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CONTENTS

Volume 11 Number 2 June 2016

Journal of Islamic International Medical College

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EDITORIAL

Internet Addiction or Problematic Internet Use: Current Issues and Challenges in Conceptualization, Measurement and Treatment

Saad Naeem Zafar

There are now over three billion Internet users in the world.[1] This makes it about 40% of the world population. In 1995, only 1% of the world population was using the Internet. The first billion mark of the Internet users was achieved in 2005, the second billion in 2010 and the third billion was reached in 2014. Pakistan is no exception. There are currently over thirty four million Internet users in the country.[2] The number of smart phones that further facilitates Internet connectivity is expected to cross 40 million by the end of the current year.[3] This increased internet connectivity has changed many an aspect of personal, professional and social lives of Internet users. Consequently, the amount of time people spent online has been growing steadily. According to a recent study young people in the UK have started spending more time online than watching TV for the first time.[4]

The early researchers and adaptors of the Internet technology generally viewed the online social engagement, entertainment and discussion in a positive light because they believed that virtual communities provide emotional support and a platform for discussion and sharing information with relative ease and with less inhibition. However, the pervasive nature of Internet in daily lives has also led to excessive or uncontrollable use in extreme cases. The seminal studies by Goldberg [5] and Young [6] in 1996 are generally considered as the first efforts in developing the notion and conducting empirical research on the topic of Internet Addiction (IA) or Internet Addiction Disorder (IAD).

Over the years the scope of research on IA has been considerably widened but without any universal definition, assessment criteria or treatment methods. A comprehensive review of IA research in 2014 indicated association of a number of risk factors with IA.[7] These risk factors include sociodemographic, Internet use, psychological factors and co-morbid symptoms. The sociodemographic risk factors may comprise male gender, younger age and higher family income. The Internet use risk factors may include time spent online and using social or gaming applications. The psychological factors may be impulsivity, neuroticism and loneliness. Finally, the co-morbid symptoms may consist of depression, anxiety and psychopathology in general.

At the conceptual level the difference is whether the criterion is derived from pathological gambling, substance-related addictions or the number of problems experienced. Additionally, there seems to be a disagreement about the cut-off points used within each criterion. As far as the psychometric measures are concerned, Young's Internet Addiction Test [8] seems to be the most popular instrument used in the empirical studies but different cut-off points are used across studies making the comparison between studies difficult.[9] Other measures often cited include Computer Game Addiction Scale (AICA-S) [10], Compulsive Internet Use Scale (CIUS) [11] and Chen's Internet Addiction Scale.[12]

There is also now a focus on differential diagnosis and/or co-morbidity of Internet addiction. A more recent review in 2016[9] indicates that presence of co-morbidities in internet addiction in clinical context appears more prevalent than initially thought. Individuals seeking help often have symptoms of mood and anxiety, impulse control and addictive disorders. This suggests that IA treatment can be more effective when a holistic approach is taken that combines evidence-based treatments of any co-morbidities that may be present in an individual. Accordingly, the IA treatment approaches have been either based on psychopharmacotherapy, psychological therapy and combined therapy approaches.

Psychopharmacotherapy has shown an overall positive effect on IA symptoms and Internet use times. In a few studies antidepressant medication has been reported to be successful, indicating that mood disorders may be more prevalent with Internet addiction.[9] As regards to the psychological therapy, a combination of individual and group therapy approaches have also been used. Overall group therapy treatments have shown better results over individual therapy approach for both reduction in

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time spent online and significantly higher self-esteem. Moreover, in case of adolescents, the most important factor to reduce internet addiction seems to be parent-child relationship.[13] Some studies have reported combined therapy treatments that have resulted in positive results in both post-treatment and follow-up measures. The study that stands out in this category of therapy is the significantly positive results in use of electro-acupuncture in combination with a psychological intervention[14] suggesting that this novel approach may be investigated further to establish its efficacy and effectiveness.

The Internet connectivity is relatively cheap and accessible in urban and semi-urban areas of Pakistan. With advent of 3G and 4G mobile networks available through Pakistan, the amount of time people spend online is expected to grow significantly. Physicians in Pakistan should explore the possible signs of Internet addiction or problematic internet use among the vulnerable segments of the society. The co-morbidity of Internet addiction with mood and anxiety disorders may also be explored when deciding a treatment approach. The role of family structures in Pakistan as support group may also be useful in group therapy sessions. It may be kept in mind that presence of co-morbidities complicates the treatment as it may be important to establish whether Internet addiction is the primary or secondary disorder.

As suggest in [9], research scholars in Pakistan are also recommended to validate the measures already in use and collaborate with international research community to develop a universally agreed-upon criterion for assessment and treatment. This will also pave the way for public policy debate and development of health care facilities in the country that provide early diagnosis and treatment to the affected individuals. The study reported in this journal on Internet addiction and its impact on academic performance is a head start for further research on the topic.

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ORIGINAL ARTICLE

Effect of Internet Addiction on Academic Performance of Medical Students

Muhammad Alamgir Khan[1], Ahsan Ahmad Alvi[2], Faizania Shabbir[3], Tasif Ahmed Rajput[4]

ABSTRACT

Objective: To determine the frequency of internet addiction among medical students and its effects on their academic performance.

Study Design: Cross sectional comparative study.

Place and Duration of Study: The study was conducted at Army Medical College, Rawalpindi from 5th January to 15th May 2015.

Materials and Methods: Data collection tool was a closed ended, self-administered questionnaire, 'Young's Internet Addiction Test'. Duly filled questionnaires were returned by 322 MBBS students. The 'Young's Internet Addiction Questionnaire' consists of 20 items with responses on a 5 point Likert scale. The total score which ranged from 20 to 100 was categorised into mild (normal), moderate (problem) and severe internet addiction. Scores $\leqslant$ 49 were classified as normal, 50-79 as moderate, and 80-100 as severe internet addiction. Academic performance of the students was measured as the percent marks obtained in 2nd professional MBBS examination. Students with marks 50 and above were declared as 'pass' and below 50 as 'fail'. Data was analysed using SPSS version 22. Simple linear regression was applied to determine the effect of internet addiction on academic performance.

Results: There were 175 male and 147 female students in the study with mean age of 19.27±1.01 years. Two hundred and sixty-eight (83.2%) students were in normal category, 52 (16.1%) in moderate and 2 (0.6%) in severe category. There was significant difference in the proportion of students who passed or failed the exam in the two categories (normal vs moderate + serious) being low pass and high fail in 'moderate+serious' categories (p=0.02). The mean internet addiction score was negatively correlated with academic performance (p=0.01).

Conclusion: Excessive internet usage by medical students may lead to internet addiction which may adversely affect their academic performance.

Key Words: *Computer, Internet Addiction, Young's Internet Addiction Test.*

Introduction

Information technology revolution of present era is primarily based upon internet. It has permeated into our lives to such an extent that life without internet seems meaningless. Every walk of life, education, research, business, military etc and even day to day chores are heavily dependent on internet.[1] There is tremendous amount of information available on internet which is just a click away. It is horrible for a today's student to think of the academic/research activities without internet. Internet has connected the people from fields of science and education all over the world.[2] Accomplishment of academic goals has become extremely easy in today's technology enabled epoch.[3] Amount of information available on internet is greater than present in world's largest libraries and with just a single click one can have access to the huge databases.[4] However, internet is a double edged sword; its appropriate use can undoubtedly facilitate the academic process like a magic wand whereas inappropriate use can wreak havoc.[5]

Inventors of the internet would have never thought that internet usage could also have a downside, named as bad as 'addiction'. Internet addiction is defined as "inability to stop internet overuse, tendency to perceive offline time as meaningless, excessive irritation and aggression during

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deprivation".[6] It is also described as internet dependence, pathological internet use or compulsive internet use.[7] Internet addiction can be compared to other types of addictions regarding risks and consequences.[8] It is especially prevalent in college/university students and can accompany or herald other psychiatric disorders.[9] The user feels himself unable to refrain from the use of internet and 'carried away' with it resulting in wastage of time and energy. This leads to substantial deterioration in performance, health and interpersonal relationships. The students are trapped in a vicious cycle which may lead to extremely adverse outcomes.[10] They find refuge in internet and tend to elope from reality.[11] Internet addiction has evolved as a major public health issue in the recent years and has gained attention of the researchers all over the world.[12]

Internet in the form of smart phones and tablets has become an integral part of every student's life.[13] Although a small fraction of students use internet for educational activities in a controlled way, however, a large percentage just keep wasting time by visiting 'non-educational' sites.[14] Research has shown that proportion of time a student spends on internet for educational purpose versus non-educational activity could significantly determine his success.[15] College students, being young and psychologically immature are naturally vulnerable to internet addiction, hence it is the responsibility of society, institutions, teachers and parents to adopt measure which can keep the youth away from this nuisance.[16] There is debate about advantages and disadvantages of internet usage among young students as the research data regarding internet addiction in students and its effects on their academic performance is scant. Hence, the current study was planned to determine the frequency of internet addiction among medical students and its effects on their academic performance.

Materials and Methods

This cross sectional study was conducted at Army Medical College, Rawalpindi from January to May 2015. The study was commenced after getting formal approval from Ethical review committee of Army Medical College. Non-probability convenience sampling was used to include medical students in the study after getting the written informed consent. Data collection tool was a closed ended, self-administered questionnaire, 'Young's Internet Addiction Test' which was developed by Young in 1998. The questionnaire is fully validated with high reliability index.[17] The questionnaire was distributed to 350 students of different classes of MBBS however, duly filled questionnaire were returned by 322 students at a response rate of 92%. The 'Young's Internet Addiction Questionnaire' consists of 20 items with responses on a 5 point Likert scale. The total score which ranged from 20 to 100 was categorised into mild (normal), moderate (problem) and severe internet addiction. Scores $\leqslant$ 49 were classified as normal, 50-79 as moderate, and 80-100 as severe internet addiction. Academic performance of the students was measured as the percent marks obtained in 2nd professional MBBS examination. Students with marks 50 and above were declared as 'pass' and below 50 as 'fail'.

Data was analysed using SPSS version 22. Mean and standard deviation was calculated for numerical variables like age of participants, marks obtained in professional exam, total Likert scale scores whereas frequency and percentage for categorical variables like gender and categories of each item of the questionnaire. Simple linear regression was applied to determine the effect of internet addiction on academic performance. Reliability was determined through internal consistency by applying Cronbach's Alpha test. The alpha value was set at 0.05.

Results

There were 175 male and 147 female students in the study with mean age of 19.27±1.01 years. Table I illustrates frequency and percentage of students falling in each category of internet addiction i.e. normal, moderate and serious. Table II shows cross tabulation of internet addiction categories (moderate + severe) with exam outcome status (pass/fail). The two variables are associated as indicated by the p-value (0.02). Table III shows overall mean score of the instrument along with mean academic performance in terms of percent marks in professional examination. The table also shows significant and inverse correlation between the two variables (r=-0.13, p=0.01). Table IV shows parameters of simple linear regression for prediction of academic performance from internet addiction scores. Academic performance can significantly be

predicted from internet addiction score as is evident from the p-value (0.016). Value of Cronbach alpha was 0.90 reflecting high reliability.

Table I: Frequency of different categories of internet addiction among the students (N=322)

Category	Frequency	Percentage
Normal	268	83.2
Moderate	52	16.1
Severe	2	0.6

Table II: Frequency and percentage of students with different categories of internet addiction (N=322)

Category	Pass	Fail	p-value
Normal	252 (94.0%)	16 (6.0%)	0.02
Moderate + Serious	46 (85.2%)	8 (14.8%)	

Table III: Correlation between internet addiction score and academic performance (N=322)

Variable	Mean±SD	r-value	p-value
Internet addiction	37.59±12.96	-0.13	0.01*
Academic performance (%marks)	60.77±9.18		

Table IV: Simple linear regression analysis of internet addiction as predictor of academic performance (N=322)

Model	B	Standard error	Beta value	t-value	p-value
Constant	60.34	1.56			
Internet addiction	-.095	0.039	-0.134	-2.42	.016*

Discussion

The average internet addiction score of our study (scale average) is about 38 which almost corresponds to 'occasional' category of the Likert Scale. The total internet addiction score ranges from 20 to 100 whereby 20 relates with almost no usage of internet and 100 relates with total internet addiction. The scale average of our study reflects that the use of internet by medical students is occasional and it is overall much away from internet addiction. The same finding is supported when the data was analysed by converting total internet score into the three categories i.e. normal, problem and serious according to 'Young's Internet Addiction' test guidelines. The results revealed that over 80% students were in normal category whereas about 17% had some degree of internet addiction. Academic performance of the students was significantly and negatively correlated with total internet addiction score. This means, the more the students were nearer to internet addiction on the scale, the less was their academic performance as reflected by their marks in the professional examination. When the data were analysed by considering the frequency of students within each category who passed and failed the examination, almost similar picture was seen. Ninety-four percent students in 'normal' category passed the exam and 6% failed whereas about 85% in 'problem plus serious' category passed the exam and 15% failed. The difference in proportion of students who passed or failed the exam in each category was found significant. After analysing the data from multiple perspectives, tests of statistical significance revealed that low academic performance was not by chance but due to the variable under study that is internet addiction. All these factors acting jointly push the students away from books leading to poor academic performance.

Stavropoulos V and colleagues conducted a study to recognizing internet addiction, prevalence and relationship to academic achievement in adolescents enrolled in urban and rural Greek high schools.[18] They also used 'Young's Internet Addiction' questionnaire and found a frequency of 3.1% for seriously addicted students. They found that internet addiction had negative correlation with academic performance as was the finding in our study. However, the frequency of severe internet addiction, they found was higher as compared to our study (0.6%). This may be due to the fact that study conducted by Stavropoulos had a larger sample size as compared to ours (2090 vs 322). The other reason may be that a large percentage of our students especially boys reside in hostels where internet is not provided. Akhtar carried out a study to determine internet addiction in university students and its effects on academic performance.[19] The scale

average of her study was 39.23 and she reported that internet addiction scores were negatively and significantly correlated with grade point average of the students (r=-0.130, p=0.039). The results reported by Akhtar were comparable to our study.

Excessive usage of internet in students leads to internet addiction due to which they cannot spend enough quality time on studies. They lose capacity to concentrate and focus on studies due to late night internet sessions. Even they sacrifice extracurricular activities for internet due to which they remain aloof and their mental and physical health deteriorate. Academic performance of a student depends not only upon his mental/physical health but also the degree of his time/self-management. To extrapolate the findings on to the general population, multicenter studies need to be conducted with a large sample size that is representative of the general population to draw reliable parametric inferences.

Conclusion

Excessive internet usage by medical students may lead to internet addiction which may adversely affect their academic performance. Parents/teachers need to take preemptive measures to avoid this and to remain vigilant especially for students whose academic performance is persistently low as internet addiction may be one of the reasons.

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ORIGINAL ARTICLE

Effect of Glycemic Control on Radiological Manifestations of Pulmonary Tuberculosis –A Hospital Based Study

Shamaila Burney[1], Omer Awwab Khan[2], Saerah Iffat Zafar[3]

ABSTRACT

Objectives:

- To study the frequency of diabetes in patients with active pulmonary tuberculosis.
- To determine the impact of diabetes on radiological findings in tuberculosis.
- To study the association of atypical radiological manifestations with glycemic control in diabetes associated tuberculosis.

Study Design: A Descriptive study.

Place and Duration of Study: The study was conducted in Medical Department of Pakistan Air Force Hospital Mianwali from August 2013 to July 2014.

Materials and Methods: Seventy five new cases (18 years and above) of active pulmonary tuberculosis were selected by non-consecutive convenient sampling. All patients received standard anti-tuberculous treatment (ATT) for six months. Fasting blood glucose and chest X-ray were performed in all patients. Glycosylated hemoglobin (HbA1c levels) were checked to assess the glycemic control in diabetic patients. Radiographic features of the two groups; diabetic vs. non diabetic and within diabetic population; poor vs. optimal glycemic control, were then compared.

Results: Thirty three (33/75 or 44%) patients were found to be diabetic. Radiological changes were more frequently atypical in diabetic group as compared to non diabetic population (21/33 or 63.6% vs. 8/42 or 19%). Nine of the 12 diabetic patients with poor glycemic control i.e. HbA1c levels >7% had cavitations, lower zone involvement and bilateral changes as compared to 11/21 patients with optimal glucose control i.e. HbA1c <7% and the difference was significant (9/12 or75% vs.11 /21 or 52.3%, p value <0.001).

Conclusion: A high index of suspicion for diagnosis of diabetes is required for TB patients with atypical radiological manifestations. Poor glycemic control is related with atypical findings on chest X-ray in pulmonary tuberculosis.

Key Words: *Atypical Chest X-Ray, Diabetes, Glycemic Control, Pulmonary Tuberculosis.*

Introduction

The re-emerging global pandemics of type 2 diabetes mellitus (DM) and tuberculosis (TB) is a serious threat to the attainment of Millennium Development Goals (MDG's) for Tuberculosis especially in the low and middle income countries of the world.[1] The looming co-epidemic of tuberculosis-diabetes (TB-DM) in South Asia is being compared to the tuberculosis- human immunodeficiency virus (TB-HIV) co-epidemic of sub-Saharan Africa in 80's and 90's, as one disease seems to fuel the other in the same manner.[2] A recent study on association between tuberculosis and diabetes in the developing region of Africa has shown that countries with rising diabetes prevalence have depicted a simultaneous increase in the prevalence of tuberculosis.[3] There is now sufficient evidence to suggest that TB patients with diabetes are more likely to experience an aggressive course of disease with more chances of treatment failure, multi-drug resistant TB (MDR-TB), relapse and death.[4] Literature review reveals that diabetes frequently alters the radiological manifestations of pulmonary tuberculosis.[5] Atypical findings are common with lower zone involvement, cavitations, multiple and/or bilateral lesions which are often misdiagnosed as pneumonia, lung abscess etc with delay in treatment. Recently it has also been suggested that poor glycemic control may be linked to atypical radiological findings in such patients.[6]

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Despite such conclusive evidence, unfortunately no separate guidelines/protocols for treatment of tuberculosis patients with diabetes currently exist. World Health Organization (WHO) and the International Union against Tuberculosis and Lung Disease in 2011 issued a global recommendation of bidirectional screening for early detection and management of both diseases.[7] Countries like China and India have already incorporated these recommendations into their TB-DM screening programs. However, in Pakistan, a country with one of the highest figures for both tuberculosis and diabetes, serious gaps between recommendations (including National TB Guidelines) and current practices still exist.

Present study was conducted to highlight the association of TB and DM and to investigate the impact of glycemic control on radiological manifestations of patients with coexistent TB and DM in our hospital setting. Published data on this association is still scarce. To our knowledge, no such study has been conducted in Pakistan so far.

Materials and Methods

This descriptive study was conducted in the Medical Department of Pakistan Air Force Hospital Mianwali from August 2013 to July 2014. The study was initiated after the approval of study proposal by the Hospital Ethics Committee after incorporating its suggestions to protect the patient's confidentiality. Seventy five new cases (18 years and above) of active pulmonary tuberculosis were selected by non consecutive convenient sampling after informed consent. Exclusion criteria included relapse cases, patients with extra pulmonary TB, type 1 diabetes, impaired fasting glucose, pregnancy and endocrinological disorders. Patients with immunocompromised states/comorbids such as HIV, chronic renal failure, cirrhosis or malignancies that could cause possible stress hyperglycemia and hence act as confounders were not included. Similarly patients taking drugs known to cause hyperglycemia such as steroids, beta agonists and thiazide diuretics were also excluded from the study. Active pulmonary TB was diagnosed when a patient with clinical features of TB met at least one of the following three criteria; a positive sputum smear, a positive sputum culture, or a positive chest radiograph.[8] Patients were divided into two groups; diabetes-associated TB patients (DMTB group) and non diabetic TB only patients (TB-only group). All patients received 4 drugs standard ATT in the initiation phase and 2 drugs in the continuation phase and treatment was monitored by parameters defined by the National TB guidelines.[8] Screening for diabetes mellitus was done by twice measured fasting blood glucose levels. Diagnostic criteria for diabetes followed the WHO guidelines; > 126 mg/dl fasting plasma glucose.[9] ATT transiently elevates glucose levels, therefore samples for blood glucose were taken before beginning ATT and repeated at 12 weeks. HbA1c levels were performed in all diabetic patients (previously known or newly diagnosed on screening) to determine the level of glycemic control. DMTB patients were then further subdivided into two groups. Patients with HbA1c levels > 7% were considered as having poorly controlled diabetes while patients with HbA1c < 7% had optimal glycemic control.[10] Chest X-ray findings that were considered atypical included lower zone involvement, bilateral involvement, large cavities (>2cm) and/ or multiple cavitations.[5,11] Radiographic features of the two groups with poor and optimal glycemic control were then compared.

Data was analyzed using IBM SPSS 20. Categorical data was calculated as frequencies and percentages. Mean and standard deviation was calculated for age. The chi-square test was used to test the statistical significance of categorical variables such as HbA1c levels and atypical chest X-ray and p-value of less than 0.05 was considered significant at 95% confidence interval.

Results

There were 35 male and 40 female patients. Only 6% were below 40 years of age while 26% patients were 70 years or older. Out of 75 new cases of pulmonary tuberculosis, 33 (44%) were found to be diabetic and constituted the TBDM group while 42/75 (56%) were non diabetic and constituted TB-only group. In the TBDM group, 20/33 (60.6%) were known diabetics and 13/33 (39.3%) were newly diagnosed detected on screening. Poorly controlled diabetes (HbA1c >7%) was observed in 12/33 (36.3%) diabetic patients and required insulin for sugar control. In 21/33 (63.6%) patients, HbA1c was < 7% and glycemic control was achieved with oral hypoglycemic agents. In none of the 33 diabetic

patients blood sugar was controlled with diet alone. Radiological changes were more frequently atypical in DMTB group as compared to TB-only group (21/33 or 63.6% vs. 8/42 or 19%). (Table I).

Table I: Frequency of atypical chest X-ray in diabetic and non-diabetic TB Patients (n=75)

Diabetes Status	No. of TB Patients	AtypicaL CXR	Percentage
Diabetic	33	21	21/33 (63.6%)
Non Diabetic	42	8	8/42 (19%)
Total Number	75	29	-

The presence of atypical changes was associated with poor glycemic control and insulin use. Nine of the 12 diabetic patients with poor glycemic control (HbA1c levels >7%) had cavitations, lower zone involvement and/or bilateral changes as compared to 11/21 patients with optimal glucose control (HbA1c <7%), (Table II). The difference was statistically significant (9/12 or75% vs.11 /21 or 52.3%, p value<0.001).

Table II: Atypical chest X-ray in TB patients with poor glycemic control

Diabetes Control	Typical CXR	Atypical CXR	Total Diabetic Patients	% With Atypical CXR
Hb A1c <7% (optimal)	10	11	21	11/21 (52.3%)
HbA1c >7% (poor)	3	9	12	9/12 (75%)
-	-	-	33	-

Discussion

In our study, 63.6% of patients in TBDM group were seen to have atypical radiological manifestations as compared to 19% patients in the TB-only group. Glycemic control is an important aspect of TB management and may have an effect on radiological manifestations. An attempt was thus made to correlate the two in the present study. Interestingly, a significant association existed between atypical radiological manifestations and poor glycemic control as DMTB patients with HbA1C levels >7% were more likely to have lower zone involvement, cavitations and/or bilateral changes as compared to non diabetic TB patients (76.9% vs. 55%, p value <0.001).

Literature review reveals that screening for DM in TB patients yields high prevalence of DM ranging from 1.9% to 35% depending on the geographical location.[12] In the present study, 44% of TB patients had co existing DM, a rate more than thrice the prevalence of diabetes in Pakistan (12.1% in males and 9.8% in females).[13] The frequency of newly diagnosed diabetes was 39.3% in our study which is also higher than most previous studies[14,15,16]and highlights the significance of screening for diabetes in all patients with tuberculosis.

Pulmonary TB has a propensity to affect upper lobes of the lungs. It is still a matter of debate whether or not the presence of diabetes alters the radiological manifestations of PTB.[5,17] Previously authors have reported that chest X ray findings are frequently atypical in TB patients having diabetes; with lower zone involvement, cavitations, bilateral changes and multi lobe involvement.[18,5] The study by Parez-Guzmann was most striking in this aspect who determined that diabetes was the most significant factor in development of lower lung lesions.[5] In one of the more recent studies conducted, Patel et al also reported a high frequency of atypical chest X-rays in patients with coexistent TB and DM.[19] However other authors do not report any significant difference.[17]

Literature search revealed that data regarding association of radiological manifestations with glycemic control is scarce. Earlier, Park et al suggested that poor glycemic control was linked to a higher incidence of cavitatory lesions.[18] In a recently conducted Indian study, Avathu et al studied 70 diabetic patients with PTB and concluded that atypical changes were more frequently seen in diabetic patients with HbA1c levels >7% and poor glycemic control as compared to those with optimal control.[10]A most recent large scale study conducted in Taiwan also reported significant correlation between poor glycemic control and atypical radiological features.[6] The findings of the present study are thus in agreement with these few studies.

Tuberculosis was a deadly threat to diabetic patients

in the pre-insulin era. Poor diabetes control possibly exacerbated by co-existent tuberculosis affects innate cytokine responses. Suboptimal glycemic control not only predisposes to tuberculosis, it often leads to poor ATT response. This could result in higher chances of complications with treatment failure, relapse and case fatality. Anti tuberculous drugs and oral hypoglycemic agents have complex interactions with one another and diabetes patients may have lower concentrations of anti-TB drugs.[2] While drugs such as rifampicin are known to cause transient hyperglycemia, some of the newer oral hypoglycemic agents such as gliptins can lower the efficacy of ATT. Resultant TB associated hyperglycemia often worsens the glycemic control of diabetes necessitating timely switching to insulin.[20] In the present study, 36.3% of the patients with TB had uncontrolled hyperglycemia (HbA1c >7%), and required insulin for sugar control. Although we did not have a comparison group of diabetes-only patients, it is noteworthy that in none of the TBDM patients blood sugar could be controlled with diet alone. A significant number of newly diagnosed diabetics also had poorly controlled diabetes.

Previously, a similar study from Lahore (Pakistan) had determined the frequency of diabetes in TB patients as 25.9% and that of the newly diagnosed cases as 5.69%.[14] Balakrishnan et al have reported the frequency DM in TB as 44% in India, a country with similar demographic and socioeconomic background.[15] The incidence of newly diagnosed diabetes cases in their study was 21%.

PAF Hospital Mianwali is one of the peripheral hospitals in Mianwali District catering for the needs of all the patients affiliated with Pakistan Armed Forces from District Mianwali, Chakwal, Khushab, DI Khan, Layyah and Bhakkar. Moreover it has a high turnover of civilian patients. The limitations of our study include a relatively small sample size due to limitation of resources and a high number of patients being lost to follow up by virtue of peripheral location of our hospital. In addition we also applied stringent exclusion criteria such as exclusion of patients with impaired fasting glucose and including only patients who were followed up until complete duration of treatment. Despite these limitations, our study not only augments previous local studies in terms of a high occurrence of DM in patients with pulmonary TB, it also highlights other clinical aspects such as maintaining strict glycemic control with frequent monitoring and possible switching to insulin, when treating TB patients with coexisting DM. Further large scale studies from other regions of Pakistan are needed to explore these aspects in detail. Similarly standards and protocols have to be developed at hospitals and national level for diagnosis and treatment strategies for management of diabetes mellitus in newly diagnosed cases of tuberculosis.

Conclusion

We conclude that optimal glycemic control is an integral component of TB treatment. A high index of suspicion for diabetes is required for TB patients with atypical radiological manifestations. Active screening for diabetes in all patients with tuberculosis can be a more cost-effective way of controlling and preventing both diabetes and tuberculosis.

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ORIGINAL ARTICLE

Vitamin D Level in Unmarried Females with Polycystic Ovarian Syndrome

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ABSTRACT

Objective: To assess and compare the levels of vitamin D in the young unmarried patients of PCOS and healthy females of same age group in population of Rawalpindi.

Study Design: A descriptive cross sectional study.

Place and Duration of Study: The study was conducted in Gynecology and Obstetrics department of Railway Hospital, Rawalpindi in collaboration with Department of Biochemistry IIMC, Rawalpindi from October, 2014 to April, 2015.

Materials and Methods: A sample of 150 young, unmarried females of 16-25 years was enrolled with their written consent in this study. These females were divided into two groups, 50 apparently healthy females and 100 diagnosed patients of polycystic ovarian syndrome selected according to Rotterdam criteria. Vitamin D assay was measured by using 25OH Vitamin D Total Elisa Kit. Data was collected on pre-designed questionnaire. The Data was subjected to SPSS version 21 and analyzed using independent T-test.

Results: We had 56% controls and 56% PCOS patients suffering from severe vitamin D deficiency. Women with PCOS showed no significant differences in the vitamin D level (10.618+5.296 ng/ml in patients vs 11.846+7.898 ng/ml in controls, respectively, p=0.324). We also did not find significant association between severity of hypovitaminosis D and clinical symptoms of hyperandrogenism like hirsutism (P=0.669), acne (P=0.480) and alopecia (P=0.317).

Conclusion: Hypovitaminosis D is equally common among both PCOS patients and healthy females. There is no difference in the vitamin D level among PCOS and control subjects suggesting that there is no role of vitamin D in the pathogenesis of PCOS.

Key Words: *Polycystic Ovarian Syndrome, Hyperandrogenism, Vitamin D.*

Introduction

The Polycystic ovarian syndrome (PCOS) is the commonest heterogeneous endocrine disorder and major health problem among females in their reproductive life with the prevalence of 6-15% but it may high up to 20%, depending on used criteria.[1] Study among Asian people showed the prevalence of PCOS about 6.3% among females in their reproductive age (15-45 years) in Srilanka, 2-7.5% in females of China by using Rotterdam criteria.[2] A study from Pakistan in 2005 reported a prevalence of PCOS about 20.7%.[3] It was first reported in 1935 with the clinical manifestations including amenorrhea, hirsutism, obesity, acne and alopecia[4] and has been significantly associated with insulin resistance, hyperinsulinemia, diabetes mellitus type 2, hypertension, dyslipidemia and cardiovascular disease.[5] The PCOS cases don't exhibit the clear pathophysiology however some factors including insulin resistance, obesity, genetic, environmental, endocrine and metabolic factors may thought to be involved in the development of PCOS.[6] Under the 2003 Rotterdam diagnostic criteria for polycystic ovary syndrome, presence of any two features out of three (polycystic ovarian (PCO) morphology on ultrasound scan, clinical and biochemical hyperandrogenism and oligo-amenorrhoea) are the diagnostic tool for declaring polycystic ovary syndrome.[7]

In past few years vitamin D has got the popularity in the field of research due to its association with many diseases including reduced fertility, endometriosis and polycystic ovarian syndrome. Vitamin D is a fat soluble steroid hormone synthesized in the skin by

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ultra-violet radiations which convert the 7-dehydrocholesterol into cholecalciferol. Active form of vitamin D ($1,25(OH)_2D$) is formed by the two hydroxylation process occurring in liver and kidney in the presence of 25-hydroxylase and 1α-hydroxylase.[8] $1,25(OH)_2D$ is then bound with the VDR, a transcription factor, involved in the expression of up to 2000 gene.[9] Vitamin D has a significant role in bone metabolism and mineral homeostasis but also involved in cellular growth process, differentiation and metabolic modulations. Many studies have investigated the vitamin D status in PCOS patients but the contradictory results have made the role of vitamin D suspicious in pathogenesis of PCOS. Limited studies with modest sample sizes have shown the association between VDR (vitamin D receptor) polymorphisms and the development of a polycystic ovarian syndrome.[8]

Most studies have focused on Caucasian population and no such research has been done before in Pakistan. Our study aim was to find out the association between PCOS and vitamin D and to know whether a low vitamin D status can be observed in unmarried young female with PCOS. In addition we also investigated the association between clinical symptoms of hyperandrogenism and hypovitaminosis D.

Materials and Methods

A descriptive cross sectional study was conducted in Gynecology and Obstetrics department of Railway Hospital, Rawalpindi in collaboration with Department of Biochemistry IIMC, Rawalpindi over a period of 6 months after obtaining approval for research proposal. We enrolled 150 young, unmarried females of 16-25 years from OPD of Gynecology and Obstetrics department of Railway Hospital by using non-probability purposive sampling technique with their written consent after explaining the purpose of study. These females were divided into two groups, 50 apparently healthy females had normal menstrual cycles and none of them had clinical symptoms of hyperandrogenism and 100 newly diagnosed patient of polycystic ovarian syndrome selected according to Rotterdam criteria. Accordingly, the presence of two features out of three i.e polycystic ovarian (PCO) morphology on ultrasound scan (presence of 12 or more follicles measuring 2-9 mm in diameter per ovary or ovarian volume above 10cc), clinical/biochemical hyperandrogenism (hirsutism, acne or alopecia and /or elevated androgens levels) and ovulatory dysfunction (oligomenorrhea or amnorrhea) were existed. The females taking drugs(oral contraceptive, hypoglycemic drugs, vitamin D supplementation) and with other medical causes including Cushing syndrome, androgen secreting tumor, thyroid disorders, and prolectinemia were excluded from the research. Ferriman-Gallwey scoring system was used to evaluate the hair growth at seven sites: upper lip, chin/ face, chest, back, abdomen, arms and thighs. A score above 8 was indicative of hirsutism. Body weight in kilogram and height in meters was measured and BMI was calculated as weight (kg) divided by the square of the height (m). Subjects were categorized as normal weight (BMI between 19.5 to 25), overweight (BMI between 25 to 29.9) and obese (BMI > 30).[10] 3ml venous blood was drawn in vaccum clot activator tubes from both groups and centrifuged at 2500-3000rpm for 15 minutes for serum separation. Serum samples were stored at -20°C[11] until further analysis at Biochemistry Research Laboratory IIMC. The vitamin D assay was measured by Enzyme Linked Immunosorbent Assay by using 25OH Vitamin D Total Elisa Kit: Cat#KAP1917; LOT#131106 (DIAsource, S.A,Belgium). Hypovitaminosis was defined as plasma level of 25(OH) D less than 30ng/ml, graded as severe vitamin D deficiency for plasma level of 25(OH) D <10ng/ml, mild vitamin D deficiency for plasma level of 25(OH) D 10-19.9ng/ml and vitamin D insufficiency for plasma level of 25(OH) D 29.9ng/m.[12] Statistical analysis was done in SPSS version 21.0. Results were compared by applying independent T test and Chi-square. The level of significance was set as $P<0.05$.

Results

Vitamin D levels were tested in both the groups, cases and controls and it is found that 56% controls and 56% PCOS patients have severe vitamin D deficiency (>10ng/ml), 30% controls and 38% PCOS women have vitamin D deficiency (10-19.9ng/ml). Only 1 (2%) woman in control group has sufficient level of vitamin D (>30ng/ml). The mean vitamin D level is bit higher in controls (11.846±7.898) as compared to PCOS patients (10.618±5.296), but this is not statistically significantly (P-value > 0.05)

different in both groups as given in table I. According to the results it is found that there is significant (p-value < 0.05) difference in BMI of both groups. The mean BMI in PCOS patients (27.094±4.396) is significantly (p-value < 0.05) greater in comparison to control group (20.739±3.452). The association of

Table I: Comparison of mean Vitamin D level in 50 controls and 100 PCOS patients

	Group	N	Mean	Std. Deviation	P-Value
Vitamin D level (ng/ml)	Control	50	11.846	7.898	0.324
	PCOS	100	10.618	5.296	

Table II: Association of BMI with vitamin D status in 100 PCOS patients

Body Mass Index	Vitamin D status			Total	P-value
	Severe Vit D deficiency	Vit D deficiency	Vit D Insufficiency		
Normal weight	13	5	2	20	0.322
Over weight	10	5	2	17	
Obese	33	28	2	63	
Total	56	38	6	100	

BMI and vitamin D status in PCOS patients is found insignificant (p-value > 0.05). There is no significant relationship between body mass index and vitamin D level in patients of PCOS as elaborated in table II. The distribution of clinical symptoms presented by the PCOS patients show that majority of PCOS subjects has oligomenorrhea (59%), hirsutism (51%), polymenorrhea and irregular menstruation (9%), acne (8%), alopecia (7%) and amenorrhea (5%) but study does not find any significant association between severity of hypovitaminosis D with clinical symptoms of hyperandrogenism like hirsutism (P-value>0.05), acne (P-value>0.05) and alopecia (P-value>0.05).

Discussion

PCOS is one of the most common female endocrine disorder with the prevalence of 5-10% in females of reproductive age causing infertility, metabolic and psychological disturbances leading decreased quality of life.[13] Vitamin D deficiency has been shown to be associated with the development of PCOS through the gene transcription.[14]

According to the result of our study the mean value of vitamin D is bit higher in controls (11.846+7.898 ng/ml) as compared to PCOS patients (10.618+5.296 ng/ml) but the difference is not statistically significant. So our study does not find any association between serum vitamin D and PCOS. Our findings are similar to the findings observed by Kim et al. who found no differences in the absolute level of serum vitamin D between PCOS patients (19.6+6.6 ng/ml) and matched controls (20.1+7.4 ng/ml) and p= 0.696. Panidis et al. also reported that vitamin D levels were similar in women with and without PCOS.[14] These results are also in line with our study. Wehr et al. reported lower serum vitamin D level in women with PCOS (n=545) compared to control (n=145) (25.7 vs 32.0 ng/ml, respectively).[15] Observational study conducted in Italy reported lower serum vitamin D level in 90 PCOS women (32.4nmol/l=10.18ng/ml) than in 40 controls(73.7nmol/l=23.17ng/ml).[11] The study carried out by Mahmoudi et al. even found a significantly higher serum vitamin D level in PCOS women (29.3ng/ml) than in controls (19.4ng/ml) with similar age and BMI.[14] Although there is discrepancy in the literature about the vitamin D levels between women with and without PCOS but it is clear that vitamin D deficiency is a common finding among controls and PCOS patients. Many studies have been carried out to investigate the association between vitamin D status and BMI. Our findings reveal that the mean BMI in PCOS patients (27.094+4.369) is significantly (p-value < 0.05) greater in comparison to control group (20.739+3.452). This result is in the line with the results of the other studies.[5,16,17] Our results shows insignificant association between BMI and vitamin D status among PCOS patients demonstrating that 33 obese and 13 normal weight PCOS patients are severe vitamin D deficient. The descriptive cross sectional study conducted by Faraj et al in 2014 also found no significant association between vitamin D and BMI.[18] Another study conducted in Iran by Firouzabadi et al. on 100 infertile PCOS women also found no significant association between BMI and serum vitamin D level before and after the treatment with calcium and vitamin D supplements.[19] Although

Wehr et al. found the strong correlation between BMI and vitamin D concentration in women with PCOS in 2009.[20,21] Although hypovitaminosis D is common in PCOS but we don't not find significant association between severity of hypovitaminosis D and clinical symptoms of hyperandrogenism like hirsutism (P=0.669), acne (P=0.480) and alopecia (P=0.317). The results of our study are in agreement with the result of study conducted in young females (16-20 years old) in 2014.[22] One small uncontrolled study (n=13) has shown the improvement of acne vulgaris in the affected females when treated with vitamin D supplements but study found no improvements in hirsutism and alopecia.[14] Our result are in contrast with the finding of Wehr et al who found negative correlation between hirsutism and vitamin D level.[20] It seems that this difference may be due to the age and presence of metabolic features in PCOS patients. Further work is needed in this field because studies show that 60% to 80% females with PCOS present with hyperandrogenism and hirsutism is the most common feature presented by 70% of PCOS patients.[17] A population based cohort analysis study in 2014 alarmed that PCOS or hirsutism alone cause persistently high depression and anxiety in women.[23]

The limitations in our study were small sample size, the lack of adjustments for confounders that may play a role in causing vitamin D deficiency and secondly the metabolic features of PCOS were not evaluated for comparison with vitamin D level.

To the best of our knowledge we are the first investigating the relationship between vitamin D deficiency and PCOS in Pakistan. To prove our findings new therapeutic approaches and large intervention trials are required.

Conclusion

Vitamin D deficiency is becoming a major public health problem worldwide in all age groups. Studies from Africa, Australia, Brazil, Middle East, Mongolia and New Zealand also indicate a high risk for vitamin D deficiency in both adults and children. On the basis of this findings vitamin D deficiency or insufficiency is present in 1 billion people around the world.

This study found no difference in the vitamin D level among PCOS and control subjects. Hypovitaminosis is common in both PCOS and healthy females suggesting that vitamin D has no role in the pathogenesis of PCOS. Our results are in agreement with the previous data supporting an association of BMI with PCOS but don't support the significant association of BMI with severity of hypovitaminosis D.

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ORIGINAL ARTICLE

Laser Cordectomy in Bilateral Abductor Paralysis

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ABSTRACT

Objective: To determine the effects of Unilateral Posterior Cordectomy by CO_2 laser, in terms of improvement of airway with acceptable voice quality, among the patients with Bilateral Abductor Paralysis.

Study Design: A Descriptive study.

Place and Duration of Study: The study was carried out in ENT Department Combined Military Hospital (CMH) Rawalpindi and Armed Forces Institute of Rehabilitation Medicine (AFIRM) Rawalpindi, from August 2011 to July 2015.

Materials and Methods: A total of 33 patients having difficulty in breathing or stridor with bilateral vocal cord paralysis were selected for unilateral posterior cordectomy by CO_2 laser. Prior tracheostomy was carried out. Cordectomy involved laser ablation of one of the vocal cords anterior to vocal process of arytenoids. CO_2 Laser was used in intermittent firing mode, with 5 watt power super-pulse and small spot size. Post operatively all patients were given Intravenous antibiotics, steroids and analgesics. Post operative speech therapy was carried out in all these patients at the AFIRM. Successful outcome was taken as the ability to decannulate with acceptable voice quality.

Results: Decannulation was successful in 31 patients, while acceptable voice quality could not be achieved in 7 patients. Hence successful outcome was made possible in 24 (73%) patients.

Conclusion: Unilateral posterior laser cordectomy, in patients with bilateral abductor paralysis, gives excellent results in improving the airway, while preserving an acceptable voice quality.

Key Words: *Co_2 Laser, Posterior Cordectomy, Vocal Cord Paralysis*

Introduction

Bilateral abductor paralysis with respiratory distress is not a very common finding, but may present as an acute emergency. Iatrogenic trauma, especially the thyroidectomy, has been seen as the commonest cause for this problem. The patient presents with dyspnoea and stridor, although voice quality is not affected.

First surgical intervention to address this problem was carried out by Chevalier Jackson in 1922 when he removed the entire vocal fold along with the ventricle (ventriculo-cordectomy). Since then various surgical procedures including various types of arytenoidectomy and other lateralization procedures have been carried out with varying results., Of course, aim of all these procedures was to improve the airway. But it was always at the cost of quality of voice. In any procedure designed to improve the airway the surgeon has to strike a delicate balance between patent airway and acceptable voice quality. Hence further developments in this context were made to improve the airway while preserving good quality voice as well.

In 1989, Dennis and Kashima carried out posterior laser cordectomy to address this problem. Cordectomy involves ablation of vocal fold along with the vocalis muscle. Although this procedure gives good respiration, but quality of post operative voice is less than ideal, hence reinnervation procedures were attempted to gain better voice quality, but showed inconsistent results. Bilateral posterior cordotomy is another modification in this regard. But no matter whatever procedure is adopted for improvement of airway, it is a compromise with the voice quality. But since, voice quality is not the primary aim in this condition, an acceptable voice quality with decannulation of the patient is considered a successful outcome. Since posterior laser cordectomy with Carbon Dioxide laser gives successful outcome in around 90% of the cases with negligible complication rate, it has

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become procedure of choice. Moreover, it is a safe and simple procedure which can be repeated without any increase in morbidity. However, this procedure cannot be undertaken in patients having thick, short necks or having fixation of spine as vocal cords are not properly visible.

Materials and Methods

A descriptive study was carried out in ENT Department, Combined Military Hospital Rawalpindi and Armed Forces Institute of Rehabilitation Medicine (AFIRM) Rawalpindi, from August 2011 to July 2015. The aim of this study was to determine the effects of Unilateral Posterior Cordectomy by CO_2 laser, in terms of improvement of airway with acceptable voice quality, among the patients with Bilateral Abductor Paralysis.

In this duration, 33 patients (n= 33) with Bilateral Abductor Paralysis reporting in the ENT OPD with complaints of difficulty in breathing and stridor, were selected by convenient sampling. Only those patients were included, in whom, at least six months had passed since they suffered this problem, as six to nine months are required for spontaneous recovery. Those patients, who had already undergone some corrective surgery, were not included in the study. Those patients, who refused to undergo laser surgery, were also excluded from the study. Nineteen of these patients had stridor even at rest and urgent tracheostomy was carried out on them. Detailed history was taken in all these cases to determine the cause and duration of cord paralysis. Complete ENT and head and neck examination was carried out in these patients. Indirect laryngoscopy and flexible fibreoptic laryngoscopy were carried out in all of them. Routine investigations were carried out in all these patients, while CT scans of base of skull, neck and thorax, Blood Glucose levels (R), Coagulation Profile, Serum Lipid profile and ESR were done in the patients with no apparent cause. The selected patients were counseled about procedure of vocal cordectomy with Carbon Dioxide Laser and its effects on airway and voice quality.

All of these patients underwent surgery. All of them were operated by the same Consultant ENT surgeon. Cordectomy involved laser ablation of one of the vocal cords anterior to vocal process of arytenoids. Carbon Dioxide Laser was used in intermittent firing mode, with 5 watt power super-pulse and small spot size. Post operatively all patients were given Intravenous antibiotics, steroids and analgesics. Post operative speech therapy was carried out in all these patients at the AFIRM Rawalpindi. Successful outcome was taken as the ability to decannulate with acceptable voice quality, the voice that is easily understandable.

The parametric data was analyzed for frequencies by SPSS 19.

Results

The causes of bilateral abductor paralysis are shown in Table I.

Table: I. Etiology of Bilateral Vocal Cord Paralysis

S.No	ETIOLOGY	NO OF PATIENTS
1	Surgical Trauma	23 (70%)
	a. Thyroid Surgery	20
	b. Cardiac Surgery	01
	c. Tracheal Surgery	02
2	Accidental Trauma	03 (9%)
3	Idiopathic (No known cause)	07 (21%)
	Total (n)	33

Unilateral posterior laser cordectomy was carried out in 33 patients. Twenty (61%) patients were successfully decannulated on 5th post operative day, while 5 (15%) patients were decannulated in the 2nd post operative week. In four (12%) of these patients procedure had to be repeated once after a fortnight, while in two patients (6%) the procedure was repeated thrice fortnightly, before decannulation was possible.

Two (6%) patients could not be decannulated despite repeated procedures. In 7 (21%) patients, the post operative quality of voice was poor. Hence the successful outcome was possible in 24 (73%) patients.

Discussion

Our study shows success in 73% of the patients. These results are comparable with results of other studies carried out at various centers. Our study also describes thyroidectomy to be the commonest cause of bilateral abductor paralysis.

Bilateral abductor paralysis is a potentially life threatening condition. Its management is one of the biggest challenges an Otolaryngologist has to come across, and still tracheostomy is considered to be the safest and permanent solution for this problem.

Bilateral abductor paralysis mostly occurs as a result of trauma, mostly iatrogenic. Among surgical procedures, thyroidectomy has been the most frequent cause. Our study also confirmed this fact. In our study the thyroidectomy appeared to be the most frequently carried out surgical procedure (87%) that resulted in bilateral abductor paralysis. Probably it is the result of poor surgical technique where the surgeon does not identify the recurrent laryngeal nerves while doing surgery. Other such studies also show thyroidectomy to be the most frequent cause of bilateral abductor paralysis. Ozdemir et al (2013) also showed thyroidectomy as the surgical procedure resulting in bilateral abductor paralysis in 92% of the patients.

As posterior glottis accounts for 50-60% of the glottis, any surgical intervention in this area is bound to improve the airway. This is the basis for posterior laser cordectomy, but degradation of voice quality after any such procedure is a known fact. The patients included in this study were counseled about this outcome. Any improvement in the airway is always at the cost of voice quality. In our study, decannulation was possible in 76% of the patients after first surgical intervention. The results are not much different from other studies as decannulation was made possible in 94% of the patients after repeated interventions. Khalil & Tawab (2014) had similar results in terms of improvement in airway. Similar results in terms of improvement in airway were shown in another study by Motta S et al (2003). Another study also showed improvement of airway in 89% of the patients and similar results were shown by Shvero et al (2003).

In our study satisfactory voice quality was achieved in 73% cases. Similar results were shown in a study by Segas et al (2001). Dispenza et al (2012) also showed satisfactory results in a similar study. Landa et al reported a 95% success rate with posterior transverse cordotomy, with excellent voice outcome. Although our study includes only 33 patients in a descriptive case series, it may not be very significant. Hence, it is recommended that further studies be carried out at a broader level that should compare the results of various surgical procedures carried out to manage bilateral abductor paralysis.

Conclusion

Unilateral posterior laser cordectomy, in patients with bilateral abductor paralysis, gives excellent results in improving the airway, while preserving an acceptable voice quality.

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ORIGINAL ARTICLE

Effect of Vitamin C on Monosodium Glutamate (Ajinomoto) Induced Changes in the Ovary of Rats

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ABSTRACT

Objective: To determine the protective effect of Vitamin C on MSG (Ajinomoto) induced histomorphological changes in rat ovary.

Study Design: It was randomized control trial.

Place and Duration of Study: This study was carried out in the department of Anatomy, Islamic International Medical College, Rawalpindi, in collaboration with National Institute of Health (NIH), Islamabad. The study was conducted from September 2015 to March 2016.

Materials and Methods: Total 45 female rats (Sprague Dawley) were used and divided into 3 groups. The control group (C) was kept on plain water and normal laboratory diet, while the experimental group A, was given MSG and experimental group B, was fed on MSG and Vitamin C both, for 4 weeks to induce histological changes in ovary. All rats were sacrificed after 4 weeks. Ovaries were dissected out and examined for gross and histological parameters. Results were compared with the control and experimental groups.

Results: In experimental group A, weight of the ovary was increased as compared to the control group. The histological examination of ovary showed granulosa cell degeneration and decrease in the number of primary follicles in group A. In addition to MSG, vitamin C was also given to experimental group B by mixing it in drinking water and the dissected ovary of this group showed changes which were less severe than experimental group A.

Conclusion: Protective effect of vitamin C is proved on MSG induced histomorphological changes in ovary of rats.

Key Words: *Degenerated Granulosa Cells, Infertility, MSG, Number of Primary Follicles, Vitamin C.*

Introduction

Fertility or fecundity is defined as the ability to conceive children[1],while infertility is defined as inability of a couple to conceive after a period of twelve months of unprotected sexual intercourse. According to WHO, infertility is defined as inability of a couple to conceive after twenty four months of unprotected intercourse.[1] Rate of infertility has increased remarkably over the past twenty years.1Almost one in six couples have a delay in conception while only few of them would attempt for medical treatment.[1]

It is roughly calculated that in 40% to 50% of couples, infertility is due to female problems which include disorders of oocyte production, fallopian tube function and implantation of embryo.[2] According to WHO, the factors responsible for infertility in females include tubal factors 36% ,disorders of ovulation 33% and endometriosis 6% and evincible causes 40%.[3]

Globally the rate of infertility is about 10–15%.[1] Inspite of the fact that Pakistan is one of the popular countries of the world and its population growth rate is about 2% and it also has high rate of infertility that is about 21.9% out of which 3.5% are due to primary causes and 18.4% are due to secondary reasons. According to the statistics ratio this indicates that the average number of children in married Pakistani women is 6.5.[1]

The female reproductive system is easily offended by harmful environmental factors which include environmental chemicals, industrial pollutants and food additives.[1-3]One of the food additive is Monosodium glutamate, commonly known as Ajinomoto.[1-3]

It is commonly used in restaurants (especially mixed in noodles), packaged food industries including chips, salads, soups, canned food and household kitchen.[1-3] MSG increases the palatability of meal by

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triggering the taste buds to ''UMAMI'' taste which is a pleasant savory taste4and it also accelerates appetite centre which results in increase in body weight.[5]

MSG is a sodium salt of glutamic acid which is one of the naturally occurring non essential amino acid.[6] The part of MSG that negatively affects the human body is glutamate not the sodium.[7,8] It is composed of 78% glutamic acid, 22% sodium and water.[9]

Vitamin C defends the human body against oxidative damage by preventing oxidative damage to DNA, proteins and lipids.[8] Reactive oxygen species (ROS) plays a critical role in the normal function of reproductive system and also in the pathogenesis of female infertility.[10] Oxidative stress will impair the oocyte maturation and folliculogenesis.[11] Treatments that reduce the oxidative stress may help to reduce the infertility caused by this imbalance.[10] This research was done with an objective to observe the reverse histological effects of vitamin C on MSG induced changes in ovary.

Materials and Methods

It was a randomized control trial. The study was carried out in the department of Anatomy Islamic International Medical College in collaboration with National Institute of Health and the duration of study was from September 2015 to March 2016. Forty five female adult rats (Sprague Dawley) with a weight of 250-350g and age between 10-12 weeks were included in this study. Pregnant female rats and rats with any obvious pathology were excluded. Male rats were also excluded. Rats were purchased from animal house of NIH, Islamabad where they were kept under standard laboratory conditions.

Rats were randomly divided into 3 groups. The control group C (n = 15) was kept on standard pellet diet with tap water to drink. The experimental group A (n = 15) was fed on MSG diet for 4 weeks to induce degenerative changes. The experimental group B (n = 15) was fed on MSG and vitamin C diet for a period of 4 weeks.

Dissected ovaries were examined for gross and histological parameters.

After tissue processing, embedding was done in paraffin wax. For the preparation of slides haematoxylin and eosin stains were used. Microscopic study was done under 10x and 40x objective. Statistical analysis was done in SPSS version 20.0. Qualitative variables were analyzed in percentages and compared by applying Pearson Chi Square test. Quantitative data was expressed as Mean + S.D. The means were compared among three groups by using one way Analysis of Variance (ANOVA). A p–value of <0.05 was considered statistically significant.

Results

Gross Assessment

Weight of Ovary: Weight of ovaries and histological analysis of all experimental animals were done. The weight of ovary in control group was 0.15±0.02 gm. The weight of ovary in group A, was 0.21±0.03gm. The weight of ovary in group B, was 0.18 ±0.05gm.So the mean weight of ovary was greater in group A and the difference was statistically significant ($p < 0.001$). (Table I)(Fig 1).

Control group had significantly lower mean weight as compared to experimental group A ($p< 0.001$). Control group had lower mean weight as compared to experimental group B ($p = 0.03$) which is insignificant. Similarly experimental group A had higher weight as compared to experimental group B ($p = 0.06$) which is also insignificant.

Table I: Mean weight of ovaries in three groups

Groups	Weight of ovary Mean±SD	SEM	p- value
Control Group C (n = 15)	0.15 ± 0.02	0.005	< 0.001
Group A (n = 15)	0.21 ± 0.03	0.009	
Group B (n = 15)	0.18±0.05	0.01	

Microscopic Assessment

One quantitative and two qualitative histological parameters were also studied.

Number of primary follicles

Number of primary follicles were counted per slide at 10x.The average number of primary follicles were 5.9±1.2 in control group C, In experimental group A, the number of primary follicles is 2.7±1.8 and in experimental group B, the number of primary follicles is3.4±1.7 and this difference of mean is statistically significant (p-value<0.001). (Table II and Fig 1).

Control group had significantly higher mean of

number of primary follicles as compared to experimental group A (p< 0.001). Control group had higher mean of number of primary follicles as compared to experimental group B (p = 0.001) which is insignificant. Similarly experimental group A had lower mean of number of primary follicles as compared to experimental group B (p = 0.28) which is insignificant.

Table II: Mean number of primary follicles in three groups

Groups	Number of primary follicles Mean ± S.D	SEM	p-value
Group C (n = 15)	5.9 ± 1.2	0.30	
Group A (n = 15)	2.7 ± 1.8	0.46	< 0.001*
Group B (n = 15)	3.4±1.7	0.44	

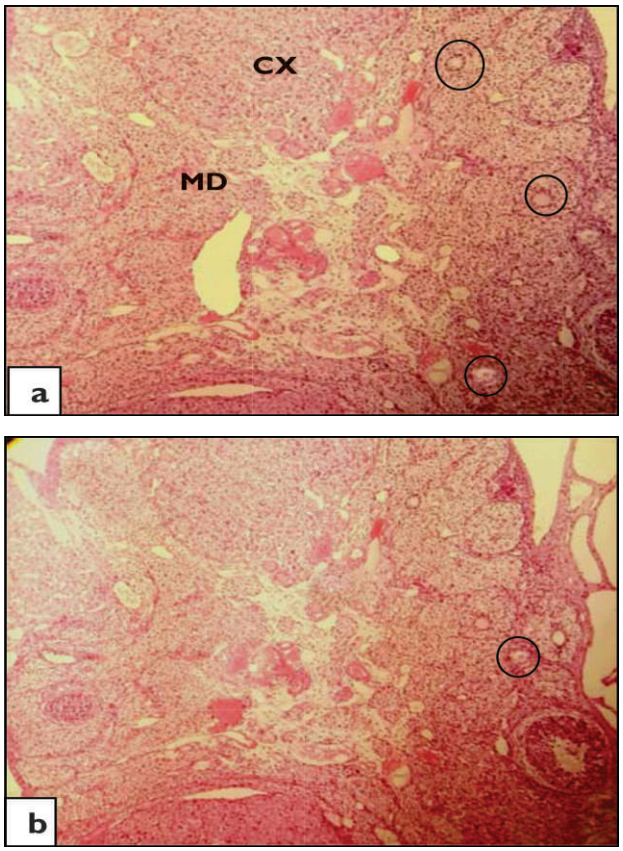

Fig 1: Photomicrograph (a) showing cortex (CX), medulla (MD) and primary follicles in animal rat no. C13 and (b) showing primary follicle in animal rat no. A1 (demarcated by a circle). H & E Stain, x10

Granulosa cell degeneration

In control group C, none of the rat showed granulosa cell degeneration. In group A, 11 rats (73.3%) showed granulosa cell degeneration and in group B, there were 6 rats (40%) which showed degeneration of granulosa cells. Presence of granulosa cell degeneration was significantly (p-value <0.001) different between all groups.(Fig 2).

Vascular congestion in medulla

In control group C, none of the rat was found with increase vascular congestion in medulla whereas in group A, there were 12 rats (80.0%) with an increase in vascular congestion and in group B, there were 6 rats (40%) with increased vascular congestion. Statistically significant p-value <0.001 was obtained after comparison between all groups.(Fig 3).

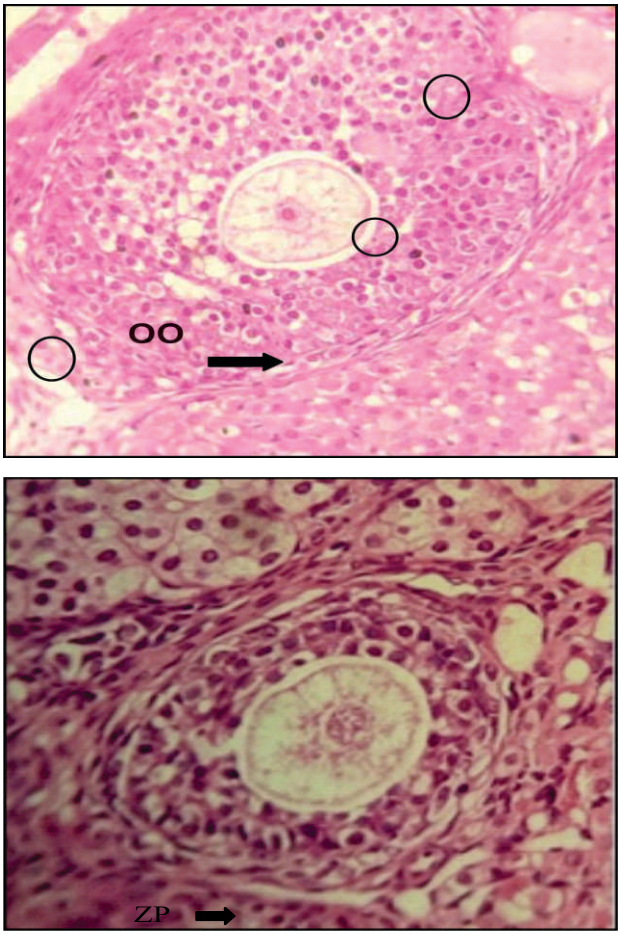

Fig 2: Photomicrograph (a) showing oocyte(OO), zona pellucida (ZP)and granulosa cell degeneration in animal rat no. A3(demarcated by a circle) and (b) absent degeneration in animal rat no. B4. H & E Stain, x40.

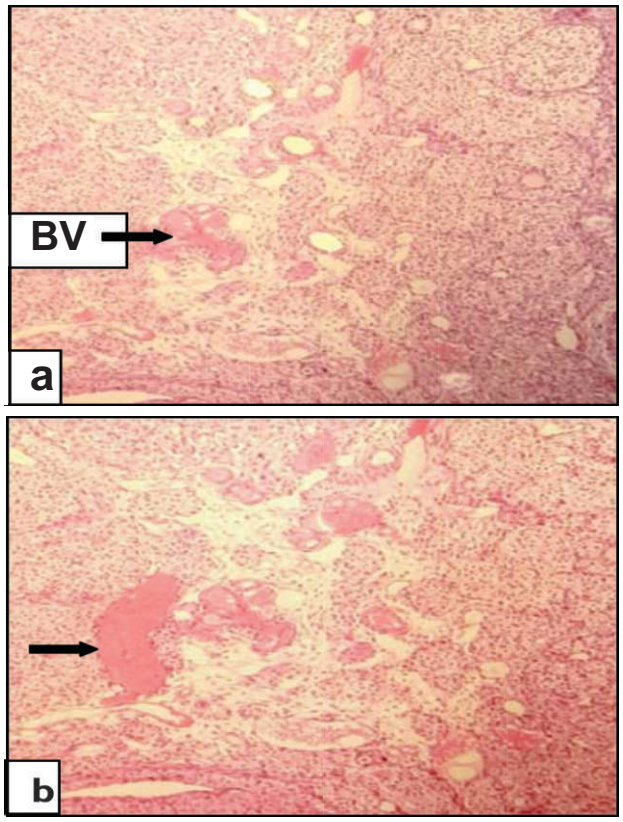

Fig 3: Photomicrograph (a) showing congested blood vessel (BV) in animal rat no. C5 and (b) showing vascular congestion in animal rat no. A2.H & E Stain, x10.

Discussion

The effect of MSG on the female reproductive system causes degenerative histological changes in ovaries causing granulosa cell degeneration, vacuolization of theca cells and decrease in the number of primary follicles.[10-12]

In the conducted study, it was observed that there was significant increase in the weight of ovaries in group A in which the average weight was 0.21 g which was significantly different from the control group (0.15g). The result of this study disagree with the previous report of Ilegbedion IG et al[13] and Das[14], showing insignificant increase in ovary weight due to MSG intake for a period of 2 and 10 weeks respectively, although it was also dose dependant In group B the average weight was 0.18 g, lower than that of group A. Decrease in the weight of ovary in group B may be attributed to the effective anti oxidating properties of vitamin C.[2]

Primary follicle is defined as an oocyte surrounded by a single or double layer of cuboidal epithelium.[8] The number of primary follicles were counted in this study, the average number of primary follicles in group A is 2.7 and in group B is 3.4. In comparison, the number of primary follicle in group C is 5.9. The result of this study disagree the previous report of Das[14], in which the number of primary follicles were increased in the experimental group. Naureen et al reported similar results in the study of lead induced changes in ovary of mice.[7,8]

Folliculogenesis was improved in group B, because vitamin C improves the integrity of follicular membrane and also responsible for the synthesis of collagen, required for the growth of follicles.[2]

In the present study, 73.3 % of the rats in group A and 40% of the rats in group B also showed granulosa cell degeneration which was highly significant from the control group in which none of the ovary showed such pathological change. Result of this study is in agreement with similar studies by Veronika Husarova[9], Eweka et al [10,11], Saber A. Sakr[12] , Ahmed et al[15] in which MSG was given for a period of 2 weeks. Similar study was carried out by Afeefy et al in which MSG was given for a period of 4 weeks, causes degenerative and atrophic changes in kidneys.[16]

Degeneration of the granulosa cells can be due to the toxic effects of MSG.[17] Reduction in the degeneration of granulosa cells in group B can be attributed to the wound repair ability of vitamin C by stimulating the synthesis.[18] Vascular congestion is defined as blood filled dilated veins.[19] 80% of the rats in group A and 40% in group B, showed increase vascular congestion which was highly significant from the control group in which none of the rat showed increase vascular congestion. The results of this study is consistent with the previous work of Mustafa et al.[20] Similar work has been done in Nigeria by Oladipo et al in 2015, in which vascular congestion was observed in experimental group with the use of MSG for 2 weeks.[21]

Vascular congestion was ameliorated in experimental group B, because vitamin C protects the capillary endothelium from oxidative damage by increasing the synthesis of nitric oxide.[22,23] collagen and extracellular matrix.[24,25]

The results of this study proved the alternate hypothesis that states that vitamin C has protective effect on MSG induced histological changes there by rejecting the null hypothesis.

Limitation of Study: Estrous cycle was not traced in

the current study.

Conclusion

Protective effect of vitamin C is proved on MSG induced histomorphological changes in ovary of rats.

Recommendations

Effect of MSG can also observe on other organs. Duration and sample size of study can also be increase.

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ORIGINAL ARTICLE

Knowledge about MERS (Middle Eastern Respiratory Syndrome) among Doctors in Holy Family Hospital, Rawalpindi

Abida Sultana, Sayema Awais, Fazal Mehmood

ABSTRACT

Background: MERS is one of the newly emerging infectious diseases. Since it is confined mostly to the Arabian Peninsula, all those returning from this region are likely to bring this infection. Hence, with the huge number of Hajj/Umrah pilgrims returning each year from Saudi Arabia, health care workers should be well aware of the various aspects of this disease.

Objective: To measure the level of awareness of doctors about Middle Eastern Respiratory Syndrome (MERS) Infection.

Study Design: A cross-sectional, descriptive study.

Place and Duration of Study: The study was conducted in the medical and pediatric units of Holy Family Hospital, Rawalpindi from 24th August to 5th September, 2014.

Materials and Methods: Study population consisted of qualified and registered medical practitioners. Demographic details about the respondents of the study were collected. Awareness about MERS infection was assessed by a questionnaire. Responses were classified as correct/ incorrect, enumerated and converted into percentages.

Results: Eighty five percent of the respondents knew about the causative organism. Most of the doctors were aware of the signs and symptoms (75%), mode of spread (51%) and the treatments available (51%). However, most of them lacked knowledge about preventive methods (72%) and diagnostic techniques (59%).

Conclusion: Awareness about MERS among doctors working in medical and pediatric Units of Holy Family Hospital is quite high but knowledge regarding preventive measures is suboptimal.

Key Words: *Doctors, MERS (Middle Eastern Respiratory Syndrome), Mode of Transmission, Pakistan, Reservoir.*

Introduction

Middle East Respiratory Syndrome caused by Coronavirus (MERS-CoV) has been recognized as an emerging viral infection that is also potentially lethal. According to World Health Organization, by June 2015, as many as 1289 cases of MERS-CoV had been identified and confirmed on laboratory reports.[1] Since the first reported case in September 2012 in Saudi Arabia[2] 455 deaths have occurred worldwide and almost 300 cases have been identified within Saudi Arabia.[3] It is the sixth Corona virus with the potential to cause severe acute respiratory syndrome and multiorgan failure in humans. This viral infection is potentially lethal with a mortality rate of 40%.[4] The symptoms include complaints like fever, chills, cough, dyspnoea and muscle aches and pains. Gastrointestinal symptoms are also reported like diarrhoea and vomiting as well as abdominal pain. Patients older than 40 years of age had higher mortality rates than younger patients.[4,5] Those suffering from co-morbidities like diabetes, renal failure and heart failure are more likely to die from this infection.[6,7] Diagnosis requires detection of MERS-CoV nucleic acid by polymerase Chain Reaction (RT-PCR) in upper and lower respiratory tract secretions, such as in sputum, tracheal aspirate and in bronchoalveolar lavage.[8]

Although most of these cases are clustered in countries of the Arabian Peninsula with Saudi Arabia as the hub, yet travellers to this region can carry this infection far and wide as shown by the appearance of secondary cases in UK, Jordan, Egypt, Austria, etc. The source of this infection is the dromedary camel, known to harbor the virus causing MERS but the mode of transmission, whether direct or indirect, is still unclear.[9]

Human-to-human transmission has been brought to

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notice with the appearance of hospital-acquired and community acquired cases. In a study that followed up 280 contacts of 26 index patients, the transmission rate was found to be 5% (i.e. 12 cases of MERS-CoV were identified).[10] Health care workers (HCW) are shown to be at greatest risk of acquiring the infection. According to a study in Jeddah, HCW constituted 20.9% of the patients diagnosed with MERS. Those who were symptomatic were also found to have had contact with a health care facility or a confirmed case of MERS or with someone who had fever with respiratory complaints within the last 14 days.[11]

To date, there is no vaccine available against MERS nor is there any specific treatment being offered.[12] Investigators have found that nosocomial and zoonotic transmission is the most important mode of spread of this infection.[13] The preventive measures that are recommended for those coming in contact with animals particularly camels in the Arabian Peninsula include rigorous hygienic measures such as hand-washing and avoiding contact with diseased animals. Consuming raw meat or milk from camels should be strictly avoided and animal products must be subjected to pasteurization and cooking or other processing that renders it safe for consumption. Moreover all those who suffer from immune-compromising conditions, diabetes, chronic lung diseases and renal failure are considered at high risk for developing MERS-CoV infections.[14] Health care workers are recommended to wear personal protective equipment including mask, gown, gloves and goggles besides practicing hand washing before and after handling MERS-CoV infected/ suspected patients or his/ her surroundings.[15]

The most recent outbreak of MERs-CoV has occurred in South Korea. This is also the largest outbreak outside Kingdom of Saudi Arabia. The most important feature of this outbreak is that the transmission of infection was not limited to South Korea alone but MERS was exported to a third country, China; thus highlighting the existence of human-to human transmission of this virus. It is a third generation transmission of infection- from index case to contacts, and from the secondary case to another person who had no contact with the index case.[16] This outbreak in Korea highlights the fact that even a single imported case of MERS-CoV can be a huge risk that can trigger the spread of infection.[17,18] Since transmission of MERS is mainly nosocomial, knowledge about control of infection and preventive measures in order to intercept the transmission of the virus particularly in hospitals, is extremely crucial in containing an epidemic.[18,19]

With millions of hajj and umrah pilgrims returning from Saudi Arabia in addition to a regular turnover of expatriates visiting throughout the year, Pakistan is at particularly high risk of developing such epidemics. With the arrival of even a single case, an epidemic can be triggered and MERS can spread like wildfire all over Pakistan. In addition, the low literacy level of the Pakistani population and a general lack of awareness about health issues especially newly emerging diseases make Pakistan more vulnerable to the threat of MERS. In Pakistan's context, knowledge and training of doctors and health personnel in the control of newly emerging infections like MERS is also suboptimal since refresher courses and continued medical education is not mandatory. To the best of our knowledge, no studies regarding assessment of knowledge about MERS virus/ MERS syndrome have been undertaken except one study conducted in Saudi Arabia. Keeping this rationale/scenario in mind, this study aimed to assess level of knowledge among doctors regarding Middle Eastern Respiratory Syndrome (MERS-CoV) in a tertiary care hospital of Rawalpindi.

Materials and Methods

This was a cross-sectional, descriptive study in which the study population consisted of doctors including House Officers, Postgraduate Trainees, Medical Officers (MOs), Woman Medical Officers (WMOs), Assistant Principal Medical Officers/ Woman Medical Officers (APMO/APWMO), Registrars, Assistant and Associate Professors. All these doctors were registered with Pakistan Medical and Dental Council and were working in Medical and Paediatric units of Holy Family Hospital, Rawalpindi. Holy family Hospital is a multidisciplinary 850-bedded hospital located in the densely populated city of Rawalpindi close to its junction with the capital, Islamabad. It provides both out-patient and in-patient facilities.

Data was collected from 24th August to 5th September, 2014. Informed written consent was taken from the respondents and anonymity was maintained.

Using the prevalence of insufficient knowledge about MERS i.e. 4%20, margin of error 4.99%, significance level 95%, the sample size calculated using Sample Size Calculator was 60. Convenience sampling technique was used.

The questionnaire was developed to assess the knowledge of the doctors about Middle East Respiratory Syndrome (MERS). The questions asked were about the causative organism, mode of spread of infection, clinical signs and symptoms, diagnostic tests available, awareness about treatment options, and prevention of MERS. Multiple choice questions were designed and included in the questionnaire. The questionnaire was approved by the research supervisor and was distributed and collected by medical students.

Data collected was non-parametric and was entered in SPSS version 20.0. Those giving the correct answers were enumerated and percentages were calculated.

Results

A total of 60 questionnaires were distributed. Among these 41 were Postgraduate Trainees, 14 were Medical Officers/ Woman Medical Officers, 3 were Senior Registrars/ Consultants and 2 were APMO/ APWMO. Regarding the age distribution, majority (56%) were 21-30 years of age. Only 5% were 51-60 years of age. Most of them (63%) had been working for a period of one to five years as a doctor (Table I).

Table I. Demographic data of study participants

Distribution of doctors according to their characteristics (n=60)	
Age in Years	**% (Number)**
21-30	58.3%(35)
31-40	30%(18)
41-50	6.7%(4)
51-60	5%(3)
Years of Experience	
Less than 1	25%(15)
1-5	63%(38)
6-10	6.6%(4)
11-15	5%(3)
Designation	
Postgraduate Trainees	68.34% (41)
Woman Medical Officer/Medical Officer	23.33%(14)
APWMO/APMO	5%(3)
Senior Registrar/Consultant	3.33%(2)

95% (n=57) of the doctors were aware of the abbreviation while 5% (n=3) did not know what MERS stands for. Of the 57 doctors who knew about the abbreviation, 48(85%) knew that the causative organism was corona virus. Most of the respondents were aware of the clinical picture but the most apparent knowledge gap was observed regarding the methods of prevention. Only 11 (18.3%) knew about the appropriate methods of prevention to be adopted while handling a case of MERS infection. The percentage and number of doctors who gave the correct answers are given in Table II.

Table II: Percentage and Number of doctors who were knowledgeable about different aspects of MERS (n=60)

Knowledge about	**Percentage(%)**	**Number (n=60)**
Abbreviation of MERS	95%	57
Causative Organism	85%	51
Mode of Spread	51.6%	31
Signs and Symptoms	75%	45
Diagnostic Method	41.6%	25
Treatment	51.6%	31
Methods of Prevention	18.3%	11

Discussion

In our study, despite the fact that only a small percentage of our sample consisted of senior consultants, the majority of the doctors were aware of the newly emerging infectious disease of MERS. The most important knowledge gap was regarding the preventive measures required for the containment of this infection. Less than one-third of the respondents were aware of the appropriate methods of prevention.

To the best of our knowledge, there has been only one similar study on the subject of awareness about MERS-CoV conducted in the Kingdom of Saudi Arabia among Health Care Workers (HCWs) including nurses, pharmacists and technical staff besides doctors.[20] In contrast, our study population consisted of only doctors.

Since MERS is a major public health problem in the Arabian Peninsula, it is no wonder that the knowledge of HCWs in KSA is better in almost all aspects of the disease than in our study. Like the study in KSA with 96% respondents correctly

identifying the signs and symptoms of MERS, in our study the most correct answers (75%) were about the clinical signs and symptoms of MERS. Whereas 94% of the HCWs in Saudi study were aware of the important preventive measures, only 18% answered correctly in our study. The next important knowledge gap is regarding the diagnostic method most suitable for detection of MERS infection. Only 41% Pakistani doctors are aware of it, whereas 76.5% HCWs replied correctly about the diagnostic method in the Saudi study. In contrast, the participants (doctors) in our study are more knowledgeable about management in MERS infection (51%) whereas among HCWs in KSA, only 40% knew appropriate management. This is to be expected since the educational background is much broader for doctors than for nurses, pharmacists and technical staff who were also included in the participants of the study in KSA.

Conclusion

Our study shows that although the awareness among doctors regarding signs and symptoms and treatment of MERS virus/syndrome is high, the level of knowledge about preventive methods is suboptimal.

Recommendations

Our study has highlighted the fact that the major emphasis in our clinical setup is laid on treatment and not on prevention. There is an urgent need to educate the medical community about new and re-emerging infections that can spread rapidly. For this purpose, continued medical education programmes must be instituted.

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ORIGINAL ARTICLE

Learning Style Preference of Medical Student in University of Lahore

Najma Naz[1], Rehan Ahmed Khan[2], Gohar Wajid[3]

ABSTRACT

Objective: The aim of the study was to identify learning styles of medical students and find out gender difference in learning style preference.

Study Design: Descriptive cross section study.

Place and Duration of Study: This study was conducted at University College of Medicine and Dentistry, Lahore from June to August 2015.

Materials and Methods: A total of 115 out of 170 students from 3rd year MBBS and 32 out of 50 students from 2nd year BDS completed the questionnaire. VARK(visual, auditory, reading/writing, kinesthetic) questionnaire was used to assess preferred learning style of medical students. The validity of the questionnaire was assessed through experts' views and its reliability was calculated by using Cronbach's alpha coefficients (α=0.86). Data were analyzed by using SPSS software.

Results: The result indicate that 67 (46%), prefer single learning style, out of these 44(66%) visual, 4(6%) auditory, 7(10%) read/write and 12(18%) prefer kinesthetic. 80 student (54%) select more than one learning style, in which 59(74%)binary learning style, 19(23%) tertiary learning style and 2(3%) prefer quaternary learning style. There is no gender difference in learning style selection. Visual and kinesthetic were the most preferred learning style in both male and female.

Conclusion: In the present study the preferred learning styles of medical students were Visual and kinesthetic. Knowledge of learning style of medical student will be help full in teaching, but we will have to assess learning style of other classes of MBBS and BDS as well.

Key Words: *Learning Style, Medical Students, VARK.*

Introduction

Learning style is defined as the individual's preferred way and the setting in which learners most effectively and efficiently perceive, process, store, and recall what they are going to learn.[1] As we know that students have diverse learning styles and single teaching approach is not effective for all students or even most students so it is a responsibility of the teacher to tackle this diversity of learning styles of students and develop appropriate learning strategies.[2,3] Teacher should have sufficient knowledge of the subjects taught to the students as well as characteristics(learning style, learning strategies) of the students to be a successful teacher.[4] There are various method for assessing learning styles of the students; the most recent is the VARK questionnaire.[5,6] It was developed by Neil Fleming, in 1998.[7] This method defines the preference in the learning style in terms of the sensory modality in which a student prefers to take in new information.[8,9] Four sensory modalities of learning have been defined: visual, auditory, read-write and kinesthetic according to the student interaction and response to learning environment which recognizes student's interest for particular modes of information presentation.[10] Learning approaches are also different for the four different VARK Learning Styles. Educational researchers hypothesize that every student has his own learning style and, if teaching is modified to accommodate that style, it is anticipated that learning will be improved.[11]

One reason of student's frustration towards the curriculum is contradiction between learning

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content and teaching methods. In order to enhance motivation and get better student performance, it is necessary to modify and select appropriate teaching methodology and assess their efficacy.[12]

Learning style has significant impact on academic performance of undergraduate medical student. Learning outcome could be highly achieved if learning was coordinated with main learning style. It is not necessary that student learn all subject with same learning style. Different subjects need different learning style and instruction to benefit the student.[13]

We are interested to assess appropriate learning style of medical student to develop teaching strategies accordingly. Majority of previous studies on learning style of undergraduate medical student was conducted in other countries. Less research was conducted to know the learning style of undergraduate medical students in Pakistan. Flemings VARK questionnaire was used to know the learning style.[14]

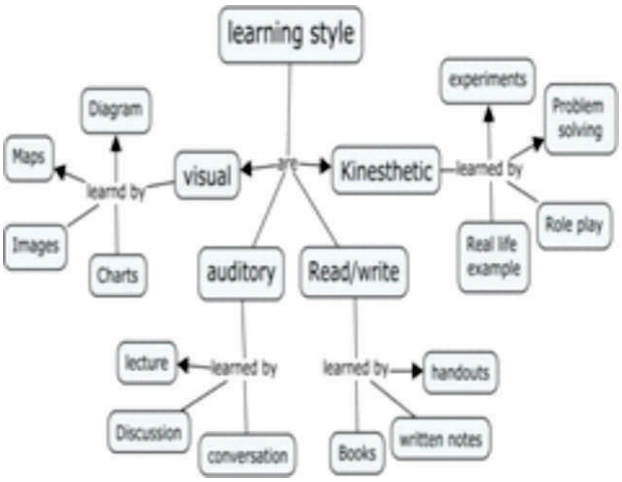

Fig 1:Activities that accommodate VARK learning styles[2]

Materials and Methods

This is a descriptive cross sectional study. This study was conducted in University College of Medicine and Dentistry, Lahore from June to August 2015. In this study we used VARK questionnaire (version 7.8)[15] to assess the learning style of medical student after taking permission from the author. VARK questionnaire was developed by Neil Fleming.[16] Instructions were given to the students prior to attempt the questionnaire. The validity of the questionnaire was assessed through experts' views, and its reliability was calculated by using Cronbach's alpha coefficients (α=0.86). Data were analyzed by using SPSS software.

Sample Size

Study participants consist of 170 students of 3rd year MBBS and 50 students of 2nd year BDS at University College of Medicine and Dentistry, Lahore. A total of 115 out of 170 students from MBBS and 32 out of 50 students from BDS completed the questionnaire (Male and Female).

Procedure

Informed consent was taken from the students prior to attempt the questionnaire and confidentiality of data was ensured. In august 2015, Data were collected by using a hard copy of questionnaire which has two parts. The first part included bio-data (age, gender), and the second part was use of VARK standard questionnaire from the students of 3rd year MBBS and 2nd year BDS during regular classes. 220 questionnaires were distributed to all medical students, who were available at the time of the study. 147 questionnaires were completed and collected.

Results

From 170 students, 147 students completely filled the questionnaires that were analyzed. Among 147 students MBBS were 78% and BDS were 22% in which females were 92(63%) and males 55(37%) as shown in Table I.

Table I: Gender Distribution among MBBS & BDS

Categories	BDS	MBBS	Total
Female	20 (62%)	72 (63%)	92 (63%)
Male	12 (38%)	43 (37%)	55 (37%)
Total	32(22%)	115(78%)	147(100%)

Students responded in two ways. First, preferred single learning style, second, preferred multiple learning styles.

Table II depicts the Group wise and collective distribution of preferred learning style. Student's preferred, single learning style were 67 (46%), and students preferred, multiple learning styles were 80

Table II:Preferred Learning Styles

Learning Styles	BDS	MBBS	Total
Single	13 (41%)	54 (47%)	67(46%)
Multiple	19 (59%)	61(53%)	80 (54%)
Total	32 (22%)	115 (78%)	147 (100%)

(54%).

Table lll illustrates single preferred learning style. 44 students (66%) prefer visual, 4 students (6%) prefer auditory, 7students (10%) prefer read/write and 12 students (18%) prefer kinesthetic. Visual learning

Table lll: Single preferred Learning Styles

Learning Styles	BDS	MBBS	Total
Visual(V)	7 (54%)	37 (68%)	44(66%)
Auditory(A)	1(8%)	3 (6%)	4 (6%)
Read/Write(R)	1 (8%)	6 (11%)	7 (10%)
Kinesthetic(K)	4 (30%)	8 (15%)	12(18%)
Total	13 (19%)	54 (81%)	67 (100%)

style was the most preferred learning style among MBBS (68%) and BDS (54%) students. 2nd preferred learning style was Kinesthetic.80 students (54%) select more than one learning style, in which 59 students (74%) prefer binary learning style, 19 students (23%) prefer tertiary learning style and only 02 students (3%) prefer quaternary learning style.

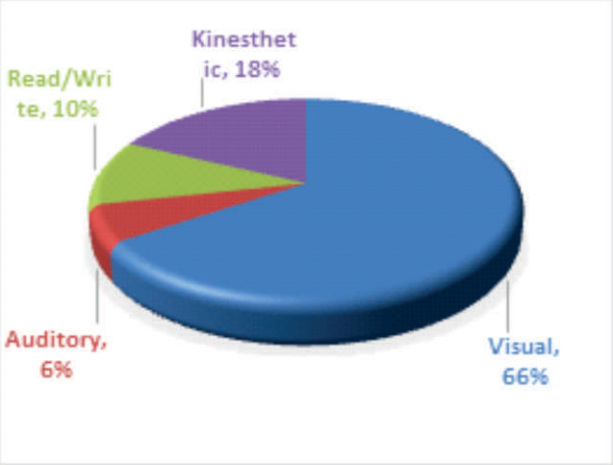

Fig 2: Single preferred Learning Styles

The most preferred multiple learning styles were visual and kinesthetic in both groups i-e MBBS (39%) and BDS (42%) illustrated in Table lV.

In Table V, 44.6% female prefer single learning style while male were 34.5%. Most preferred style was visual and kinesthetic in both groups.Majority of male(63.6%) and female(55.4%) students select multiple learning styles.

Discussion

Every student has a unique learning style. Identification of learning style of student in initial year of study is helpful for students to select

Table IV: Multiple preferred Learning Style

Learning Style	BDS	MBBS	Total
VA	1 (5%)	4 (7%)	5 (6%)
VR	1 (5%)	8 (13%)	9 (11%)
VK	8 (42%)	24 (39%)	32 (40%)
RK	2 (11%)	5 (8%)	7 (9%)
AK	3 (16%)	3 (5%)	6 (8%)
Binary	15(79%)	44(72%)	59(74%)
VAK	1 (5%)	4 (7%)	5 (6%)
VRK	3 (16%)	6 (10%)	9 (11%)
VAR	0 (0%)	5 (8%)	5 (6%)
Tertiary	4(21%)	15(25%)	19(23%)
VARK	0 (0%)	2(3%)	2 (3%)
Quaternary	0	2(3%)	2 (3%)
Total	19(24%)	61(76%)	80(100%)

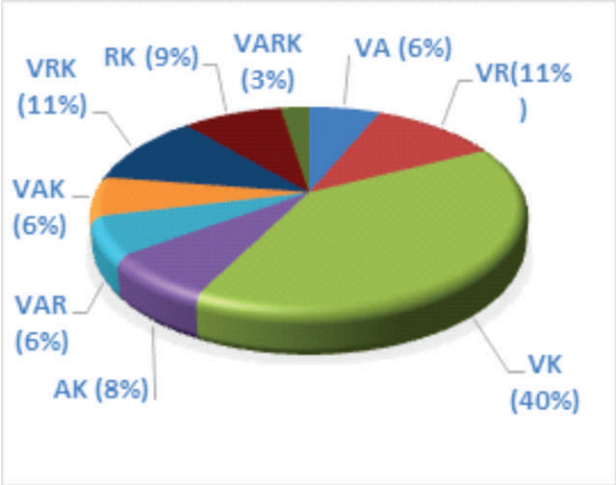

Fig 3: Multiple preferred Learning Style

Table V: Gender wise Distribution of Preferred learning style

Categories	Learning Styles	Gender		Total
		Female n %age	Male n%age	n %age
Multiple learning style	Visual	31 (69%)	13 (59%)	44 (66%)
	Auditory	3 (7%)	1 (5%)	4 (6%)
	Read/Write	5 (11%)	2 (9%)	7 (10%)
	Kinesthetic	6 (13%)	6(27%)	12 (18%)
	Total	45 (49%)	22 (40%)	67 (46%)
Multiple learning style(MLS)	VA	1(2%)	4 (12%)	5 (6%)
	VR	5(11%)	4 (12%)	9 (11%)
	VK	21 (45%)	11(33%)	32 (40%)
	RK	5 (11%	2(6%)	7(8%)
	AK	4 (8%)	2 (6%)	6 (7%)
	VAR	2(4%)	3(9%)	5 (6%)
	VAK	3(6%)	2(6%)	5 (6%)
	VRK	5 (11%)	4 (12%)	9 (11%)
	VARK	1(2%)	1 (3%)	2 (2%)
	Total	47 (51%)	33 (60%)	80 (54%)
	Grand Total	92 (63)%	55 (37%)	147(100%)

appropriate style to improve their learning and teacher select appropriate teaching strategy according to student's preference towards learning.[12] This can prove very helpful for students who need attribution training when they fail to pass examinations because of their inability to understand a specific discipline, topic or subject.

In present study 67 students (46%) prefer single learning style. 80 students (54%) preferred multiple learning styles. Most of the participants (MBBS, BDS) in current study prefer more than one (multiple) learning style. This favors the approach of the teaching students with multiple teaching strategies. In single and multiple learning style 50% students prefer visual and kinesthetic. This strengthens the ideology of teaching students with learning situations where knowledge delivery is not the sole aim and combining knowledge with skills is more appealing for the students.[17] Active learning promote concept formation, decision making reasoning, and problem solving.[18] Similar preferences were reported in a study done in Michigan show that majority of medical student (64%) prefer multiple learning style to acquire knowledge. comparable to preferences reported by Karim H that 58.2% preferredusing multiple learning style and 41.8% of particepants preferred single learning style.[19]

The present study further demonstrated that dominenant single learning style was visual forty four students (66%)acquire knowledge through charts, images, maps, and diagram., Second common learning style was kinesthetic. Twelve students (18%) preferred learning by experiments, real life example, hands on approach and role play. Visual learning style was the most preferred single learning style among MBBS (68%) and BDS (54%) students. Second preferred single learning style was Kinesthetic which was mainly preferred by BDS (30%). A recent study was done in Isphahan university of Medical sciences. It was found that (48.4%) preferred only one learning style, (51.6%) preferred multiple learning style. Preferred single learning style was read/write and auditory which is contradictory from our finding.[12] it was observed in present study that both male and female preferred multiple learning style. Slater et al., also supported this finding that both males and females preferred multiple learning style.[20]

Students may change their way of learning according to the situations, goals and interest. Every one need to be improve their weaknesses and translates information into their preferred style.[18] Student also switch learning styles depending on what they are studying. Although changing a preferred way of learning offers flexibility, it is also good for capitalizing on learning strengths.

Conclusion

According to the results of this study students require diversity in teaching method because of different learning style of the students. They never feel burden if information presentation style match with the learning style of students and it enhance learning.[12] Learning style of student of other medical college should be comparing to reach in consensus

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ORIGINAL ARTICLE

Choice of Specialty Careers among Final Year MBBS Students

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ABSTRACT

Objective: To explore the different specialty career choices of undergraduate medical students and to identify the factors influencing their career choices.

Study Design: A descriptive cross-sectional survey.

Place and Duration of Study: This study was conducted in Islamic International Medical College in April 2013.

Materials and Methods: Final year students were selected through convenience sampling for this study. A 20 items questionnaire with one open ended and 19 Likert scale based close- ended questions was handed to 100 final year MBBS students, in order to explore their preferred career choices and reasons behind them. Non parametric data analysis was done through SPSS 20.

Results: Response rate of students was 82% of which 49 (60%) were female and 33 (40%) were male. Medicine, surgery and gynecology were the top career choices among students. Family practice was the least chosen specialty. The top 3 reasons to choose a specialty were natural aptitude, better subject comprehension and work enjoyment. Parents in the same field, easy career progression and specialty related illness in the family were the least chosen reasons.

Conclusion: Choice of specialty career in health professions has an impact on the healthcare needs of the country. 'Family practice' is a forgotten domain and its importance needs to be stressed. Medical curricula should emphasize on the importance of family practice as a career choice.

Key Words: *Career Choice, Career Preferences, Influential Factors, Medical Specialties.*

Introduction

Medical sciences have a wide variety of disciplines and specialties. It is a difficult decision for a medical student who is about to graduate from medical school to choose his/ her future career specialty. This decision may depend on a multitude of factors as suggested by various studies. The Bland–Meurer model was presented in an attempt to give an overview of the complex interplay of factors that determine medical students' specialty choice with the conclusion being that students choose a specialty whose characteristics most closely match their own career needs.[1] Some of the common determining variables identified in various studies were gender, interest spurred by practical experience in a particular field during medical years, life style or prestige associated with certain specialties, better job opportunities and easier routes to specialize etc.[2,3]

Factors influencing student choices for specialty careers are still unclear and culturally distinct. The decisions made by medical students regarding their specialty career choices do not only effect their own future but also have an impact on the quality of health care system of the country.[4] If they are not aligned with the health care and societal demands, there is an imbalance between the need and supply of doctors in relation to the needs of the community.[5,6]

Information regarding medical students' career choices can thus guide restructuring of health care policies in relation to the needs of the society and to ensure provision of workforce according to needs of that community.[2] Understanding these influences can also aid in curriculum designing and career counselling for students in medical institutes.[6]

This is a descriptive study undertaken to identify the specialty career choices of final year medical students at our medical institute, the gender differences among these choices and the factors which influence their choices.

Materials and Methods

The study design was a descriptive cross-sectional survey, conducted in Islamic International Medical

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College in April 2013. All final year students were selected through convenience sampling. A 20 items questionnaire was distributed among all final year MBBS students (n=100) during their self-study time slot, to identify their future specialty career choices and underlying reasons of their choice. They were briefed about it and their understanding regarding terminology was checked. They were given 45 minutes to fill in the proforma. The questionnaire was collected at the end of the self-study time.

The questionnaire consisted of 20 questions in all, developed after extensive literature review and specialist validation from multiple consultants. The 1st question was open ended, requesting students to either choose from a list of 18 clinical specialties, write their choice if not listed or select the 'not sure' option. Specialties listed were surgery, obstetrics and gynecology, pediatrics, medicine, psychiatry, orthopedics, ophthalmology, dermatology, anesthesiology, radiology, public health, family practice, pathology/ laboratory medicine, basic sciences, urology, cardiology, pulmonology and ear, nose, and throat (ENT). Rest of the 19 were close ended questions based on a Likert scale of 1 to 3. These 19 questions were formed on the most likely reasons for career choices based on multiple specialist opinions. These were related to aptitude of the specialty, specialty related illness in self or close others, respect for specialty in the family members, reputation of the specialty in the community, media related hype of the field, higher anticipated income, work experiences in labs and clerkships, more patient contact, better understanding of the discipline, good teacher/ role model, impressive life style of the specialist in the chosen field, parents already practicing in the specialty, peer pressure or friend in the same specialty, more satisfaction, preference to work with a specific community group or gender, better job opportunities, fewer doctors in the chosen specialty, better/ controllable working hours and alternate easier routes for fellowships.

Non parametric data analysis was done through SPSS 20 and descriptive statistics were derived.

Results

Eighty-two out of 100 final year MBBS students participated in the survey. Medicine (18%), surgery (15%) and gynecology (14%) were the top three career choices of students, with family practice coming last in the ranking (1%). The distribution of different specialties chosen by the students is given in Fig 1.

The top three reasons to choose a specialty were natural aptitude for it, better subject comprehension and work satisfaction for the specialty. The least attributed factors for their choices were easier perceived career advancement, an illness in the family regarding the particular specialty or parents already practicing in that field. The reasons to choose a specialty in order of preference are given in Table I.

Surgery (10%) and medicine (8%) were the top rated specialties in males while females preferred gynecology/obstetrics (14%), medicine (10%) and

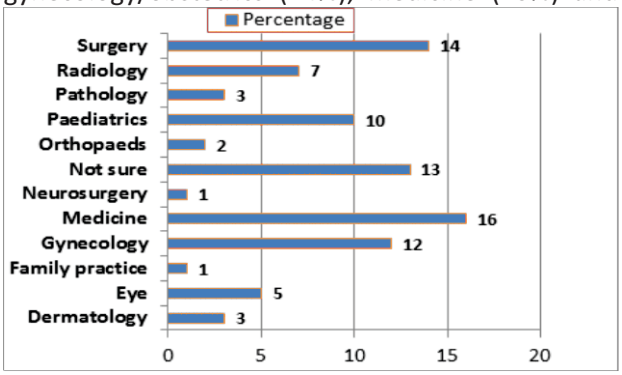

Fig 1: Career choice in MBBS final year students

Table 1: Reasons for choosing a specialty, in descending order of preference

1	Aptitude for the specialty
2	Better understanding of the subject
3	More satisfaction/ Work enjoyment in chosen specialty
4	More patient contact
5	Reputation of the specialty in community
6	Respect for specialty in the family members
7	Good teacher/ Role model of the subject
8	Higher anticipated income in chosen specialty
9	Impressed by the life style of specialist in chosen field
10	Better jobs availability in specialty
11	Controllable life style/ working hours
12	Practical experiences (hands on skills) during study years such as labs and clerkships
13	Few doctors available in the specialty
14	Peer pressure
15	TV/ media related hype for the specialty
16	Preference to work with a specific community-group or gender bias
17	Specialty related illness in self or others
18	Alternate easier routes to specialize available (e.g certificates, minor diplomas)
19	Parents already working in the specialty

surgery (5%) in the descending order. Thirteen per cent of the students were not sure about choosing a career. These included10% females and 3% males. None of the male students opted for family practice and only 1% of females opted for it as a prospective future career. The gender differences in choice of specialty careers in main specialties is given in Fig 2.

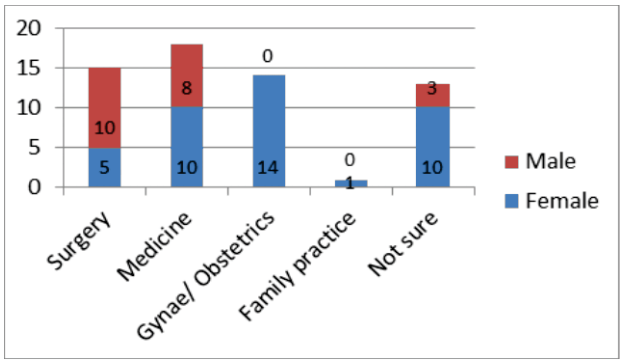

Fig 2: Gender differences in career choice in percentage

Discussion

Choosing a specialty for post graduate training is a major life decision for medical students on which their future career depends, influenced by multiple factors.

In the present study, medicine and surgery were found to be the two top specialties chosen by the students as is the trend noted in many local studies[2,3] as well as in international studies.[7] A significant percentage of students (13%) were found to be unsure of their choice. We have reported 19 reasons of choosing a career in a specialty with aptitude, understanding of specialty satisfaction, more patient contact as the top most reasons. The least chosen reasons were parents working in that specialty, easier routes of specialization and illness in a close relative related to the specialty.

Multiple studies are available in literature identifying student preferences in post-graduate medical specialization and their influencing factors.

Several important factors that influence the choice of student include: the emphasis with which the student is taught a particular discipline and as an extension the influence that the teacher of that discipline has. Several studies indicate that the subject specialist teacher can influence the choice of career in a student. Working with a 'generalist' rather than a specialty/ sub-specialty faculty teacher was associated with selection of a primary care career, in some[8] but not all studies.[6] Also, structural changes in the curriculum with more emphasis on primary care[6,9] experiences encouraged student interest in primary care. Family practice was not found to be a very desirable choice to pursue.[10,11] This trend was also evident in our study where only 1% of the students showed an interest to pursue career as a general physician.

However other factors like uncontrollable life style and excessive working hours also effected career choice of a specialty. Controllable or uncontrollable life style is one of the major determinants in choosing a career.[12,13] Life style is influenced by working hours, working in shifts, salaries and job satisfaction.[14] More recently, changes in the workplace environment also influence career choices for example duty-hour limitations designed partly to improve the work satisfaction of residents[15,16] and rapidly increasing student debts especially in the western societies.[17] Students increasingly prioritize lifestyle issues when choosing careers.[14-16]

Male medical students in our study were inclined to choose surgery as their topmost choice followed by medicine whereas female students preferred gynecology/obstetrics followed by medicine as their preferred career choice. Similar results were found in other studies where males preferred surgical specialty and females were inclined towards gynecology and obstetrics.[18,19] Medicine was equally considered as a prospective specialty choice by both the genders.[20] We were not able to correlate our findings exactly to factors that influence career choice in both genders, as generally student satisfaction and understanding of the specialty were the prime reasons of choice in both groups. In literature the two reasons given for variability in male and female students choices was lifestyle controllability and gender biases inherently present in some specialties.[14,20] Multiple studies reported female students preferring more controllable lifestyle specialties and considering domestic responsibilities and flexible hours as important variables while choosing specialty career as compared to male students.[14] It is also worth noting that males prefer choosing a career that is technically challenging and has more earning potential and would consider residency conditions and leave availability as secondary issues.[14,20]

A significant percentage of students in our study, 13% were unsure of a future career in any field, 10% of whom were female. This indecision has been regarded by studies to be due to lack of information about specialties, perceived equal interest in multiple specialties, lack of career counselling, conflicting interests etc.[1]

Our study also emphasizes the fact that family practice is one of the last career choice of the students. This dilemma has been addressed by multiple local and international studies.[10,11] However ironically many students in our local context do end up becoming general practitioners by default, due to economic or circumstantial reasons, armed only with an undergraduate degree which becomes a disadvantage for the health care delivery system at large.[11]

Conclusions and Recommendations

Clinical fields i.e. Medicine, Surgery and Gynaecology/ Obstetrics remain the most popular student choices probably as a reflection of the more clinically oriented curricula. 'Family practice' is a forgotten domain and its importance needs to be stressed. Medical curricula should be made more community oriented and emphasize on the importance of family practice as a career choice for which health policy makers should take appropriate steps.

Our study is limited by a relatively smaller sample size and single institutional data. Additional prospective, qualitative studies are needed for a better insight on factors influencing gender differences in choosing a specialty, as female students now make a significant bulk of the medical students and future doctors.

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ORIGINAL ARTICLE

Assessing Competency in Distant Learning Master Programs in Medical Education: A Qualitative Analysis

Rehan Ahmed Khan[1], Omer Awwab Khan[2], Madiha Sajjad[3]

ABSTRACT

Objectives:

- To investigate the assessment tools and processes used to assess students of MHPE programs in Pakistan for achieving the learning outcomes of the program.
- To Compare this process in developed (United Kingdom) and developing country (Pakistan).

Study Design: It is a qualitative archival study designed to provide an insight into the type and level of assessment tools used in MHPE programs.

Place and Duration of Study: The study was conducted in IIMC from 1st October 2013 to 30th July 2014.

Materials and Methods: The study method chosen was archival research. The data was collected from the official websites of the program. Purposive and convenient sampling method was used to select 08 programs, 04 each from United Kingdom and Pakistan. As programs in Pakistan offer only blended programs, hence only blended programs were included in the study. Manifest conventional content analysis of the data was done using NVIVO 10.

Results: Common assessment tools used to assess competence were assignments and dissertation submission in all the programs. Programs in UK also used portfolios whereas in comparison only summative examination using MCQ, SEQ's and OSTE was employed in Pakistan. All programs in the study assessed student at 'shows how' level except 02 programs in UK, which assessed Meta competency (Does level).

Conclusion: Distant learning blended programs in HPE assess competency at different levels of competence. This results in variability of level of assessment and hence affects the eventual outcome. A uniform method of assessment should exist for master programs in health professions education to ensure uniform learning and outcome.

Key Words: *Assessment Tools, Distant Learning Programs, Health Professions Education, level of Assessment.*

Introduction

MHPE programs aim to produce effective leaders in medical education.[1-4] These programs are an emerging field and mushrooming at a fast pace. The reason for this surge is understandable. However what needs to be ascertained is the professionalization of these programs. Professionalization is defined as the process of giving a professional character, identity, or status to 'Health Professions Education' as a profession. It involves establishing a suitable and accreditable qualification, satisfying both national and international needs of medical education.[5] As we know that 'Assessment drives learning'[6,7], implementation of the learning outcomes of the MHPE programs have direct relationship to the type and level of assessment that is being employed in these programs. The main objectives of this study were:

- To investigate the assessment tools and processes used to assess students of MHPE programs in Pakistan for achieving the learning outcomes of the program.
- Compare this process in developed (United Kingdom) and developing countries (Pakistan).

Materials and Methods

It is a Qualitative archival study in which archival method of research has been used. In archival research, the researcher collects data stored in archives. The archives can be in the forms of newspapers, articles of journals, books or websites. The reason for choosing archival research was its simplicity, ease of gathering data and easy

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availability of the archives. More over because of the type of objectives of the study the data required to analyze was present in the archives available via internet and did not require to collect data through other methods as questionnaires, interviews or emails.[8]

To collect data, first the website of the program was found through www.google.com. The next step was to locate the information provided about the program. The data about the MHPE program was either present in pdf format or information given on the webpages itself. All the concerned pdf files and webpages were downloaded and opened in NVIVO.

Convenience and Purposive sampling technique was used.[9,10] Eight MHPE programs were selected. Out of these, four programs were from Pakistan (developing country) and four were from the United Kingdom (developed country). Eight programs were included in the study as they yielded enough data to ensure validity and reliability in a qualitative study. It was also taken into consideration that data from 08 programs had to be transcribed and coded into themes. In qualitative case studies, handling this amount of data requires considerable time and work. The programs were selected each from well-established and newly established institutes running these programs.

Results

All programs in UK and Pakistan used assignments at the end of a module or a semester. All programs included in the study from UK required dissertation for the award of master's program except one university. Two universities from UK used portfolio as their tool of assessment. All programs in Pakistan used written assignments and dissertation for assessment purposes. However, two universities also had a summative exit assessment. The detailed results are reported below:

Discussion

The global distribution of MHPE programs is not uniform. The reported number of MHPE programs was 121 Up to 2013.The maximum number of programs are offered in USA (32) followed by UK (31).[11] The number of programs in Pakistan was only two until 2012[12] however it has increased to 6 now. All these HPE programs share many features in common but they have a lot of differences as well.

Table I: Duration and mode of delivery of the content (UK= United Kingdom, we=Well Established, ne= newly established, PK= Pakistan)

Program	Duration	Mode of delivery of the Content
UKwe1	1 year for on campus and flexible for DL	On campus ,Blended/Complete Distant learning (DL)
UKwe2	1 – 3 years	On campus , Blended Distant learning
UKne1	1 - 5 years	On campus , Blended Distant learning
UKne2	3-5 years	On campus ,Blended Distant learning
PKwe1	2 years	Blended Distant learning
PKwe2	2 years 6 months	Blended Distant learning
PKne1	2-5 years	Blended Distant learning
PKne2	2-3 years	Blended Distant learning

Table II: Type and duration of contact session

Program	Type of contact session in distant learning
UKwe1	On campus Flexible Face to face/ Completely online
UKwe2	Face to face online/on campus once a week
UKne1	Flexible on campus session 1-4 days per semester
UKne2	18 tutored hours per 15 credits
PKwe1	Face to Face on campus 10 days session 6 times
PKwe2	Face to face on campus for 1-2 weeks. Total contact time 12 weeks
PKne1	Face to face 8 contact sessions, each of 1-2 weeks
PKne2	04 contacts sessions, each of maximum 02 weeks

Table III: Exits in the program

Program	Exits in the program
UKwe1	Certificate, Diploma , Masters
UKwe2	Certificate, Diploma , Masters, PhD
UKne1	Certificate, Diploma , Masters
UKne2	Certificate, Diploma , Masters
PKwe1	Masters
PKwe2	Masters
PKne1	Certificate, Diploma , Masters
PKne2	Masters

Table IV: Details of Assessment tools used

Program	Assessment tools
UKwe1	1-4 summative assessment for each module in the form of written responses, presentation, practical exercises, Dissertation
UKwe2	Portfolios comprising of assignments , Dissertation
UKne1	Portfolios comprising of written assignments, effective use of audio-visual material, exercises in teaching, plan for acting on the feedback of students and peers , critical reflection on videotaped sessions, Dissertation
UKne2	Written assignments, presentations, posters, coursework
PKwe1	Assignments , Objectively structured teaching exercise, Dissertation (written and oral defence)
PKwe2	Assignments , End of year summative examination , Dissertation
PKne1	Assignments , Dissertation defence
PKne2	Assignments , Dissertation

Table V: Classification of assessment tools according to Miller's Pyramid

Program	Level
UKwe1	Shows how (Competence)
UKwe2	Does (Performance/Capability)
UKne1	Does (Performance/Capability)
UKne2	Shows how (Competence)
PKwe1	Shows how (Competence)
PKwe2	Shows how (Competence)
PKne1	Shows how (Competence)
PKne2	Shows how (Competence)

The flexibility of a program is evident from the optional modules it offers to its students. The optional modules are only offered in UK programs which give the students freedom to choose from topics of their interest. Programs have options for surgeons, anesthetists and gynecologists. A lot of emphasis in these programs is on the impact of medical education in clinical training. This is lacking in Pakistani programs where only one program offers options of electives. Flexibility is further enhanced in UK programs by offering exit at multiple levels. Duration of these program is variable extending from 1 to 5 years. The mode of delivery varies from complete distant learning (DL) to distant learning with contact sessions. Contact sessions are offered in different formats including contacts sessions using web boards, Skype, Adobe connect, and physical face to face contact sessions.[1-4,13-15]

In UK, the MHPE programs offered by Universities are either on campus, blended or complete distance learning. In Pakistan the programs are only blended, which includes an average of 6-8 weeks of contact session, which offers very little flexibility to the students. In authors observation, one of the main reason for the difference in flexibility of these programs is that complete distance learning programs are still not recognized by the accreditation body in Pakistan.

Learning outcomes in masters in Health professions education are assessed by variety of assessment tools. Most of the programs use both formative and summative assessment methods.

The tools used are pen and paper methods; OSCE, OSTE, Short Essay Questions (SEQ's), Multiple choice questions (MCQ's), portfolios, assignments and oral defense of thesis.[11,12] These tools assess 'shows how', to assessment strategies that evaluate 'Does' of the Miller's Pyramid. All programs have aligned learning outcomes and learning strategies with assessment tools to achieve the desired outcomes.

Programs in United Kingdom are more flexible as they offer exits at different levels, optional and specialized modules to study and different modes (complete distant learning, blended and on campus) of program to choose from. They also aim to produce capable medical educationists (at the 'does' level), who can perform in real life situations. Programs in Pakistan are in their infancy, however their learning outcomes, assessment and learning strategies share a lot of features in common with programs in UK. The main contrasting feature though is minimal flexibility and assessment at the 'shows how' level.

Conclusion

Distant learning blended programs in HPE assess competency at different levels of competence. This results in variability of level of assessment and hence affects the eventual outcome. Guidelines and standards from Regulatory and Accrediting authorities should stress on uniform method of assessment for master programs in Health Professionals Education to ensure uniform learning and outcome throughout world.

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