, independent and active learning takes place at bedside only if students are willing to invest the energy required to meet their needs of BST.[16] Remarkable academic performance both in basic and clinical years has been shown by the students with higher level of intrinsic motivation.[17] In our study majority of the respondents believed that students are

encouraged to answer the questions as was suggested by Ramani, who favoured free and safe environment for interactive discussions.[18] Our study is consistent with the above mentioned results. Similarly, many studies indicate that 2/3rd of the opinions remained focused on the issue of lack of time.[19] Our study is also consistent with the previous studies which show that majority of the teachers are in agreement regarding the learning of the students about the communication skills and they also emphasize that they should utilize these skills not only in their student life but also in their clerkship and whole future life. Our study shows that the 65.52% of teachers agree on the rush of patient and shortened hospital stay are a practical hindrance in BST. The results of our study are comparable with the focus group study of Ramani *et al*, carried out on clinical teachers that they spent 15–25% of their time for this art of teaching.[18]

In our study majority of teachers agreed regarding the time constraints. Our study results are quite similar to the study results of a questionnaire-based survey carried in a large teaching hospital of South Coast of England where BST gives rise to a great opportunity for learning skills and attitudes to while dealing with the patients.[19] Our study is not consistent with the study of Peters and Cate in that most of respondents in our study prefer technology over real patients.[20] Our study is also consistent with the study of Norcini, which favoured the need to introduce new approaches and modalities through BST.[21]

CONCLUSION

Bedside teaching may be the most useful strategy for learning clinical reasoning, communication and professional behaviour to think at higher cognitive level. Bedside Teaching maintains an interactive conducive positive environment for learners and patients increasing motivation and improving communication skills. Participation helps in the process of self-regulation and standard setting as well as effective use of questioning in bedside sessions. Attention to time constraints through integration, selectivity, flexibility and group dynamics, choosing right time of teaching and incorporating technology in BST may improve efficacy.

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ORIGINAL ARTICLE
ASSESSMENT OF CHILDREN PRESENTING WITH HISTORY OF PICA FOR IRON DEFICIENCY ANAEMIA BY SERUM FERRITIN ESTIMATION

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Background: Pica is persistent ingestion of non-nutritive substances for at least one month mostly after the age of 2 years. Pica is common presentation of iron deficiency anaemia. This study aimed to assess children for iron deficiency anaemia presenting with history of pica by serum ferritin estimation. **Methods:** This study was done over one year in Ayub Teaching Hospital, Abbottabad. Children of either sex above two years presenting with history of pica were included. Patient history of pica substance and nutrition along with milk intake, age, sex, weight, height, was documented on proforma. Data was analysed on SPSS-20 and results were taken significant with $p<0.05$. **Results:** A total of 120 patients, 59 (49.2%) males and 61 (50.8%) females, were recruited. Their age range was 2–10 years; weight ranged 6.8–40 Kg with mean weight 12.55±3.43 Kg. Height ranged from 70.5 to 154 Cm with mean height 90.5±10.48 Cm. Haemoglobin ranged from 5.3 to 11.9 gm/dl with mean Hb 8.81±1.21 gm/dl. Mean serum ferritin level was 7.3±4.28 ηg/ml. Substances eaten were soil, sand and lime accounting for 72.5%. Twenty percent children were breast fed. There was significant relationship between weight and height with pica ($p<0.001$). **Conclusion:** Pica is one of the common presentations of iron deficiency anaemia and most of the parents ignore this as if this is not manifestation of disease, rather consider it to be habit of child. Any child presenting with pica history should be evaluated for iron deficiency anaemia.

Keywords: pica, anaemia, children, ferritin, serum

INTRODUCTION

Anemia, being a major public health problem has affected both developed and underdeveloped countries. In 1980, the World Health Organization (WHO) estimated about 700 million people throughout the world was affected by anaemia. According to WHO, anaemia is one of the commonest preventable cause of death under 5 years' children. About 50% of anaemia cases are due to iron deficiency, which is the most common malnutrition disorder.[1] The prevalence of iron deficiency anaemia is between 40–70% in Pakistanis' children under five year.[2,3] The most important causative factors include excessive milk consumption and delayed weaning with poor iron rich foods. Iron deficiency anaemia is associated with growth retardation, decreased cognition, learning disability and limited physical activity.[3]

The word 'Pica' has been derived from a Latin word, meaning Magpie, a bird capable of eating a variety of non-food items.[4] Pica is defined as 'persistent ingestion of non-nutritive substances for at least one month at an age when such behaviour is developmentally inappropriate'.[5] At least the age of 2 years is suggested for the diagnosis of pica because in younger children less than two years, the ingestion and mouthing of non-nutritive substances is common and is non-pathological.[6] In pica a wide variety of non-food substances are ingested like clay, dirt, sand, stones, salt, ice, pebbles, hair, lead, laundry starch, vinyl gloves, plastic, pencil erasers, powders, creams, fingernails, paper, paint chips, coal, chalk, wood, plaster, light bulbs, needles, string, cigarette butts, wire, and burnt matches.[7] Different terminology are used for ingestion of different objects like ingesting ice cubes (pagophagia), clay (geophagia), dried pasta (amylophagia), chalk, starch, paste, Kayexalate resin (resinphagia).[8]

The exact cause of pica is unclear, but it is strongly associated with iron deficiency anaemia. When it is associated with iron deficiency, it is believed that pica is an effect rather than a cause.[8,9] As iron deficiency may cause glossal pain, so patients with anaemia choose to chew ice for its analgesic properties but other pica substances do not have any known analgesic properties.[10] Different hypothesis exist about why iron deficiency causes pica but there is no single agreed upon explanation including physiological mechanism.[1,4] Pica as observed since antiquity, seems to be strongly associated with iron deficiency anaemia, and in majority cases it disappears upon iron supplementation.[6,8,10,11] There are many theories to explain the causes of pica. Earlier investigators proposed nutritional deficiencies as pica's cause like iron and zinc. This idea was rejected as many children who consume foam, paper and rubber as pica substances usually don't have any nutritional deficiencies. Other theories suggest psychological

problems, obsessive-compulsive disorders and family stresses as predisposing factors for pica. Usually pica is attributed only for texture and taste's enjoyment.[12] Pica is linked to different factors like age, gender, religion, culture, nutritional deficiency, stress, and mental development.[13]

Serum ferritin shows iron stores and is the most accurate diagnostic test for iron deficiency anaemia when mean corpuscular volume (MCV) is less than 75 μL.[14] Levels less than 25 ηg/ml are consistent with the diagnosis of iron deficiency anaemia.[15] Serum Ferritin greater than 100 ηg/mL generally exclude iron deficiency anaemia.[16] This study was done to assess the children for iron deficiency anaemia presenting with history of pica by estimation of serum ferritin level.

PATIENTS AND METHODS

This cross-sectional study was done in the Department of Paediatrics (B ward), Ayub Teaching Hospital, Abbottabad from July 2017 to June 2018. A total of 120 patients of either sex between 2 years to 10 years of age were included with history of pica after taking consent from either parent. Children with congenital anaemia, haemolytic anaemia, mental disabilities and behaviour problems were excluded. Information gathered included duration of pica, substances consumed perceived as pica and a detailed dietary history including age at weaning, amount of milk consumed per day. Weight and height were measured to assess general nutritional status along with parent's education were documented on proforma.

Data was analyzed on SPSS-20 and results were taken significant with $p<0.05$. Sample size was calculated with OpenEpi taking prevalence of pica as 90% in children with confidence interval of 95%.[17] Calculated sample size was 139 patients but only 120 patients could be included. Haemoglobin level of less than 11 gm/dl and/or serum ferritin less than 25 ηg/ml were considered as iron deficient state.[15]

Qualitative variables included sex, nutritional status and weaning practices along with pica substances. Substances were presented as frequency and percentages. Quantitative variables included age, weight, height, and amount of milk consumed per 24 hours, Haemoglobin level, MCV and serum ferritin level were expressed as mean and standard deviation.

RESULTS

A total of 120 patients with iron deficiency anaemia were included in the study, 61 (49.2%) girls (50.8%) and 59 (49.2%) boys. Mean age of patients was 3.09±1.40 years. Mean weight and height were 12.55±3.43 Kg and 90.50±10.48 Cm respectively. Mean Hb was 8.81±1.21 gm/dl. Mean serum ferritin level was 7.3±4.28 ηg/dl (Table 1).

The most common pica substances were soil, sand and lime accounting for 72.5%. We could not find

foams, salt and ice as pica in our patients. There was significant relationship between pica and non-breast feeding practices in children (p=0.04) as 96 (80%) children with pica were not taking breast milk while 24 (20%) were breastfed. There was also significant association between onsets of pica with the type of feeding of children (breastfeeding or artificial feeding) (p=0.035). Pica and age also had significant relationship ($p<0.001$). There was significant correlation of weight and height with pica ($p<0.001$).

Table-1: Anthropometric parameters, pica duration, haemoglobin, serum ferritin level in subjects (n=120)

Variables	Min	Max	Mean±SD
Age (Years)	1.10	10.00	3.05±1.43
Weight (Kg)	6.80	40.00	12.55±3.43
Height (Cm)	70.50	154.00	90.50±10.48
Pica duration (months)	1.00	60.00	8.82±9.77
Weaning age (months)	4.00	36.00	7.94±5.19
Daily Milk intake (L)	0.00	2.50	0.72±0.44
Hb (gm/dl)	5.30	11.90	8.81±1.21
MCV (fl)	49.80	93.30	61.70±7.01
Serum Ferritin level (ηg/ml)	0.10	26.46	7.31±4.28

DISCUSSION

Anaemia being a major public health problem, has affected both developed and underdeveloped countries. Anaemia is the commonest preventable cause of death in children under 5 years and above 50% cases are due to iron deficiency.[1] Pica is defined as 'persistent ingestion of non-nutritive substances for at least 1 month at an age when such behaviour is developmentally inappropriate'.[5]

In our study, the age of children with pica ranged from 24 months to 10 years whereas in a study done in Egypt by El-Nemer et al[18] the age of children suffering from pica ranged from 20 to 72 months. Both studies show that pica starting age is above 1.5 year. At least, the age of 2 years is suggested for the diagnosis of pica because in younger children less than two years, the ingestion and mouthing of non-nutritive substances is common and is non-pathological.[6] Al-Joborae et al[19] found that the majority of childhood pica starts at the 1st year of life or older (65.3%), and under one year of age 34.7% with the mean age of 14.51±4.13 months. The mean age for pica in our study was 3.05 years as we enrolled only those patients with pica who were above 2 year. The other reason for this difference might be due to lack of knowledge and concern of parents about pica.

We did not find any association between gender and pica. We found 61 girls (50.8%) and 59 boys (49.2%). Similar findings were noted in a study by Ivascu et al[20] in America. Al-Joborae et al[18] found that 69.3% of patients were males and 30.7% of patients were females. Similar results were shown in studies from Iran[21] and Egypt[18] with male predominance.

The common types of materials in childhood pica in our study were soil, sand, and lime accounting

for 72.5%. This is similar to Al-Joborae et al[19] who reported clay, soil, stones, and dirt as types of material in childhood pica in 69.3% cases. The same results were observed in a study from Iran[21] where the common substances were soil, sand and lime accounting for 72.5%, and geophagia in 62.3%. In a study on Zambian[19] children, 74.4% practiced some form of geophagia which is comparable to our results. Similar findings were reported in a study from Egypt[17] where clay (43.1%) and dust (25.9%) were the most common types of pica substances.

In our study, there was a significant association between onset of pica with the type of feeding of children (breastfeeding or artificial feeding). Al-Joborae et al[19] found that two-thirds (68.7%) of children with pica were breastfed while the other one-third was artificially fed. This is close to our results, i.e., 80%. In comparison, a study by Gupta et al[22] reported that pica was seen more in bottle-fed children than breastfed children. This is in agreement with a study from Egypt[18] which found that pica was more in bottle-fed children (70.1%) as compared to breastfed children (29.9%). Results of both these studies are comparable to our results. Dietary factors were found to have major impact in the occurrence of iron deficiency anaemia as it was found to be more prevalent in children not consuming enough iron-rich food. There is significant relationship between pica and non-breast feeding practices in children; 80% children with pica are not taking breast milk while 20% are breastfed. These results are comparable to Paudel et al[23] where 31% of iron deficiency anaemia children were exclusively breastfed.

Pica had significant ($p<0.001$) correlation with age. Pica was highest in younger patients and its prevalence decreased with advancing age; same results were reported by Ivascu et al[20]. There was significant ($p<0.001$) relationship of pica with weight and height. Patients with pica had lower average weight in all age groups. Same results were also observed by Ivascu et al[20]. If pica was the cause it might be due to complications of pica like worm infestation and recurrent gastrointestinal infections. Whether pica was the effect or cause of lower weight could not be established by our data.

In our study haemoglobin ranged from 5.3 to 11.9 gm/dl with mean Hb 8.81±1.21 gm/dl as it is comparable to mean haemoglobin (7.96±1.1 gm/dl) in the study by Paudel et al[23]. Mean serum ferritin level was 7.3±4.28 ηg/ml. MCV ranged from 49.8 fl to 93.3 fl with mean of 61.69±7.01 which is similar as in the study of Paudel et al[22] where the average MCV was 58.16 fl.

In the study of Al-Joborae et al[19], the mean Hb was 8.44±1.50 gm/dl, ranging from 6 to 11.9 gm/dl, and mean serum ferritin was 6.36±1.54 ηg/ml, ranging from 3.7 to 11.0 which is close to our results. The results by Bainton[24] showed mean MCV as 74 fl, and mean haemoglobin as 7.6 gm/dl in patients with iron deficiency anaemia, similar findings are there in our study. Geophagy is significantly associated with iron deficiency anaemia in our study and serum ferritin concentrations are negatively associated with geophagy. These results are comparable to a Western Kenya study.[25] In a meta-analysis by Miao et al[26], a significant association of pica with low Hb and low hematocrit was found as observed in our study. El-Nemer et al[18] found the mean Hb as 9.7±1.5 g/dl ranging from 6.70 to 12.80 and mean level of serum ferritin as 14.24±16.13 ηg/ml ranging from 4.20 to 55.10 ηg/ml, which was comparable to our study. Singhi et al[27] also found mean Hb and iron levels significantly lower in children suffering from pica. There was strong association between iron deficiency anaemia and pica which is due to malabsorption of iron from the diet due to pica. Al-Sawaf[28] also expressed the same results of low level of Hb and Ferritin associated with pica. Some studies[29] failed to find any association between pica and anaemia and/or iron deficiency. A double-blind controlled study[27] did not find any relationship between iron therapy and pica behaviour. This is probably because pica is more a cultural behaviour than a result of iron deficiency.

CONCLUSION

Pica is a common presentation of iron deficiency anaemia and most of the parents ignore this as if this is not a manifestation of disease, rather consider it to be habit of child. Pica is also present in older children having low serum ferritin levels. Any child presenting with pica history should also be investigated for iron deficiency anaemia.

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Contribution of Authors:
SN: Data collection, analysis, abstract
SSHS: Theme, data collection, analysis, discussion
BA: Data entry, literature search
SS: Data entry, literature search
A: Results, discussion
EH: Results, discussion

ORIGINAL ARTICLE

RENAL DOPPLER ULTRASOUND AS PREDICTOR OF RENAL IMPAIRMENT IN PATIENTS WITH HEPATITIS C AND ITS CORRELATION WITH SERUM CREATININE

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Background: In patients with liver cirrhosis due to Hepatitis C virus, impaired renal haemodynamics leads to disturbance of glomerular filtration rate, real time estimation of renal haemodynamics can be assisted using renal Doppler. The aim of this study was to determine the correlation between renal resistive index (RI) and serum creatinine for evaluation of renal function in patients with Hepatitis C infection. **Methods:** This cross-sectional research was done from 22nd November 2013 to 5th November 2018 at Radiology Department, Mayo Hospital, Lahore. A total of 158 Hepatitis C positive patients divided to four groups (A, B, C, and D) according to disease stages and 79 healthy individuals were included as control group (group E). Serum creatinine was estimated and renal resistive index studied on colour Doppler, and correlation between serum creatinine and renal resistive index was studied. **Results:** Serum creatinine levels were considerably higher among diseased groups as compared to the control group. The highest creatinine level was observed in Group-D (1.05±0.20), followed by group C, B and A. Similarly, mean renal resistive index was significantly higher in diseased groups (highest: Group-D; 0.78 and 0.81 in right and left kidneys respectively). **Conclusion:** Renal resistive index has positive correlation with serum creatinine level. Resistive index taken on Doppler ultrasound can predict disease progression at an early stage, even before establishment of clinical symptoms and derangement of serum creatinine.
Keywords: Renal Doppler, resistive index, creatinine, hepatitis c, cirrhosis, mixed cryoglobulinemia

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INTRODUCTION

Hepatitis C does not only affect the liver, but also has extrahepatic manifestations. It has renal, neurological and dermatological complications due to a chronic immune complex-mediated process known as mixed cryoglobulinemia (MC). It has a strong association with mixed cryoglobulinemia in which vasculitis of small and medium sized arteries and veins occurs due to deposition of complexes of complement, cryoglobulin and antigen in vessel walls. It clinically presents as glomerulonephritis when kidneys are involved.[1] Type-I membranoproliferative glomerulonephritis (MPGN) associated with type II cryoglobulinemia is the most frequent association when kidneys of HCV infected patients are involved. Among all, 30–36% patients with cryoglobulinemia develop MPGN and it is the most relevant clinical manifestation.[2]

Renal Duplex Doppler Ultrasound is a simple, effective and non-invasive method and enables the detection of altered renal haemodynamics even before the renal dysfunction becomes clinically evident.[3] Renal Resistive Index (RI) is a useful parameter for quantifying the alternation in renal blood flow that may occur with renal impairment and has significant correlation relation with serum creatinine levels.[4]

Creatinine overestimates the renal function and results can be biased in case of liver disease. Therefore in HCV patients serum creatinine levels are affected by altered liver function and it may not correctly determine the renal function.[5] Renal Doppler Duplex Ultrasound may be useful for early identification of patients at high risk for developing impaired renal function. It can also be used to predict further disease course and outcomes.[6] The aim of this study was to assess the clinical validity of renal resistive index to diagnose renal impairment and correlate it with serum creatinine in patients having Hepatitis C infection.

MATERIAL AND METHODS

It was an analytic, cross-sectional study, conducted at Department of Diagnostic Radiology, Mayo Hospital Lahore, from 22nd November 2013 to 5th November 2018. The sample size was 158, calculated at 90% confidence level taking expected percentage of renal impairment in patients with Hepatitis C as 30%[7], margin of error at 6%, (α=0.06). Non-probability purposive sampling technique was used for data collection. The study was approved by the Institutional Review Board/Ethical Review Committee at King Edward Medical University. Written informed consent was taken from all individuals.

A total of 158 patients having Hepatitis C infection were selected as diseased population and 79 healthy individuals visiting hospital for routine physical examination were selected as control group.

First encounter was considered as Screening Stage where History, Clinical Examination, Serum Creatinine was performed. Patients already diagnosed with Hepato-renal Syndrome, Diabetes Mellitus, systemic hypertension, nephrolithiasis, renal vascular disease or malignancies were excluded from the study.

Included patients were divided into groups according to the stage of disease and ascites: Patients without liver cirrhosis (group A), patients at compensation stage of liver cirrhosis (no ascites) (group B), patients at decompensation stage of liver cirrhosis with non-refractory ascites (group C), patients with liver cirrhosis with refractory ascites (group D) and healthy individuals serving as control (group E).

Using real time ultrasound equipment (Toshiba Nemio XG) with standard 3.5–5.0 MHz curvilinear transducer, Colour Doppler Ultrasonography was performed in all patients and healthy controls to localize vessels and for calculation of Resistive Index (RI). RI value of inter lobar or segmental intra-renal arteries was calculated in each kidney using standard formula (RI=A-B/A). A mean RI value for each kidney was taken after obtaining three reproducible waveforms. RI value of ≤0.6 was considered as normal and RI value of 0.7 was taken as an upper limit. Values above 0.7 were noted as high Resistive Index (RI). RI values were co-related with serum creatinine levels. Value of serum creatinine was noted while keeping the standard reference range (0.84–1.21 mg/dl) and any deranged values were taken as abnormal.

Data was analysed on SPSS-20. One-way ANOVA was used to compare resistive index and serum creatinine value in relation to hepatitis C severity. Independent sample t-test was used to compare the resistive index and serum creatinine in hepatitis C positive cases and controls if data held the assumption of normality otherwise nonparametric test was applied. Spearman correlation coefficient was used to assess the correlation between resistive index and serum creatinine, and $p<0.05$ was taken as significant.

RESULTS

Mean age of Hepatitis C patients was 44.39±8.60 years. Males were 57.3% and females were 42.6%. Among these patients 20 patients were without cirrhosis (group A), 14 patients were with compensated cirrhosis without ascites (group B), 97 patients were with decompensated cirrhosis with non-refractory ascites (group C) and 27 patients were with decompensated cirrhosis with refractory ascites (group D). In the control group (group E) mean age of patients was 38.22±10.54 years, males were 74.6% and female were 25.3%.

Mean creatinine level in Hepatitis C patients and in controls was 0.83±0.16 and 0.73±0.08 respectively (Table-1).

Mean RI in both kidneys of patients included in Group-D and Group-C was significantly higher when compared with other groups, i.e., Highest Mean RI in right kidney (Group-D): 0.78, and in left kidney (Group-D): 0.81. After Group-D, highest mean resistive index was seen in Group-C (Right Kidney: 0.73 and Left Kidney: 0.72) followed by Group-B (Right Kidney: 0.55 and Left Kidney: 0.56) and Group-A (Right Kidney: 0.53 and Left Kidney: 0.51). Patients in Group-D and Group-C had significantly increased mean RI values than all others groups. Resistive Index in Hepatitis C patients and Controls respective of groups and site of kidney is shown in (Table-2).
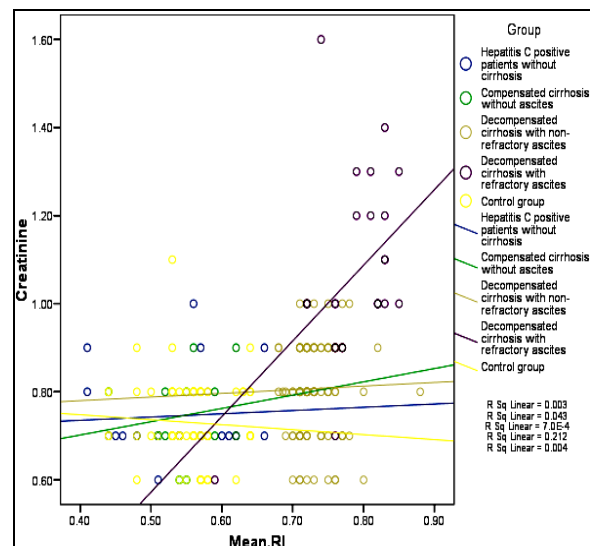
Correlation between resistive index in the both right and kidneys and serum creatinine level in all groups is illustrated in (Figure-1 and 2).

Table-1: Creatinine level among groups (Mean±SD)

Study groups	N	Creatinine
Group-A	20	0.74±0.09
Group-B	14	0.75±0.09
Group-C	97	0.80±0.10
Group-D	27	1.05±0.20
Group-E	79	0.73±0.08
F-test		42.6
p		0.001

Table-2: Resistive Index among groups (Mean±SD)

Study Groups	n	Right Kidney	Left Kidney
Group-A	20	0.53±0.07	0.51±0.06
Group-B	14	0.55±0.06	0.56±0.06
Group-C	97	0.73±0.03	0.72±0.03
Group-D	27	0.78±0.05	0.81±0.07
Group-E	79	0.55±0.04	0.52±0.04
F-test		238.8	297.6
p		0.001	0.001

Figure-1: Correlation between Resistive Index (Right Kidney) and Serum Creatinine
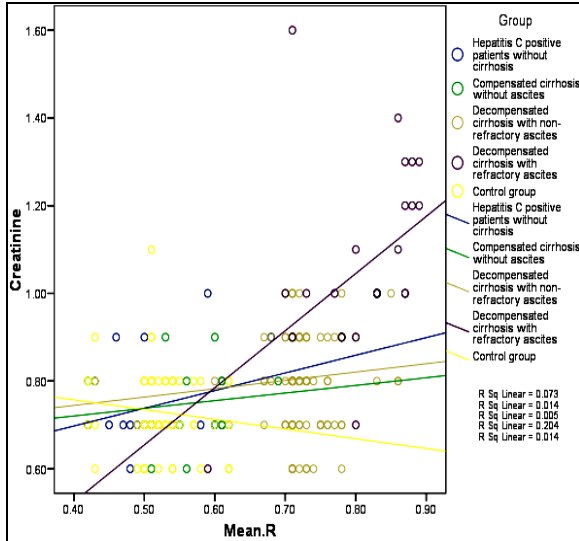
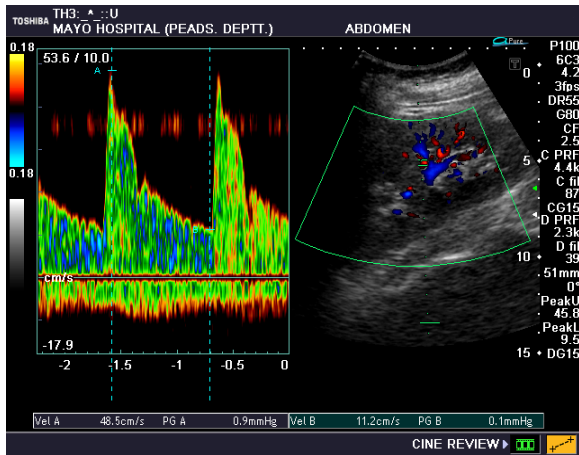**Figure-2: Correlation between Resistive Index (Left Kidney) and Serum Creatinine**

Figure-3: Colour and Pulse Wave Doppler analysis of inter-lobar renal artery showing increased Resistive Index in Group D case (RI= 0.76)
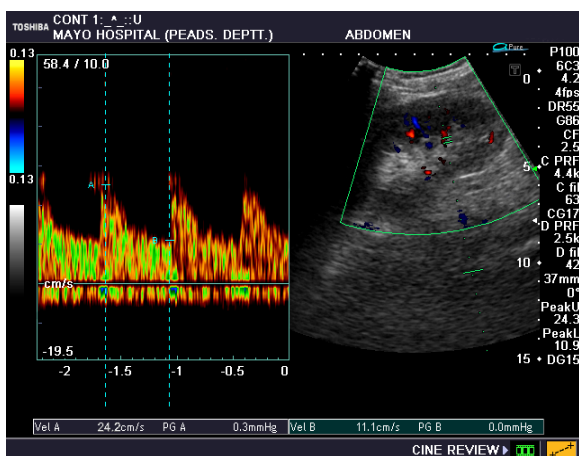

Figure-4: Colour and Pulse Wave Doppler analysis of inter-lobar renal Artery showing normal Resistive Index in Group E control case (RI= 0.54)

DISCUSSION

Doppler ultrasound serves as method for renal haemodynamic assessment and resistive index which is calculated from peak systolic and end diastolic renal arterial volumes helps in detection of alteration in blood flow to the kidneys.[3,6]

Previous studies have highlighted the importance of RI in order to assess renal blood flow in various pathological conditions of the kidneys. It is well known that in comparison to healthy population, generally there is increased RI in cirrhotic patients. Furthermore, RI is observed to be higher in cirrhotic population with ascites in contrast to those without ascites. It has been shown that patients with refractory type of ascites show further increase in RI values as compared to those with non-refractory ascites. Hence, it would be safe to say that value of renal RI varies with the degree of decompensation and type of ascites.[6,8,9]

Hamdy et al[10] have described importance of measuring resistive index using renal Doppler in early detection of alteration in haemodynamics in cirrhotic patients even before derangement of renal function clinically sets in. Furthermore, RI taken on renal Doppler was shown to be capable of identification of high-risk patients developing hepatorenal syndrome.

In this study mean creatinine level in Hepatitis C patients was significantly higher when compared with control group yet creatinine was still found within reference range in majority of the patients. The highest creatinine level was observed in Group-D (Decompensated cirrhosis with refractory ascites) patients followed by Group-C (Decompensated cirrhosis with non-refractory ascites) and Group-B (Compensated cirrhosis without ascites).

Study by Fouad et al[11] constituted of 60 patients with liver cirrhosis due to HCV and their distribution into 5 groups according to stage of disease was done. Adequately increased values of PI and RI were found by the authors in all groups in comparison with control group. Maroto et al[12] in their study observed significantly increased RI in cirrhotic patients at decompensated stage as compared to RI in patients with compensated liver cirrhosis which in turn was also higher than in healthy group. They also concluded high sensitivity and specificity of resistive index for detection of HRS. The findings of this study are consistent with the findings of Maroto et al[12] that patients with decompensated cirrhosis had significantly higher RI value in comparison to that of other study groups.

In a study conducted by Chen et al[4] renal Doppler indices were shown to be higher in cirrhotic patients when compared to values in non-cirrhotic and control population. They also demonstrated positive correlation of RI with severity of liver cirrhosis. Results of this study also support the findings of Chen et al[4] in

regard that values of RI correlated well with severity and stage of disease. A positive correlation between RI values and serum creatinine values was reported by Gamal *et al*[13]. However, in our study, serum creatinine was found increased above normal range in only 5 patients and all of them belonged to Group-D.

The results of various studies conducted by different research teams at different times and places including study by Macherla *et al*[6], Aslam *et al*[9], Fouad *et al*[11], Vlasov *et al*[14] and Mahmoud *et al*[15] support each other in conclusion that RI is significantly higher in patients with advanced liver disease as compared to healthy subjects. This study also concludes the same observation about renal resistive index.

Clinical significance of RI has enabled physicians to include renal Doppler in routine nephrological workup of patients as it provides reliable estimation of renal function even in challenging clinical settings like renal impairment due to advanced liver disease where renal function assessment by serum creatinine is doubtful.

CONCLUSION

Renal Doppler ultrasound is a reliable non-invasive method for evaluation of renal haemodynamics in cirrhotic patients with Hepatitis C. It can indicate renal impairment and disease progression towards hepatorenal syndrome even before development of clinical symptoms and derangement of serum creatinine.

LIMITATIONS OF STUDY

Renal Doppler ultrasound is equipment and operator dependent investigations which may result in inter observer variabilities. It requires breath hold, patient preparation and may take more time than routine ultrasound examination.

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ORIGINAL ARTICLE

SELF EVALUATION OF DENTAL APPEARANCE SATISFACTION AMONG CHILDREN AGED 13–17 YEARS ATTENDING GOVERNMENT SCHOOLS IN PESHAWAR

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Background: Dental appearance satisfaction is important among teenagers because decision concerning the personal characteristics of individuals is influenced by their dental appearance in the absence of other information. Objective of this study was to determine the self-evaluated dental appearance satisfaction among young adolescence. **Methods:** This questionnaire based descriptive cross-sectional study was conducted from October 2019 to January 2020 in 13–17 years old government high school going children in District Peshawar. Children with history of jaw trauma, and those receiving or had received orthodontic treatment were excluded. Data was analysed using SPSS-22. Mean±SD, frequencies, and percentages were calculated. Chi-square and t-tests were applied as per requirement of data, and $p \leq 0.05$ was considered as significant. **Results:** A total of 850 subjects, 600 (70%) males and 250 (30%) females were included in the study. Mean age of the participants was 15±1.37 years. Total 600 (70.5%) students had good psychological well-being regarding their dental appearance, 177 (20.8%) had satisfactory, and 73 (8.6%) had poor psychological well-being regarding their dental appearance. **Conclusion:** More than half of the subjects expressed pleasure with their dental appearance and male students were more satisfied than female students.
Keywords: Dental appearance satisfaction, Self-evaluation, Oral subjective Impact Scale (OASIS)

INTRODUCTION

The dental appearance plays dynamic part in the self-confidence and psychosocial aspect of a child. It also facilitates social respect, integration and acceptance in a society as it is a substantial contributor of the facial and physical appearance of an individual.[1] Self-perception of the dentofacial region has been recognized, as a noteworthy analyst for the universal, ability and affect, academic and physical fields of self-concept.[2] Several studies reported that individuals with fewer dental anomalies are judged to be more socially competent, show greater intellectual achievement and have better psychological adjustment.[3–5]

Facial attraction especially aesthetic appearance plays a vital role in social interaction. It affects mating success, personality assessments, performance, and employment prospects.[4] Facial attraction and smile attraction appear strongly connected to each other. The fact is that in social interaction, one's attention is mainly directed toward the mouth and eyes of the speaker's face.[3] Perception of dental appearance which is disturbed by individual's perception, culture and environment, is an important factor of dental treatment seeking behaviour among individuals.[5] It therefore means that the care and improvement of satisfaction with dental appearance is one of the essentials of dental care.[6]

The pleasure with dental appearance is influenced by gingival architecture, tooth colour, shape, size and occlusal wise arrangement. Dental treatments are commonly carried out during teenage years, when the permanent dentition is appearing.[6] At this particular age, the individual started to feel that his/her appearance is of great importance and that he/she has learned the right to wish or decline treatment independently.[7] Dental appearance gratification is significant among teenagers because judgment regarding the personal characteristics of individuals is influenced by their dental appearance in the lack of other information.[8]

The objective of this study was to determine the self-evaluated dental appearance satisfaction among young adolescence.

SUBJECTS AND METHODS

A questionnaire based descriptive cross-sectional study was conducted from October 2019 to January 2020 among 13–17 years old school going adolescence in the Peshawar district. The study population consisted of students attending government high schools in the Peshawar education division. Adolescence with history of jaw trauma or who were receiving orthodontic treatment and those who have received orthodontic treatment were excluded from the study.

Ethical approval for the study was taken from the Institutional Review Board (IRB), Peshawar

Medical and Dental College, Peshawar. Official permission was obtained from both male and female District Education Officers in District Peshawar.

Data of government high schools was obtained from DEO office through proper channel. Random cluster sampling technique with probability proportionate to size was used to select the sample. The design effect was considered, using cluster sampling technique, and a sample size of 850 was obtained.

Seventy percent participants were chosen from boys' schools and 30% were taken from girls' school according to number of schools in District Peshawar. The sample size of 595 boys and 255 girls was rounded to 600 boys and 250 girls to be included in the study. A written conversant consent was obtained from parents/ guardian of all students who fulfilled the eligibility criteria.

The Oral Aesthetic Subjective Impact Scale (OASIS) is a new self-evaluation tool which has been used to measure perceptive treatment need. It is a consumer-based measure, based on a child's perceived socio-psychological impact of their dental appearance. This scale measures the childhood influence of external impacts by asking queries about their sensitivities of others and themselves, as well as about their previous behaviour related to the appearance of their teeth.[9] The Oral Aesthetic Subjective Impact Scale (OASIS) is composed of five questions addressing concerns and self-perception of dental appearance, and how dental irregularities negatively affect individual's life and the social relationship. Each question is scored on a 1 to 5 Likert scale. Five questions were asked from each student and according to their answers scoring was compiled. Total score was a sum of all five items, ranging between 5 and 25. A score of 16 or above indicated severely psychologically affected patient. Score between 5 and 10 was consider as good, 11–15 as satisfactory and 16–25 as poor psychological well-being respectively. The data was entered and analysed using SPSS-22.

RESULTS

Among the 850 subjects, 70.5% (600) were males and 29.5% (250) were females. Mean age was 15±1.37 years; 151 (17.8%) were 13 years, 196 (23.1%) were 14 years, 155 (18.2%) were 15 years, 194 (22.8%) were 16 years, and 154 (18.1%) were 17 years old. (Table-1).

As a total 600 (70.5%) students had good psychological well-being regarding their dental appearance whereas 177 (20.9%) had satisfactory and 73 (8.6%) had poor psychological well-being regarding their dental appearance respectively of sample size (Table-2).

A total of 435 (72.5%) male students had good psychological well-being regarding their dental appearance while 116 (19.3%) and 49 (8.2%) male students had satisfactory and poor psychological well-being respectively. On the other hand, 165 (66%) female students had good psychological well-being regarding their dental appearance while 61 (24.4%) and 24 (9.6%) female students had satisfactory and poor psychological well-being respectively. Males were more satisfied (435/600, 72.5%) with their dental appearance than females (165/250, 66%). Female students were more worried about their dental appearance than male students; 24/250 (9.6%) female students thought that they have poor dental appearance whereas 49/600 (8.17%) male students were not entirely satisfied by their dental appearance. Highly significant ($p<0.01$) differences were identified when Chi-square test was applied to compare psychological well-being in both genders.

Table-1: Age gender distribution [n (%)]

Age	Male	Female	Total
13	103 (17.2)	48 (19.2)	151 (17.8)
14	141 (23.5)	55 (22)	196 (23)
15	114 (19)	41 (16.4)	155 (18.2)
16	135 (22.5)	59 (23.6)	194 (22.8)
17	107 (17.8)	47 (18.8)	154 (18.1)
Total	600 (100)	250 (100)	850 (100)

Table-2: Distribution of Oral Aesthetic Subjective Impact Scale (OASIS)

OASIS Categories	Frequency	Percentage
Good	600	70.5
Satisfactory	177	20.9
Poor	73	8.6
Total	850	100.0

Table-3: Gender-wise distribution of OASIS in participants [n (%)]

Gender	Good	Satisfactory	Poor	Total	p
Male	435 (72.5)	116 (19.33)	49 (8.17)	600	<0.01*
Female	165 (66)	61 (24.4)	24 (9.6)	250	
Total	600 (70.5)	177 (20.9)	73 (8.6)	850	

*Significant

DISCUSSION

Self-evaluated dental appearance is progressively getting attention because of its implication in dental care and patient-oriented healthcare delivery-favoured development.[10] In this study, more than half (70.5%) of the subjects expressed Good response with their dental appearance, similar to Ajayi[11] finding in Benin City, Nigeria among 12-year-old, Meng et al[12] findings among diverse sample of dentate adults in Florida, Alkhatib et al[13] observation among age group of 16–34 years in United Kingdom, and Hamamci et al[14] report from Turkish University students. This was lower than 89.0% reported among 18–19 years old individuals in Finland who expressed varied degrees of satisfaction with their dental appearance[15], and comparable to Azodo et al[8] who reported 79.4% approval among 15–37 years old people in Nigeria.

Findings of this study were higher than the findings among dental patients in Israel (62.7%)[16] with sample size of 407 adults aged above 21 years, Turkey[17] (57.3%) with sample size of 1,014 adults aged 16 to 70 years, and Malaysia[18] (47.2%) with sample size of 235 adults aged 18−62 years. The ages in these studies were 16−70 years. The more the age, the more the people adopt with their facial looks and are less concerned with their looks.

CONCLUSION

More than half of the subjects expressed pleasure with their dental appearance. Male students were better satisfied than the female students which is obviously due to the nature of women and the pressure and misconception of our society that only those will have a groom/bride who have beautiful looks!

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ORIGINAL ARTICLE
PARENTING STYLES, SELF-EFFICACY, EMOTIONAL INTELLIGENCE AND ACADEMIC ACHIEVEMENT IN MEDICAL STUDENTS

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Background: Academic achievement is the main concern of teachers, college consultants, and parents of students. The objective of this study was to observe the relationship between parenting styles, self-efficacy, emotional intelligence and academic achievement in medical students. **Methods:** Parenting style scale, generalized self-efficacy scale, emotional intelligence scale, and academic locus of control scale were used to measure variables under study. Data was collected from medical students of Lahore. **Results:** Correlational analysis showed highly significant positive association between parenting styles, self-efficacy, emotional intelligence and academic achievement in medical students. Regression analysis showed significant prediction between emotional intelligence and academic achievements. Moderation analysis showed self-efficacy was significant moderator between authoritarian parenting style and academic achievement. **Conclusion:** Medical students who have positive parenting styles, have high self-efficacy and emotional intelligence which leads them towards high academic achievement.
Keywords: Parenting styles, self-efficacy, emotional intelligence, academic achievement, medical students

INTRODUCTION

Academic achievement is a complicated phenomenon consisting of traditional, intellectual and emotional growth of the students. Academic achievement is the main objective of teachers, college consultants, and parents of students.[1] The aim of education is to achieve academic success.[2] An optimistic logic of parenting styles, emotional intelligence and self-efficacy is essential for individual's growth in relations of communication, abilities, understandings and academic achievement.

There are much less studies conducted on MBBS students with these variables and that is why there is need to work on this domain to fill this gap. The current study was conducted to help medical students and especially the parents to understand how much parenting styles, self-efficacy and emotional intelligence play an important influence in the academic achievement of medical students. The core determination of the present research was to provide insight to social and clinical setting about parenting styles and its influence on the academic achievement of medical students.

The objective of the current research was to observe the relationship between parenting styles, self-efficacy, emotional intelligence and academic achievement in medical students.

METHODOLOGY

Correlational research design was used in the present study. Purposive sampling technique was used to recruit a sample of 200 medical students of various medical colleges of Lahore.

The researchers obtained institutional ethical clearance from the University. Permission was taken from the authors of scales to use the tools. A booklet was prepared consisting of the informed consent form, demographic sheet and scales, and was provided to the participants for data collection. A pilot study and then the main study was conducted.

The Parenting styles scale[3] was developed. The reliability of Parenting Styles Scale was found as α= 0.95. This tool had 38 items in which students were requested to rate their parents in relations. Four sets or subscales were offered. The participants were requested to respond to a 5-point Likert scale. Generalized Self-Efficacy Scale[4] was developed. This scale had 10 items and reliability as α= 0.82.

Schutte Emotional Intelligence Scale[5] was also developed. This instrument had 33 items. Every item of scale was measured on 5-point Likert scale. The reliability of Schutte Emotional Intelligence Scale was found as α= 0.90.

Academic Locus of Control Scale[6] was also used. This scale had 28 items. This scale used True and False format for responses and had reliability as α= 0.61.

RESULTS

Parenting styles, self-efficacy and emotional intelligence have highly significant positive association with academic achievement. Emotional intelligence and self-efficacy were significant predictors of academic achievement ($p<0.005$). (Significant interaction effect of Authoritarian Parenting Style×Academic Achievement; B= -0.22, $p=0.00$). The value of R^2 (0.03) explained 3%

variance in the Academic Achievement accounted for by Authoritarian Parenting Style. (Table-1−3).

Table-1: Pearson product moment correlation analysis between study variables in medical students (n=250)

Scales	1	2	3	4
Parenting style	-	0.19**	0.38**	0.90**
Self-efficacy	-	-	0.40**	0.13*
Emotional intelligence	-	-	-	0.29**
Academic achievement	-	-	-	-

$*p<0.05, **p<0.01$

Table-2: Hierarchal regression analysis used to predicting academic achievement (n=250)

Predictors	Academic Achievement Medical Students	
	ΔR^2	β
Step 1	0.00	
Parenting Styles		0.02
Step 2	0.01*	
Self-Efficacy		0.10*
Step 3	0.06*	
Emotional Intelligence		0.26*
Total R^2	16%	

a. Dependent Variable: Academic Achievement, b. Predictors in the Models: Parenting Style Scale, Self-Efficacy, Emotional Regulation. $*p<0.05$

Table-3: Moderating Role of Self-Efficacy (n=250)

Predictor	SE	B	t
Authoritarian parenting style	0.11	-0.22	-0.2.01
Academic achievement	0.27	-0.42	-1.57
Interaction	0.00	0.00	2.02
R^2		0.03	
F		0.20	

DISCUSSION

Results indicated significant positive relationship between parenting styles, self-efficacy, emotional intelligence and academic achievement. The results showed that prediction between emotional intelligence, self-efficacy and academic achievement was high. Self-efficacy was significant moderator between authoritarian parenting style and academic achievement.

Another research[7] was conducted to investigate the association of parent's support/participation to self-esteem, hope and academic achievement in 297 university students. The findings of the study revealed sensitivity of parents' support/ participation at academic achievement of university students was significant.[7] One more study[8] was conducted to investigate the relationship between parental involvement and students' academic achievement in 30 undergraduate students. The result of that study showed high percentages of parental involvement and child academic achievement. In addition, findings revealed that parents' academic level significantly influences academic expectations of their children.

Turner *et al*[9] conducted a study to examine the association among authoritative parenting style, academic performance, self-efficacy, and achievement motivation in 264 college students. Their findings revealed that authoritative parenting affects positively the academic performance of college students. Gharetepeh *et al*[10] conducted research to explore the role of emotional intelligence in recognizing self-efficacy among 129 school students with changed levels of academic achievement. Results revealed that emotional intelligence and self-efficacy played a significant role to achieving academic achievement.

Turner *et al*[9] focused on examining the association amongst authoritarian parenting style, academic performance, self-efficacy, and achievement motivation in college students concluded that authoritarian parenting style and self-efficacy showed a significant effect on the academic performance of college students. Yazici *et al*[11] explored the effect of emotional intelligence and self-efficacy views on academic achievement of 407 students. Their findings showed that self-efficacy was a significant predictor of academic achievement. Suleman *et al*[12] conducted a research to find out association between emotional intelligence and academic achievement among 142 students. Their results showed that emotional intelligence was a significant predictor of academic achievement.

CONCLUSION

Medical students who perceived positive parenting styles have high self-efficacy and emotional intelligence which leads towards high academic achievements.

LIMITATIONS & RECOMMENDATIONS

The sample size of present research (250) was small. A larger sample could evolve even better understanding and enhance the validity and reliability of research.

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Journal article: Badar A. Launching a new journal in the era of publication accountability. Pak J Physiol 2005;1(1–2):1.

Book reference: Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Bremier BM, (Editors). Hypertension: pathophysiology, diagnosis, and management. 2nd ed. New York: McGraw Hill; 1995. pp.465–78.

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