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## FREQUENCY AND FACTORS ASSOCIATED WITH MEDICATION NON-ADHERENCE AMONG PATIENTS OF CARDIOVASCULAR DISEASES IN SELECTED PUBLIC AND PRIVATE TERTIARY CARE HOSPITALS OF PESHAWAR

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### ABSTRACT

**Introduction:** Cardiovascular diseases are on the rise and one of the major causes of deaths worldwide. Medications can greatly lower the mortality rate by delaying the progression of the disease. These patients have the problem of non-adherence to their medications due to many factors. Successful management of treatment depends on adequate self-care and knowledge of patients about their disease and medications which indirectly affects medication adherence behavior. The objectives of the study were to find the frequency of medication non-adherence in two public and private tertiary care hospitals of Peshawar and the factors which determine non-adherence.

**Materials & Methods:** A comparative cross-sectional study was conducted in the months of April-May 2016 at Hayatabad Medical Complex (HMC) and Rehman Medical Institute (RMI) Peshawar, which together treat a sizable proportion of cardiovascular disease patients of this region. A calculated sample of 168 patients was selected for the study (84 per hospital) based on convenience sampling; the 8-item Morisky Scale (MMAS-8), validated in patients with Diabetes Mellitus, Heart Failure, and Coronary Artery Diseases was used to assess adherence. Factors affecting medication non-adherence were documented with an indigenous questionnaire which was developed after a pilot study done in both the hospitals. Data analysis was done by SPSS 16.0 for descriptive statistics, while comparison of hospitals was done by the Chi Square test; multinomial regression analysis was done for factors affecting adherence levels. A  $p \leq 0.05$  was considered significant.

**Results:** Of the 168 patients from both hospitals, 107(63.7%) were males, and 61(36.3%) were females. The ages of the participants ranged from 19-84 years with a mean age of  $55.33 \pm 10.61$  years. Medication adherence calculated for both hospitals showed high adherence of 20.2%, medium adherence of 22.6%, and low adherence of 57.1%. Income per month ( $p=0.006$ ), co-morbidities ( $p=0.002$ ) and fear of getting addicted to the medication ( $p=0.048$ ) were found to be the main factors affecting medication adherence; hospitals were significantly associated with adherence levels ( $p<0.001$ ).

**Conclusion:** Income, education status, cost of healthcare, and co-morbidities are factors leading to low medication adherence among cardiovascular disease patients, more so in the public tertiary care sector.

**Keywords:** Medication Adherence; Cardiovascular Diseases; Self Care; Health Care Costs; Drug Costs.

### INTRODUCTION

Cardiovascular diseases, or diseases of heart and blood vessels, are categorized into four main types, these being coronary heart diseases, stroke, peripheral vascular diseases, and aortic diseases.<sup>1</sup> Medication adherence is defined as

patient taking the prescribed medicine regularly and continuously.<sup>2</sup>

“Drugs don’t work in patients who don’t take them.” — C. Everett Koop, MD.<sup>2</sup>

A study conducted in Quetta, Pakistan showed that there was lack of education among patients regarding benefits of medication adherence.<sup>3</sup> Cardiovascular diseases mortality rate will increase in developing countries such as Pakistan over the next couple of decades due to high life expectancy and changes in lifestyle, moreover cardiovascular diseases have reached a state of epidemic in developing countries of the world.<sup>4</sup> Studies done in the U.S have shown that more than 60% cardiovascular diseases patients have been reported non-adherent which is a growing cause for concern.<sup>5</sup> The variables affecting adherence may be physician or patient related, leading to a massive expenditure on health care system roughly estimated around \$396 to \$792 million.<sup>6</sup> By tackling the problem of non-adherence a lot of unnecessary spending on health care can be avoided.<sup>7</sup> Non-adherence is a problem not only in developing country but developed countries are also facing this challenge; it is estimated that each year 125,000 deaths of cardiovascular diseases are caused by non-adherence in the U.S.<sup>8</sup> Identification of non-adherence can help in successfully treating the condition.<sup>9</sup> If left unidentified, non-adherence can lead the physician to intensify the drug regimen which in turn leads to undesired outcomes, and a burden on economic state.<sup>10</sup>

Physicians must understand that poor medication adherence is one of the reasons of below par clinical benefits. WHO states that increasing medication adherence has a greater effect on health rather than improving specific treatment.<sup>11</sup> Physicians should identify strategies to improve medication adherence within the limits of their practice to enhance the therapeutic outcome. The approach should be carried with the support and involvements of all those people who are involved in medication use.<sup>12</sup> High medication adherence is associated with decrease in emergency department visits,

decrease in hospitalization days as well as decrease in pharmacy spending of a person.<sup>13</sup>

Medication non-adherence has been a growing cause of concern in our community as people mostly do not adhere to the drug regimen prescribed by the doctor and this leads to further complicating the disease. Being a third world country, the financial burden increases on the individuals as well as on the government to provide the community with proper health services and this cannot be done until and unless patients are observing medication adherence.

There have been no previous studies conducted in this region having this scope. Our study aims to calculate the frequency of medication non-adherence and various factors such as demographics, illness, patient-physician and medication related factors associated with non-adherence.

## MATERIALS & METHODS

A comparative cross sectional study was conducted in the months of April-May 2016 in the Outpatient Departments (OPD) of two tertiary care hospitals located in Hayatabad, Peshawar, viz. Hayatabad Medical Complex (HMC) which is a public sector hospital, and Rehman Medical Institute (RMI), a private sector hospital. Study participants were identified on the basis of clearly defined selection criteria; inclusion criteria were patients who had been using cardiovascular diseases medication for more than six months; exclusion criteria included patients who were being supported by any government or private organizations, or having dementia and other related problems, or dependent on others for taking their medications. All attempts were made to minimize differences in characteristics between patients of the two hospitals.

Sample size was calculated based on WHO formula ( $n = Z^2(p*q)/d^2$ ), keeping  $p = 12\%$



(based on an Indian study<sup>14</sup> that showed medication non-adherence among chronic diseases to be at 11.76%,  $z = 1.96$ , and  $d = 5\%$ ; calculated sample size was 162, so study sample size was kept at 168 (84 per hospital).

Data were collected through convenience sampling, based on the 8-item Morisky Medication Adherence (MMA-8) Questionnaire<sup>15</sup> previously validated for assessing medication adherence in diseases such as Diabetes Mellitus, Heart Failure, and Cardiovascular Diseases. The scoring system in the Morisky 8-Item Medication Adherence Questionnaire Scale for categorizing three levels of adherence is: Low adherence (<6), Medium adherence (6<8), and High adherence (8).

An indigenous questionnaire in local language was designed for data regarding factors that were likely to affect medication adherence. It was pretested and used after relevant modifications.

Data were analyzed with SPSS version 16.0. Frequencies of medication non-adherence were compared in both hospitals and various factors affecting medication adherence were calculated.

Association of adherence with different variables such as monthly income, literacy, number of drugs used, and comorbidities in both hospitals was analyzed.

Descriptive data analysis (frequencies and percentages) was used to document medication adherence. Comparison of medication adherence was done by cross tabulation; the strength of association between the level of adherence and variables affecting adherence was determined by the Chi Square test. Multinomial logistic regression was used to test the significance of association between medication adherence and other variables, keeping high adherence as the reference category and C.I. of 95%. A  $p \leq 0.05$  denoted significance.

## RESULTS

The ages of the 168 patients from the two hospitals ranged from 19-84 years, with a mean age of  $55.33 \pm 10.61$  years. Demographic data are shown in Table 1. A significant difference is seen in the gender status between the two hospitals, where HMC had more males and RMI had more females ( $p=0.006$ ). Other variables such as Marital Status, Monthly Income, and Education levels did not show significant differences between the two hospitals.

**Table 1: Demographic data of patients (n=168).**

Demographic Variables		HMC f (%)	RMI f (%)
Gender ( $p=0.006$ )	Male (n=107)	62 (57.9)	45 (42.1)
	Female (n=61)	22 (36.1)	39 (63.9)
Marital Status	Married	81 (96.4)	82 (97.6)
	Unmarried	3 (3.6)	2 (2.4)
Monthly Income	<10k	11 (13.1)	11 (13.1)
	>10-20k	22 (26.2)	16 (19.0)
	>20-40k	34 (40.5)	33 (39.3)
	>40-80k	14 (16.7)	14 (16.7)
	>80k	3 (3.6)	10 (11.9)
Education	Illiterate	43 (51.2)	45 (53.6)
	Primary	13 (15.5)	18 (21.4)
	Intermediate	17 (20.2)	13 (15.5)
	Undergraduate	10 (11.9)	6 (7.1)
	Postgraduate	1 (1.2)	2 (2.4)

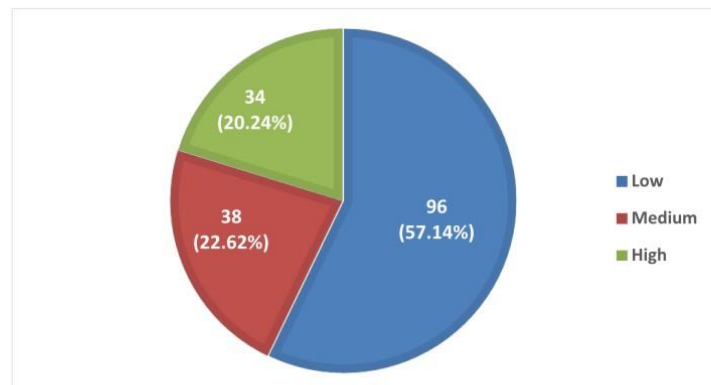
Gender based distribution of data are shown in Table 2; significant differences are seen in the Monthly Income ( $p=0.002$ ), with more males being in the higher income groups, though surprisingly there were more females in the income group of PKR>80K. Similarly, in Education status, there are more males than females in the higher education categories ( $p=0.029$ ). The Levels of Adherence showed no significant differences by gender; the reasons for non-adherence by gender were also non-significant and are not shown.

**Table 2: Gender wise distribution of monthly income, education status, and levels of adherence of patients (n=168).**

Variables		Male (n=107)	Female (n=61)	p Value
Monthly Income	<10K	15 (14.0)	07 (11.5)	0.002
	>10-20K	15 (14.0)	23 (37.1)	
	>20-40K	50 (46.7)	17 (27.9)	
	>40-80K	21 (19.6)	07 (11.5)	
	>80K	06 (05.6)	07 (11.5)	
Education level	Illiterate	46 (43.0)	42 (68.9)	0.029
	Primary	23 (21.5)	08 (13.1)	
	Intermediate	23 (21.5)	07 (11.5)	
	Undergraduate	13 (12.1)	03 (4.9)	
	Postgraduate	02 (1.9)	01 (1.6)	
Levels of Adherence	Low	64 (59.8)	32 (52.5)	0.343
	Medium	25 (23.4)	13 (21.3)	
	High	18 (16.8)	16 (26.2)	

Overall levels of adherence for both hospitals are shown in Figure 1. The majority of patients (96, 57.14%) had low adherence to the

medication regimen; 38 (22.62%) had medium levels of adherence, and 34 (20.24%) had high levels of medication adherence.



**Figure 1: Overall adherence levels in all patients (n=168).**

Table 3 shows the variables having significant differences by hospitals. The number of co-morbid conditions were higher in HMC, compared to RMI giving a  $p < 0.001$ . Use of alternate medications was higher in RMI ( $p = 0.002$ ). Stoppage of medication due to frequent changes was higher in RMI ( $p < 0.001$ ).

The cost of medications making them unaffordable was higher in RMI compared to HMC ( $p = 0.043$ ). The respect of doctors towards patients was higher in RMI compared to HMC ( $p = 0.002$ ). Other variables did not show significant differences between the two hospitals.

**Table 3: Variables showing significant differences between the two selected hospitals (n=84 each).**

Variables	HMC f (%)	RMI f (%)	p value
<b>Other associated diseases</b>			
None	08 (09.5)	33 (39.3)	<0.001
01	23 (27.4)	31 (36.9)	
02	30 (35.7)	17 (20.2)	
03	23 (27.4)	03 (03.6)	
<b>Alternate remedies used</b>			
Yes	06 (07.1)	21 (25.0)	0.002
No	78 (92.9)	63 (75.0)	
<b>Stopped medication due to frequent changes</b>			
Yes	03 (03.6)	18 (21.4)	<0.001
No	81 (96.4)	66 (78.6)	
<b>Were medicines unaffordable?</b>			
Yes	20 (23.8)	42 (50.0)	0.043
No	64 (76.2)	42 (50.0)	
<b>Did the doctor respect you?</b>			
Yes	68 (81.0)	81 (96.4)	0.002
No	16 (19.0)	03 (03.6)	

Table 4 shows the variables having significant differences by the three levels of adherence. HMC had significantly more patients in the low adherence category, whereas RMI had significantly more patients in the high adherence category ( $p<0.001$ ). Income per month also showed significance ( $p=0.006$ ), because the

higher income groups had more patients in the high levels of adherence. Presence of comorbidities showed higher frequencies of patients in the low adherence level ( $p=0.002$ ). Similarly fear of addiction to medication was higher in the low and moderate adherence levels ( $p=0.048$ ).

**Table 4: Variables showing significant differences by levels of adherence (n=168).**

Variables	Levels of Adherence f (%)			p value
	Low (n=96)	Medium (n=38)	High (n=34)	
<b>Hospital</b>				
HMC	63 (65.6)	17 (44.7)	04 (11.8)	<0.001
RMI	33 (34.4)	21 (55.3)	30 (88.2)	
<b>Income per month (PKR)</b>				
<10,000	17 (17.7)	01 (02.6)	04 (11.8)	0.006
>10,000 – 20,000	26 (27.1)	07 (18.4)	05 (14.7)	
>20,000 – 40,000	36 (37.5)	21 (55.3)	10 (29.4)	
>40,000 – 80,000	12 (12.5)	04 (10.5)	12 (35.3)	
>80,000	05 (05.2)	05 (13.2)	03 (08.8)	
<b>Other associated diseases</b>				
None	15 (15.6)	10 (26.3)	16 (47.1)	0.002
1	29 (30.2)	13 (34.2)	12 (35.3)	
2	30 (31.3)	11 (28.9)	06 (17.6)	
3	22 (22.9)	04 (10.5)	-	
<b>Fear of addiction to medication</b>				
Yes	10 (10.4)	09 (23.7)	02 (05.9)	0.048
No	86 (89.6)	29 (76.3)	32 (94.1)	

Chi-Square tests were carried out to find the strength of association between the level of adherence and the variables; among the variables tested Income per month was found to be statistically significant ( $p=0.006$ ) in the private tertiary care hospital. Co-morbidities (other diseases), and addiction to medication were found statistically significant with  $p=0.002$  and  $0.048$  respectively in the Public tertiary care hospital.

Multinomial Regression analysis was carried out in order to find out if there was any significant association between the level of adherence and variables whether they affected medication adherence. High adherence was kept as a reference category and C.I at 95% during the analysis. Among the variables tested, the hospitals were significantly associated with the adherence level (Table 5).

**Table 5: Multinomial Regression Analysis for level of adherence to medication.**

Level of Adherence*	Std. Error	df	Sig.	Exp(B)	95% confidence interval for Exp(B)	
					Lower bound	Upper bound
Low Adherence						
Intercept	1.316	1	<0.001			
Hospital	0.585	1	<0.001	0.068	0.022	0.215
Education	0.207	1	0.375	0.833	0.555	1.248
Medium Adherence						
Intercept	1.395	1	0.023			
Hospital	0.629	1	0.004	0.164	0.048	0.564
Education	0.214	1	0.986	1.004	0.660	1.528

\*The reference category is: High adherence.

## DISCUSSION

It was hypothesized that there would be differences in medication adherence of cardiovascular drugs among patients coming to public and private sector tertiary care hospitals, which was confirmed and the null hypothesis was rejected. Various factors affect medication adherence, among which income per month, education status, comorbidities and fear of addiction to medication were found to be statistically significant ( $p>0.05$ ). According to this study, the overall medication adherence was observed to be low, at 57.1%, with medium adherence of 22.6%, and high adherence of only 20.2%. Patients of private tertiary care hospital showed high adherence of 35% compared to the 4.8% high adherence of the public tertiary care hospital (high adherence ratio between private and public tertiary care hospitals  $>7:1$ ). Income

per month was the main variable which was significant in this regard. Other variables such as complexity of drug regimen, confidence in doctor, alternate remedies used, etc. were found to be statistically insignificant.

Few studies have been conducted in Pakistan regarding medication adherence among patients of cardiovascular diseases. A study conducted in Abbottabad,<sup>17</sup> Pakistan revealed that 68.14% patients were having low medication adherence. This low adherence was found to be significantly associated with gender and socioeconomic status. However, another study conducted on 460 patients at the Aga Khan University Hospital (AKUH) and National Institute of Cardiovascular Diseases, Karachi,<sup>18</sup> from September 2005–May 2006, found that 77% of patients were having high adherence; the significant factors associated with it were the



number of drugs taken by the patient & regularity of medication.

An Ethiopian study,<sup>19</sup> conducted on 384 patients, revealed that 64.6% of the patients were adherent to their treatment. Gender, knowledge about treatment, distance from the hospital and comorbidities were significantly associated factors. Another study conducted in Uzbekistan<sup>20</sup> on 209 patients revealed that 36.8% of the patients had low level of adherence; knowledge regarding the disease was significantly associated with the low medication adherence. A study conducted in India in 2015<sup>21</sup> revealed that medication adherence was below 27%. A study conducted in Chandigarh, India<sup>22</sup> on 260 patients revealed that about 47.3% of the patients had low adherence.

#### LIMITATIONS

Temporal sequence of events cannot be established in this study. Since the questionnaires were filled on the basis of recall, there might be some recall bias in the study.

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**Generalizability:** The results of this study may be applicable to other tertiary care hospitals of Khyber Pakhtunkhwa province and Pakistan, as the general characters of the patients and health care services remain similar.

#### CONCLUSIONS

Overall medication adherence among cardiovascular patients was found to be low; however, the private tertiary care hospital fared better than the public sector tertiary care hospital. Level of income, education status, presence of comorbidities, and fear of getting addicted to medications were the significant variables affecting medication adherence.

#### RECOMMENDATIONS

Government should initiate programs which would subsidize the cost of health care provision and introduce public health education measures to encourage medication adherence.



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## KNOWLEDGE, ATTITUDE AND PRACTICE OF PREGNANT WOMEN TOWARDS TETANUS IMMUNIZATION IN SELECTED TERTIARY CARE HOSPITALS OF HAYATABAD, PESHAWAR

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### ABSTRACT

**Introduction:** Maternal and neonatal tetanus is a disease of high mortality that is easily preventable through vaccination of pregnant women. In Pakistan due to poor tetanus immunization knowledge and practices, the disease is a prevalent cause of death amongst pregnant females and neonates.

**Materials & Methods:** This cross sectional study was carried out in two hospitals i.e. Hayatabad Medical Complex (HMC) and Rehman Medical Institute (RMI), Hayatabad, Peshawar from December 2015 to June 2016. Pregnant females (n=150) aged between 15-40 years were recruited for this study by convenience sampling and a structured questionnaire was used where the participants were interviewed after taking their consent. SPSS version 16.0 was used for data analysis.

**Results:** Majority of the pregnant females who participated in this study were aged between 15-25 years (47.2%) with no education of any sort (45.1%); 64.6% had knowledge of what tetanus vaccination was, while only 16.7% knew that it was for prevention of maternal and neonatal tetanus. In addition, 69.4% of the women cited the essentiality of tetanus vaccination for pregnant women, 56.9% of the women had been vaccinated against tetanus, majority of them (49.2%) having been given two doses. Only 41% had knowledge of what tetanus was, and a staggering 86.3% had no idea about the features of the disease itself. Though 32.8% women did not face any barriers to vaccination, 24.5% stated that their lack of knowledge of importance of tetanus vaccination caused a hindrance.

**Conclusion:** Practice of tetanus vaccination was high and attitude of the women was positive and encouraging but knowledge about tetanus vaccination was inadequate, with most of the females not knowing what tetanus was or why it was given.

**Keywords:** Tetanus; Immunization; Pregnancy; Vaccination; Tetanus Toxoid.

### INTRODUCTION

Tetanus, caused by *Clostridium tetani*,<sup>1</sup> is characterized by generalized rigidity and spasms of skeletal muscles. It is the second leading cause of death recognized as vaccine preventable among children, causing 0.049 million deaths worldwide with 1% of the under-5 year child deaths due to tetanus.<sup>2</sup>

Mortality is higher in the developing countries as compared to developed countries, with the most important route being through contamination of the umbilical cord with *C. tetani* spores due to unhygienic delivery or cord care practices after the delivery.

Symptoms of neonatal tetanus usually appear in the third day after birth. An apparently healthy baby will stop nursing, become progressively more rigid and experience painful convulsive spasms of skeletal muscles.<sup>3,4</sup> It is a deadly disease for newborns, with a case fatality rate of 70-100%.<sup>3</sup>

Maternal and Neonatal Tetanus is easily preventable through immunization of women with a tetanus toxoid (TT) vaccine for protection against tetanus.<sup>4</sup> A child born to a woman protected against tetanus is also protected from the disease in the first two

months of its life. Delivery of three doses of the TT vaccine to an expectant mother can protect her and any children she may have in the next 5 years. Along with hygienic birthing practices, immunization initiatives can make Maternal & Neonatal Tetanus (MNT) a disease of the past.<sup>5</sup>

As of February 2012, Pakistan is one of the 34 countries that has yet not achieved neonatal tetanus elimination,<sup>6</sup> with it contributing to 73% of the global tetanus burden. Neonatal Tetanus (NT) remains a public health problem in Pakistan where it is estimated that the current reporting system captures less than 10% of cases<sup>7</sup> and with an incidence rate of at least one neonatal tetanus case per 1000 live births at district level.<sup>1</sup> Even with the implementation of the Extended Program of Immunization (EPI) in Pakistan,<sup>7</sup> there is low tetanus toxoid vaccination coverage across the country, ranging from 60-75% over the last decade which is low compared to other countries which on an average have 86% and above coverage.<sup>8</sup> Low vaccination coverage is due to many factors, including inadequate knowledge of TT vaccine and its benefits amongst reproductive age females, lack of health facilities in rural areas, illiteracy and lack of implementation of immunization programs by health care workers.<sup>3</sup>

The main objective of this study was to determine knowledge, attitude and practice of pregnant women towards tetanus immunization and to identify potential barriers that may hinder them from getting vaccinated.

## MATERIALS & METHODS

Pregnant females aged between 15-40 years, attending Gynecology & Obstetric ward & OPD of Rehman Medical Institute and Hayatabad Medical Complex were approached for this

study. The subjects were selected by convenient sampling. Consent was taken from the participants and a structured questionnaire was distributed among them. A total of 150 questionnaires were filled, of which 144 were complete and 6 were incomplete and therefore excluded. The questionnaire consisted of the following parts:

**Part 1:** Demographic Data: Information about age, marital status, level of income, level education, working status, etc.

**Part 2:** KAP related to tetanus immunization: questions aimed to assess the knowledge, attitude and practice regarding tetanus immunization and to identify potential barriers they may have faced while getting vaccinated.

Data were analyzed using SPSS version 16.0 for descriptive statistics.

## RESULTS

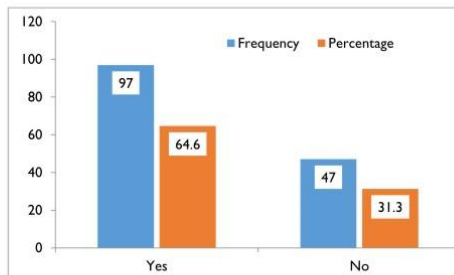
Of 144 pregnant females, 68 (47.2%) were aged 15-25 years, 65 (45.1%) had no education and 128 (88.9%) were unemployed, as shown in Table 1.

**Table 1: Socio-demographic characteristics of subjects (n=144).**

VARIABLES	f (%)
<b>Age group (years)</b>	
15-25	68 (47.2)
26-30	58 (40.3)
31-35	14 (9.7)
36-40	04 (2.8)
<b>Level of education</b>	
None	65 (45.1)
Primary level	20 (13.9)
Secondary level	24 (16.7)
Graduate	35 (24.3)
<b>Occupation</b>	
None	128 (88.9)
Self-employed	04 (2.8)
Private sector	08 (5.6)
Public sector	04 (2.8)

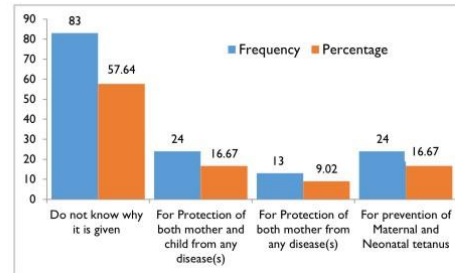


Figure 1 show the knowledge of all the subjects regarding Tetanus in which 64.6% of the participants knew what tetanus vaccination was but only 16.7% were able to correctly identify that it was used against maternal and neonatal tetanus.



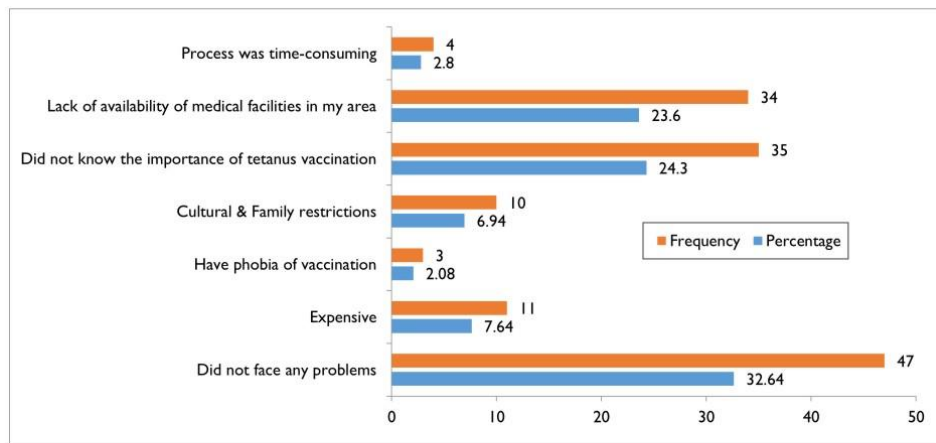
**Figure 1: Knowledge of subjects about tetanus vaccination (n=144).**

The majority of subjects (83, 56.9%) stated that they did not know why it was given (Figure 2). Of those who gave responses, 24 (16.7%) each said that it was for protection of mother and child, and for prevention of maternal and neonatal tetanus; 13 (09.0%) subjects said that it was for protection of mother from any diseases.



**Figure 2: Knowledge of reasons for vaccination among subjects (n=144).**

Figure 3 shows the details of vaccination problems that the participants faced with regard to vaccination; 47 (32.8%) did not face any problems, but for those who did, the main barriers were lack of knowledge of importance of tetanus vaccination (35, 24.3%), and lack of availability of medical facilities (34, 23.6%). Expensiveness of vaccination accounted for 11 (7.64%) subjects having problems, while Cultural & Family restrictions accounted for 10 (6.94%) of problems faced by subjects.



**Figure 3: Problems of vaccination against Tetanus among subjects (n=144).**

## DISCUSSION

This study assessed the knowledge, attitude and practice of tetanus vaccination among pregnant females attending two major tertiary care hospitals (RMI and HMC) of Peshawar, Khyber Pakhtunkhwa. As no specific data were available from studies among pregnant females of this area, the study results were compared to similar studies in different groups of women.

Knowledge about tetanus vaccination was found in 97 (64.6%) women in the present study, which is much higher than the 31.2% obtained in a similar study done in Peshawar.<sup>5</sup> In the present study 56.9% of the participants had been vaccinated, which is close to the 55.6% obtained in a study from Peshawar,<sup>5</sup> and greater than the 47% obtained in a study from Ankara, Turkey,<sup>9</sup> 15%<sup>10</sup> and 41.7%<sup>11</sup> results obtained from two different studies done in the United States, and the 49.5% obtained in a study done in Canada.<sup>12</sup>

The present study shows that the main reason for participants not getting vaccinated was that they did not know about tetanus vaccination, its importance or how/where to get vaccinated (24.5%). This result demonstrates the lack of awareness regarding tetanus immunization among pregnant women. In a similar study done in Ankara, Turkey<sup>9</sup> the main reason for not getting vaccinated was that their doctors had not recommended it to them (51%). In studies done in Khartoum-Sudan,<sup>14</sup> Dhaka-Bangladesh,<sup>15</sup> and Peshawar-Pakistan,<sup>3</sup> 44.4%, 50% and 40.5% results were obtained respectively for pregnant females who did not know about tetanus vaccination, its importance or how/where to get vaccinated. The 24.5% obtained in this study is much lesser than the percentages obtained in these four studies.

Only 58.3% of the participants of the current study were of the opinion that tetanus

vaccination was important for prevention of maternal and neonatal tetanus, which is less compared to the 67% result obtained in a similar study done in Khartoum, Sudan.<sup>14</sup> In addition 74.3% of the participants expressed willingness to get vaccinated if given information/facilities, which is much more compared to the 55.0-59.7% result obtained in a similar study done in Canada.<sup>13</sup>

## LIMITATIONS

There were comparatively more uneducated females than educated in this study, representing predominantly uneducated females attending the Gynae/Obs ward of RMI and HMC which could account for the wide difference in results. A more proportionate number of educated and uneducated females may have resulted in a more equitable outcome.

## CONCLUSIONS

Immunization practice against tetanus in tertiary care hospitals of Hayatabad, Peshawar is consistent with other developed parts of the world and most similar cities of our country with slightly better and/or similar results. The main barriers faced were lack of awareness of the importance of tetanus vaccination or less than adequate medical facilities in their areas. Moreover knowledge regarding tetanus vaccination and tetanus disease was highly insufficient.

## RECOMMENDATIONS

Health care providers, particularly private practitioners and Lady Health Workers can play a vital role in imparting knowledge regarding immunization as well as tetanus disease by providing regular house visits for immunization and to increase awareness. Maternity care providers are urged to evaluate their current



practices and consider the integration of vaccination and disease knowledge as part of

their routine services to improve vaccination practice and knowledge.

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## KNOWLEDGE, ATTITUDE AND PRACTICE OF CONSANGUINITY AND ITS ASSOCIATED REPRODUCTIVE RISKS IN A RURAL POPULATION OF CHARSADDA, PAKISTAN

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### ABSTRACT

**Introduction:** Consanguinity refers to a relationship between two people who share a common ancestor or blood. At present about 20% of the world's population live in communities with preference for consanguineous marriages. Pakistan is also one of these countries where the prevalence of consanguineous marriages is very high, particularly in rural areas. Such marriages have an impact on the reproductive health parameters such as postnatal mortality and hereditary disorders specifically autosomal recessive genetic disorders.

**Materials & Methods:** A cross sectional study was conducted in the rural community of Nahaki, Charsadda, Khyber Pakhtunkhwa (KP) Province of Pakistan, from Jan-June 2015 on patients and visitors attending the Nahaki Emergency Satellite Hospital (NESH). A sample size of 150 was selected via convenience sampling; data were collected through questionnaire-based interviews which contained questions about knowledge, attitude and practices of subjects regarding consanguinity and its associated reproductive risks, as well as questions about the factors that led to these practices. SPSS version 15.0 was used for data analysis.

**Results:** Out of 150 interviewed subjects, 82.7% responded to having knowledge about consanguinity; however only 43.3% responded to having information about the side effects associated with consanguineous marriages, while only 29.7% knew of the increased risks due to cousin marriages. A staggering 97.3% reported consanguineous marriages in their extended families and 74.0% had a positive attitude towards cousin marriages. The predominant factors of consanguinity were the traditions and authority of parents regarding marriages; 68.7% of the subjects were of the view that couples should get information about the risks associated with cousin marriages beforehand. Only 4.3% had undergone blood tests for genetic status before marriage.

**Conclusions:** The practice of consanguineous marriages is quite high in the rural areas and majority of the population is unaware about the risks associated with this practice, however, their attitude regarding awareness campaigns was quite positive. These results indicate that more efforts are needed in creating awareness and public health strategies regarding consanguineous marriages and its associated reproductive risks.

**Keywords:** Consanguinity; Marriage; Congenital abnormalities; Homozygote; Heterozygote.

### INTRODUCTION

Consanguinity ("blood relation"), derived from the Latin (*consanguinitas*) is the property of being from the same kinship as another person.<sup>1</sup> In other words, consanguinity refers to sharing of descent from the same ancestor. Many jurisdictions set out degrees of consanguinity in relation to prohibited sexual relations, marriage parties, and inheritance of property when a deceased person has not left a will. Rules of

Consanguinity are also used to determine heirs of an estate according to statutes that govern intestate succession, which vary from jurisdiction to jurisdiction.<sup>1</sup>

At present about 20% of the world's population live in communities with preference for consanguineous marriages. Consanguinity rates vary from one population to another depending



on religion, culture and geography. Many Arab countries have some of the highest rates of consanguineous marriages in the world, around 20-50% of all marriages, specifically favoring first cousin marriages with average rates of about 20-30%. The preferences for consanguineous marriages are due to socio-cultural factors such as maintenance of family structure, ease of marital arrangements, etc.<sup>2</sup> Research shows that consanguineous marriages have an impact on the reproductive health parameters such as postnatal mortality and hereditary disorders specifically autosomal recessive genetic disorders.<sup>3</sup> A study conducted in Iran on the relationship between neonatal deaths and consanguinity showed that neonatal death risks increased with cousin marriages.<sup>4</sup>

Many researches have been conducted on this aspect, mainly in Arab countries, but no such study has been conducted in the rural areas of Khyber Pakhtunkhwa (KP) province of Pakistan. This study was conducted to document evidence of the presence of this issue in rural areas of KP province. The objectives of the study were to determine the knowledge, attitude, practices, and causative factors behind consanguineous marriages among the population of Nahaki.

## MATERIALS & METHODS

A cross sectional descriptive study was conducted in Nahaki Emergency Satellite

Hospital (NESH), Charsadda, KP, from January to June 2015. A sample 150 subjects was included through convenience sampling from the patients and attendants visiting Outpatients Departments (OPDs) and wards in NESH after informed consent; incomplete questionnaires, missing data and confounding factors were excluded.

Data about Knowledge, Attitude, and Practice (KAP) were collected through interviews using a questionnaire which included three parts. The first part was for demographic data; the second part was for information on knowledge of and attitude towards consanguinity. The third part was for information on practices related to consanguinity. Descriptive analysis was done by SPSS 15.0 for calculating frequencies and percentages.

## RESULTS

Of 150 subjects, 36 (24.0%) were males and 114 (76.0%) females, with age range of 15-70 years (mean age  $36.93 \pm 13.88$  years). Marital status was that 137 (91.3%) were married; duration of marriages ranged from 1-50 years (mean  $18.99 \pm 13.36$  years); ages at marriage ranged from 10-35 years (mean  $19.05 \pm 3.06$  years). Relationship of married subjects for consanguinity from paternal side was 35.0%, from maternal side was 20.4%, and from both sides was 2.2%; 29.9% did not have consanguinity and 12.4% had other levels of consanguinity (Figure 1).

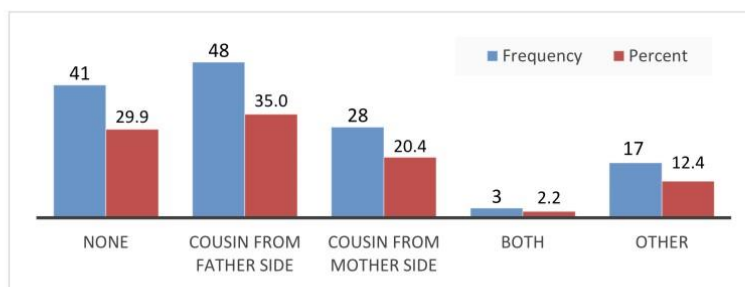


Figure 1: Blood relationship of the married subjects to their spouse (n=137).

KAP data about consanguinity are provided in Table 1. Knowledge regarding cousin marriages was estimated to be 82.7%, whereas 43.3% of the people claimed to have knowledge regarding the side effects of cousin marriages and only 29.7% knew about the increased risks of cousin marriages. Attitude of people regarding cousin marriages was positive (74%); 68.7% thought it important that couples should be informed about the risks of consanguinity before marriage and 70.0% were of the opinion that the Nikah Nama should contain a section on blood tests for genetic diseases. An overwhelming 97.3% reported the practice of consanguineous marriages in their extended families; yet only 4.3% had been asked about blood tests for genetic diseases at the time of their marriages.

**Table 1: KAP about consanguinity among subjects (n=150).**

Characteristics	f (%)
Knowledge about consanguinity	124 (82.7)
Knowledge about side effects of consanguinity	65 (43.3)
Knowledge about increased risks due to cousin marriages	44 (29.7)
Positive attitude regarding cousin marriages	111 (74.0)
Important for couples to be informed about risks of consanguinity before marriage	103 (68.7)
Section to be included in Nikah Nama about blood testing for genetic diseases	105 (70.0)
Practice of cousin marriages in the extended family	148 (97.3)
Asked about blood testing for genetic status at the time of marriage	06 (04.3)

Table 2 shows data of complications found in consanguineous unions: 25.5% had at least one child with genetic disease or postnatal death, while 59.3% knew of other couples with similar complications. The complications found in

consanguineous marriages as listed by subjects were: Mental Retardation (51.39%), Physical disability (20.83%), Deaf and Mute child (19.44%), and congenital abnormalities (8.33%).

**Table 2: Complications in children born of consanguineous marriages (n=137).**

Complications of marriages	f (%)
Any child suffered from genetic disease or postnatal death	35 (25.5)
Know children of other consanguineous couples having genetic disease or postnatal death	89 (59.3)
<b>Complications Found</b>	
Mental Retardation	37 (51.39)
Physical disability	15 (20.83)
Mute & Deaf	14 (19.44)
Congenital abnormality	06 (08.33)

The frequency of congenital defects in non-consanguineous marriages (6/41, 14.6%) was compared with those in consanguineous marriages (27/79, 34.2%); the difference was found to be statistically significant ( $p=0.023$ ).

## DISCUSSION

The present study was done to gain an insight into the prevailing practice of consanguineous marriages in a rural community of Peshawar, KP, Pakistan which came out to be 79/137 (Figure 1), i.e. 57.67%. In a cross sectional survey carried on the Muslim ethnic minority population in Nepal the overall prevalence of consanguineous marriages was estimated to be 36.7%. The median age at marriage and age at first childbirth was 15 and 18 years, respectively.<sup>5</sup> Somewhat contrastingly, consanguinity in the population of Nahaki was estimated at 55.67%, and the mean age at marriage at  $19.05 \pm 3.06$  years. The frequency of congenital malformations estimated in the present study was lower than the study conducted in Iran.<sup>6</sup> Increased incidence of genetic malformations in the offspring of consanguineous couples most likely arises from the homozygous expression of



recessive genes inherited from their common ancestor.<sup>7</sup>

In accordance with Islam MM,<sup>8</sup> the present study found consanguineous marriage to be associated with lower age at first birth, higher preference for larger family size, lower level of husband-wife communication about use of family planning methods and lower rate of contraceptive use.<sup>8,9</sup>

According to Tayebi N et al,<sup>6</sup> who studied 1195 neonates, of which there were 45 cases with anomalies, 34 (2.8%) cases were from familial marriages, while only 11 (0.9%) cases were from non-familial marriages. There was a significant correlation between parental marriages and the prevalence of anomaly. These results are in accordance with the current study which also shows that congenital anomalies were present in significantly greater frequencies among consanguineous unions compared to non-consanguineous marriages ( $p=0.023$ ).

Regarding the attitude of people of Nahaki towards information on reproductive risks, results (68.7% wanting pre-conceptual information, Table I) were in accordance with Teeuw ME et al,<sup>10</sup> whose study showed that respondents were on average, rather positive when asked whether consanguineous couples should seek (pre-conceptual) information about the possible genetic risk for their offspring; 54% agreed or totally agreed that it would be wise for couples to seek information from their local general practitioners. More than half of the respondents thought that the best moment to inform people about these risks was before marriage, and one-fifth thought this should happen before the first pregnancy.<sup>10</sup>

The present study showed that 43.3% of the participants had knowledge about the side effects of consanguinity; these results are contrary to a qualitative study from Pakistan by Hussain R,<sup>11</sup> where it is concluded that there is

a general lack of awareness of the possible adverse health effects as a consequence of consanguineous marriages. In the present study, most people were in favor of the availability of information on reproductive risks associated with consanguinity; this positive attitude might stem from important values in Islam, indicating that people should aim at gaining knowledge and should pursue all that is good for one's health.<sup>12</sup>

Regarding the factors contributory to consanguineous marriages, the study showed more inter-family unions among less fortunate households which is in accordance with a study done by Mobarak AM et al,<sup>13</sup> which showed that brides from protected households commanded larger dowries, married wealthier households, and became less likely to marry biological relatives; this protected them from facing the health risks that are related to inter-family breeding.

The strength of this study is that we tried to reach the people in the very remote areas of KP province. These areas are generally difficult to reach. However, to our surprise the people there were very cooperative in interacting and answering the questions, but individual levels of understanding, low literacy rates and their level of interest in the subject led to major biases in our study.

## LIMITATIONS

The research was a student project of 4<sup>th</sup> Professional MBBS students of Rehman Medical College (RMC), Peshawar, so it was time-bound requiring completion within a predetermined time frame. The language of the questionnaire was English, so there was a major language barrier to be overcome. Majority of the study population were illiterate and could not understand the medical terminologies present in the questionnaire; as such, the questions had to be explained to them by group members which created inter-observer bias.

## CONCLUSIONS

The practice of consanguineous marriages is very much in practice and favor among the rural poor community of KP province. Contributory factors include family pressure, low socio-economic status, age at marriage, and cultural norms and traditions. Congenital malformations and postnatal deaths due to consanguineous unions may be affecting the infant morbidity and mortality rates in the rural areas of KP province.

## RECOMMENDATIONS

- Further research is required to be conducted on this issue with a much bigger sample size.
- One priority is to increase awareness about the reproductive risks associated with

cousin marriages. For this purpose we have to educate the people of rural areas and make them self-sufficient in making their own decisions regarding health.

- Doctors and Health Care Providers should include genetic counseling as a part of their approach towards patients. They should first build empathy and trust with their patients and then inform them about the risks associated with cousin marriages.
- Government and mass media should also play their part by looking into this issue and giving it considerable importance. Awareness campaigns needs to be organized and special clinics for genetic counseling needs to be established.

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## MAGNITUDE, PATTERN AND PRACTICES OF SELF-MEDICATION AMONG SELECTED NON-MEDICAL STUDENTS OF PESHAWAR UNIVERSITY

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### ABSTRACT

**Introduction:** Self-medication can be defined as obtaining and consuming drugs without the advice of physician for diagnosis, prescription or surveillance of treatment. It has emerged as a common practice in economically deprived communities. Very few studies regarding Self-medication have been conducted in Pakistan, which have also confirmed high self-medication rate of around 51%. The objective of the study was to determine the magnitude, pattern, causes and practices of self-medication among selected university students of Peshawar.

**Materials & Methods:** A questionnaire based cross sectional survey was conducted among the non-medical departments of Peshawar University. The study was conducted within a two-month period from February to March, 2014. Convenience sampling technique was used for the collection of the data; all the students present at the defined settings on the day of study conduction were selected for inclusion. A pre tested questionnaire was used for data collection. For the analysis of data SPSS version 15.0 was used. The Chi square test was used for significance testing of variables, keeping  $p \leq 0.05$  as significant.

**Results:** A total of 200 questionnaires were distributed at different departments of Peshawar University out of which 163 responded, (response rate 81.5%). Of these 163 respondents, 89.6% practiced self-medication. Among those who treated themselves, seasonal flu was the commonest disease, (55.20%); other diseases like fever joint pain, minor injuries, skin problems, disturbed bowel, body aches, and sore throat showed a self-treatment rate of 53.3%, 10.4%, 25.7%, 15.9%, 12.8%, 23.3%, 47.8% respectively. Among the drugs, antibiotics (55.8%) and analgesics (49.1%) were the common self-prescribed drugs. Successful previous treatment (32.51%) and confidence in treating oneself (28.22%) were the most common provoking factors for self-medication.

**Conclusions:** Self-medication practices were alarmingly high in the university students of selected non-medical sector, regardless of the knowledge of prescribing medicines.

**Keywords:** Self Medication; Antibiotics; Students; Substance-Related Disorders; Nonprescription Drugs.

### INTRODUCTION

Self-medication with nonprescription drugs is a global public fitness problem<sup>1</sup> that is encountered more in developing countries.<sup>2</sup> Self-medication may be described as “the use of medicine to deal with self-identified disorders or signs and symptoms, or the intermittent or continuous use of a prescribed drug for persistent or recurrent disease or signs and symptoms”. Three studies revealed that self-medicinal drug represents a commonplace problem amongst college students.<sup>3</sup>

Self-medication increases the risk of unlawful drug use, dependence and protecting the underlying sickness which lead to public health difficulty, generate drug resistance and obstruct prognosis.<sup>4</sup> Self-remedy in Saudi Arabia appears to be a not unusual exercise amongst the overall population.<sup>5</sup> Studies carried out amongst university or college students, they has stated that the utilization of nonprescription drugs during their studies in college and the use of analgesics is not unusual.<sup>6</sup>

WHO has pointed out that self-medication can prevent and treat conditions that do not require medical consultation and provide a cheaper alternative for common illnesses.<sup>7</sup> The prevalence rates are high all over the world; 68% in European countries, 92% in Kuwait, while 31% in India and 59% in Nepal.<sup>8</sup>

In the use of nonprescription drugs, patients take responsibility of recognizing the proper indication, suitable dosage regimen or looking for clinical recommendation in cases where unfavorable occasions might also occur or when the illness does not improve.<sup>9</sup> This is a challenge, specifically to patients in developing nations where there are excessive stages of illiteracy. Furthermore, the facts used to guide selection of drug usage is more often than not obtained from friends/spouse and children, previous prescriptions and stories of the use of specific capsules.<sup>10</sup>

This inappropriate use of medication, especially antimicrobial agents, has been related to elevated danger of drug resistance. Antimicrobial resistance is presently a major concern for developing nations where the burden of infectious diseases is excessive, yet constrained by choices of remedy.<sup>11</sup> At the same time, community remedy of not unusual diseases through self-medicated drugs is being encouraged by the WHO, so as to assist in reducing the load on health care resources.<sup>12</sup>

Very little research has been done concerning analgesic self-medication in Pakistan, particularly in young, otherwise fit, adults. This study was undertaken with the objective to determine the magnitude, pattern, causes and practices of self-medication among selected non-medical students of Peshawar University, Khyber Pakhtunkhwa, Pakistan.

## **MATERIALS & METHODS**

A cross sectional survey was conducted at non-medical departments of Peshawar University,

Khyber Pakhtunkhwa, from February to April 2014. The study completed in a time period of three months approaching a total of 200 students, out of which 163 students responded to the provided questionnaire. A simple ratio of 1:2:3 was given to each department which was based on the strength of the department. All the participants were given a self- designed questionnaire with a consent form which was addressed and made clear to each participant before the participant responds to the questionnaire.

Convenience sampling technique was used for assessing the medical students, and for the collection of data. The questionnaire carried questions to access the incidence of self-medication among the non-medical students and to assess the common health issues which were treated by the students by themselves. Students were also accessed for the common medication the prescribe themselves and to their friends and relatives. Students were also assed the reasons why the students prefer treating without consulting a doctors. For the analysis SPSS 15.0 version was used. Results are tabulated as well as graphically, by using Microsoft excel.

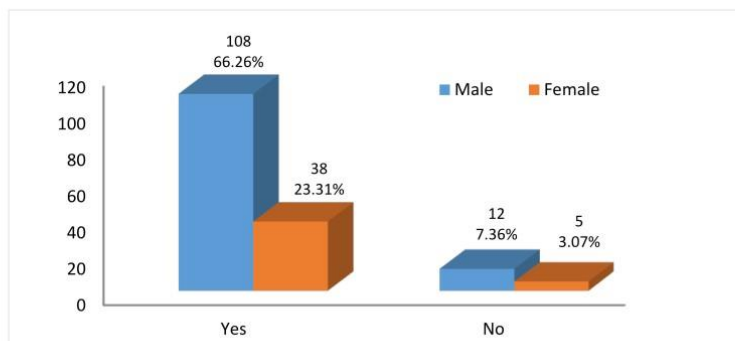
## **RESULTS**

A total number of 200 students were assessed during data collection out of which 163 students participated in the study; response rate came out to be 81.5%. Of these 163 students 73.6% were male students while 26.4% of the female students participated in the study. The number of the students who responded to the questionnaire was enrolled in the departments of University of Peshawar. Of the students participated around 89.6% of the participants practice prescribing medication themselves, while only 10.4% neither practice self-medication nor favors self-medication a healthy practice. Figure 1 given below shows that the



ratio between male and female students involved in self-medication is proportionately

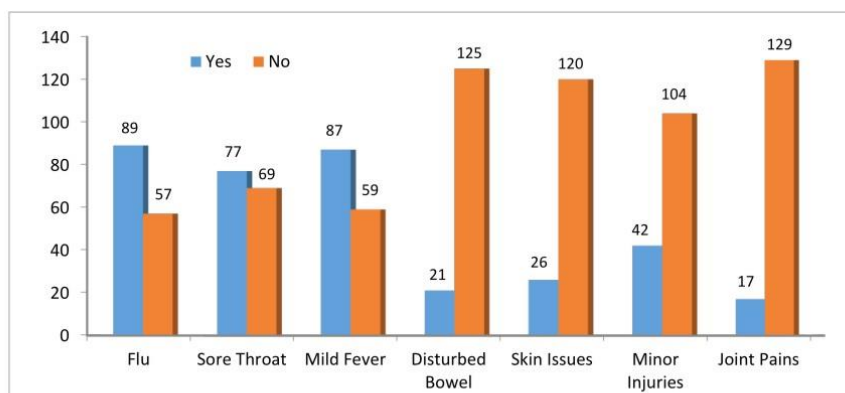
equal; as about 88% of females and 90% of males were found to be practicing.



**Figure 1: Practice of self-medication among males and females (n=163).**

Students were also assessed for the diseases they commonly prefer to treat themselves rather than consulting a physician. The response of the students is presented graphically below in Figure 2. With this we came to know about the preference of non-medical community in treating health issues. As the graph below shows flu, sore throat and fever of mild grade and sudden onset are the common health issues

which are addressed by the students most frequently. Out of them flu was the most common disorder to be treated by the students themselves; this is in contrast to the results found for 'bigger' issues like bowel disturbances, skin conditions, injuries, and joint pains, where the students would like to seek a physician's opinion before treating them.



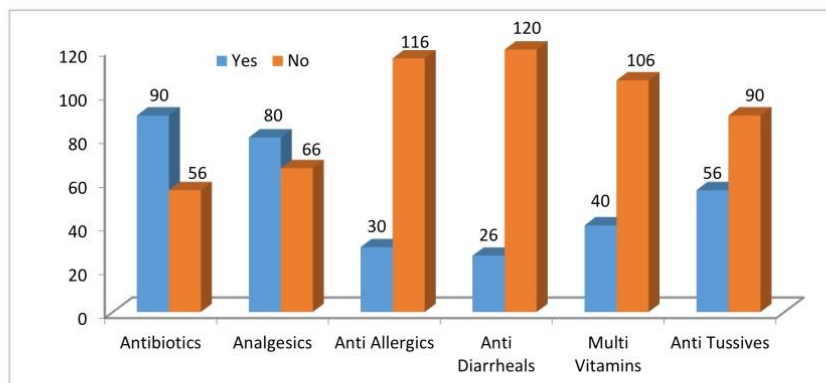
**Figure 2: Students' preferences for the diseases they treat by self-medication (n=146).**

Assessing the students for the common diseases they commonly treat, they were asked to mention what are the common medicines the students prescribe themselves whenever they feel ill. Not surprisingly majority i-e 91 out of

163 students prescribe antibiotics to themselves and to their friends and relatives commonly. Second most commonly prescribed drug is pain killer (usually NSAIDs) which can arise to other health issues. These two commonly used

drugs were followed by the use of multivitamins in society under study. Anti-allergic medication was the least used drug among the students.

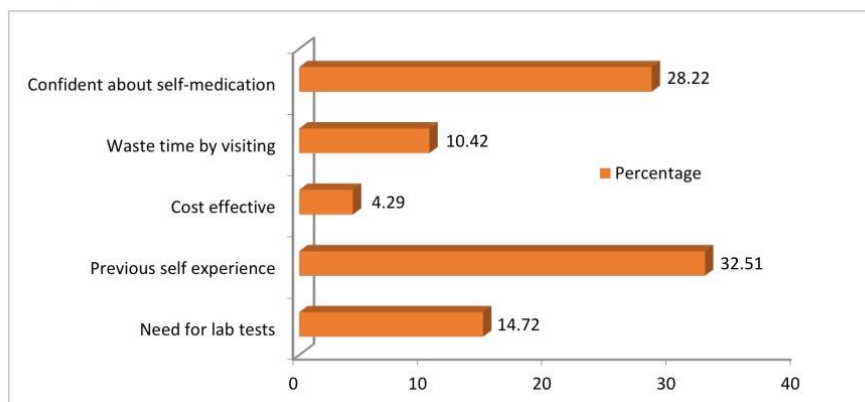
The overall response of the students is shown in Figure 3 below.



**Figure 3: The medicines commonly used by students for self-medication.**

Assessing students for the reasons why they prefer treating themselves rather than going through a proper consultation from a registered physician. Majority of the students showed no confidence over the routine practice of consultants followed by the unsatisfactory approach of doctors towards treating the disease. Majority of the students thinks that

they can treat themselves better based on their previous experience than to visit their physician. Unnecessary lab test and spending money over them in a third world country is an issue which needs to be tackled in best possible manner. A detail of the responses of students in terms of percentage is shown below in the Figure 4.



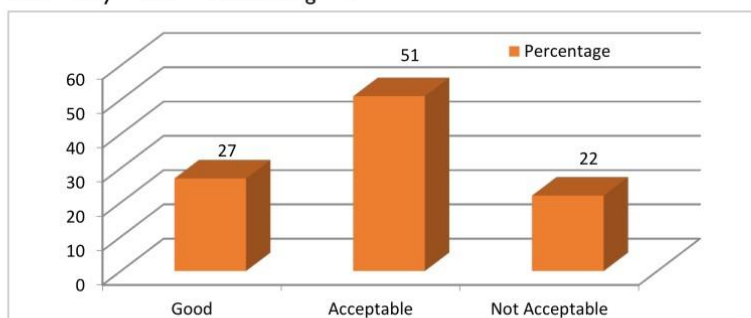
**Figure 4: Reasons for preference of self-medication by students (n=146).**

In the end of the questionnaire students were asked to feel free to write about their views about the self-medication and to prescribing

anyone else with having any knowledge of medicine. As shown below in Figure 5, the majority of students' i.e. 51% were of the view

that it is an acceptable way of accessing health facilities with only 22% considering it

unacceptable.



**Figure 5: Students views about the practice of self-medication.**

## DISCUSSION

Our study shows 89.6% self-prescribing rate and only 10.4% were not involved in the act of self-medication. Our study has discovered a high occurrence (eighty nine percent) of self-medication of drugs by the non-medical university students of university of Peshawar. This in correspondence with another study among Indians, which resulted the frequency of self-medication in 73.6% of the first and 12 months clinical college students.<sup>13</sup> However, this was the prescribing medicines frequency in our study among non-medical sector was even more than Indian medical students. This discrepancy may be attributed to variations inside the period of reporting of self-remedy, sample size, target populations or the level of information approximately self-remedy. Similar to our study higher rates of self-prescribing were found amongst college students from Egypt<sup>14</sup> and among 1st year clinical college students from Bahrain<sup>15</sup> and in Karachi University students 76%.<sup>16</sup> Contradictory to this practice, a lower rate i-e 38.8% found amongst undergraduate nursing students from Brazil.<sup>17</sup> This change in self-medicating may be because of the variations in population and economic stability in Brazil.

Our study shows that the proportion among males and females students who practice self-prescribing was statistically alike and this result is in coincidence with another study conducted among medical students in north Uganda, Sudan<sup>16</sup> and some other studies rank males to be more involved rather than females. It can be because of more exposure of males with external environment than male; secondly females are found to be more health conscious than females. Self-medication in the general population of India, our neighboring country, has been reported to be around 31%.<sup>18</sup>

Although it is true that self-medication can help really treat minor illnesses that do not require medical consultation and proved beneficial in reducing the pressure on medical services particularly in the developing countries with limited health care resources,<sup>19</sup> but the availability of the drug groups such as antibiotics without prescriptions is a source of great concern. Moreover, the practice of self-medication often has many adverse effects and can lead to many problems, including the global emergence of drug resistance, drug dependence and addiction, hazard of misdiagnosis, problems relating to over and under dosing<sup>20</sup> and drug interactions. It is generally thought that medical

students have much more knowledge about medicines than non-medical students they would be self-medicating more. But studies have shown high rates of self-medication amongst non-medical professionals.<sup>21</sup>

Many studies, as mentioned above, are in support of our study, even explaining the why students prefer self-prescribing as shown in section of results. Use of analgesics was the second comments drug in our study antibiotics being the most common, coinciding results were found in other studies ranking analgesics use especially NSAIDs and acetaminophen the most common drugs by the scholars. This coincides with results of the previous research.<sup>22</sup>

## CONCLUSION

This study concluded that the frequency of self-medication practices was high among the non-medical sector of Peshawar University, irrespective of their knowledge about the use of

medicines. The antibiotics were the most freely consumed medication which should be dealt on in the best possible manner by increasing awareness among the students.

One important result which cannot be overlooked is that some doctors practice writing unnecessary lab tests which cost patients spending extra money.

## RECOMMENDATIONS

On the basis of this study proper awareness campaigns and education regarding the consequences of self-medication should be scheduled at regular basis and should target young non-medical students to get proper and effective results. Revisiting the scope of self-medication in our local setting as majority of the students were satisfied and ranked self-prescribing an acceptable practice. Their usual practice of general practitioner can be addressed and effective policies can be designed to provide the medical facilities to the general public with ease and at their door steps.

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## TRAUMATIC AND NON-TRAUMATIC SPINAL INJURY AT TWO MAJOR TERTIARY CARE HOSPITALS OF KHYBER PAKHTUNKHWA

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### ABSTRACT

**Introduction:** Spinal cord injury is a medically complex and life disrupting condition, caused due to sudden trauma or non-traumatic reasons. The injury disrupts neural signaling and is a medical emergency requiring immediate treatment which can reduce long term affects like paralysis or partial disability of the body. It has costly consequences both for individual and family because it causes not only physical disability but dependency on others. The main objectives of the study were to determine the frequency of spinal injuries, as well as their nature and causes.

**Materials & Methods:** This descriptive study was conducted at neurosurgery units of two busy teaching hospitals of Peshawar, Khyber Pakhtunkhwa in duration of 3 months (Oct-Dec 2014). The study population was all 768 patients admitted and operated for spinal cord illness during the year 2013. Data were collected from hospital records using structured questionnaire and 384 (50%) of the total study population were selected by random sampling through SPSS version 15.

**Results:** Major factors for spinal cord injury were traumatic and non-traumatic. This study revealed that of total patients, 35% faced trauma as a cause of spinal disorder out of which 42%, 29% and 21% were sudden fall, road traffic accidents (RTA) and weight lifting respectively. While non-traumatic causes were 52% mostly due to congenital anomalies (24%), stenosis (23%), and tumor (12%). Levels most commonly involved were lumbar (42.3%) followed by patients involving multiple levels (32.52%), L5-S1 (20.87%), thoracic (2.42%), and cervical (1.92%).

**Conclusions:** The major cause of spinal cord injury was traumatic injury while congenital abnormalities and spinal cord stenosis were also common among patients with non-traumatic causes.

**Keywords:** Spinal Cord Injury; Spine; Lumbar Vertebrae; Intervertebral Disc; Trauma, Nervous System; Paraplegia.

### INTRODUCTION

Spinal cord injury (SCI) results in a change, either temporary or permanent, in the normal motor, sensory or autonomic function of the spinal cord. Patients with SCI usually have permanent and often devastating neurologic deficits and disability. Although well-protected by the bones and vertebrae of the spinal column, the spinal cord can be damaged in many ways. It can be compressed by an accident, injured by firearms injury or any sudden trauma etc. "spinal cord injury (SCI) is a medically

complex and life disrupting condition".<sup>1</sup> It is damage to spinal cord that results in a loss of function such as mobility or feeling. This loss of function has a very serious health and cost consequences, because most of the spinal injury patients become dependent or disabled.

According to World Health Organization (WHO) 2013, nearly 05 million people suffer spinal injury every year.<sup>2</sup> In low income countries mortality rate among people with

spinal cord injury (SCI) is higher than developed countries and they die prematurely. The main causes of the death are preventable secondary conditions.<sup>3</sup> According to the National Spinal Cord Injury Statistical Center (NSCISC) in UK 40,000 people living with paralysis 1200 peoples paralyzed each year and a person is paralyzed every 8 hour.<sup>4</sup> Spinal cord injury is a very costly affair for both individual and family because the cost of treatment of SCI is very high and majority of the people suffering SCI become dependent on other as well as society.<sup>3</sup> Major complications related to SCI are common and include Depression, diseases of the Respiratory & Urinary Tract, Bladder and Bowel problems, and autonomic dysreflexia, a potentially dangerous clinical syndrome resulting in acute, uncontrolled hypertension.<sup>5</sup> The most important aspect of clinical case for the SCI patient is preventing complications related to disability. Over 10,000 Americans sustain SCI every year. The major symptom is the loss of movement and sensation in areas of the body innervated from areas of spinal cord below the site of injury.<sup>1</sup> Spinal cord injury will permanently handicap about one in one thousand individuals over the course of their life time.<sup>6</sup>

The objective of this study was to determine the types of spinal cord injuries in two major tertiary care hospitals of Peshawar, Khyber Pakhtunkhwa, Pakistan; additional objectives were to document the determinants of spinal cord injuries and their distribution by gender.

## MATERIALS & METHODS

A descriptive study was conducted in the Neurosurgery wards (NSW) of two major hospitals of Peshawar, viz. Lady Reading hospital (LRH), and Hayatabad Medical Complex (HMC) Peshawar. Necessary permission was taken before start of data collection from administration of both hospitals. The duration

of study was 3 months, from October to December 2014. A total number of 768 patients were retrieved from the hospital records for the year 2013, from which a 50% random sample was taken (384 patients) while incomplete patient records were excluded. The data were transferred and recorded on a pre-constructed Performa covering all the required variables of the study. Finally the data were transferred to SPSS 15 for analysis of descriptive statistics. In addition, comparisons were done by gender, hospitals, types of injuries and causes of injuries. The Chi Square test was used to compare groups for significant differences of frequencies, keeping  $p \leq 0.05$  as significant.

## RESULTS

Of the 384 cases studied in both major hospitals of Peshawar, 311(81%) were from Lady Reading Hospital (LRH) and 73(19%) from Hayatabad Medical Complex (HMC). Gender distribution was 212 (55.0%) males and 172 (45%) females. Age distribution showed 288 (75.0%) cases having ages above 20 years; however 46(12.0%) of cases were below 1 year of age as well.

**Table I: Distribution of demographic data of patients by hospitals (n=384).**

Demographic Data	Gender		Total f (%)
	HMC	LRH	
<b>Gender</b>			
Male	38	174	212 (55.2)
Female	35	137	172 (44.8)
<b>Age Groups (years)</b>			
< 1	09	37	46 (12.0)
1-10	02	11	13 (03.4)
11-20	09	28	37 (09.6)
21-30	24	56	80 (20.8)
31-40	14	65	79 (20.6)
41-50	07	58	65 (16.9)
> 50	08	56	64 (16.7)



Data for documented causes of spinal cord injury were available for 336(87.50%) cases, with 48 cases missing, which were excluded. Table 2 shows the distribution of patients by hospitals based on gender and causes of Traumatic Injuries. Of the 336 cases, 134(39.9%) patients suffered Traumatic spinal

cord injuries; among them 56(41.8%) were Fall cases, 39(29%) Road Traffic Accidents, 28(8.3%) due to Weight Lifting, while 11(03.3%) were because of Firearm Injuries. Significant differences were not noted ( $p>0.05$ ) for both gender and type of hospital.

**Table 2: Causes of traumatic spinal cord injuries in subjects by gender and hospital (n=134).**

Causes of Injury	Male f (%)		Total f (%)	p value	Female f (%)		Total f (%)	p value
	HMC	LRH			HMC	LRH		
Firearm Injury	01	06	07	0.96	0	04	04	0.50
Fall	07	31	38		03	15	18	
Weight lifting	04	15	19		03	06	09	
Road Traffic Accident	04	22	26		02	11	13	
Total	16 (11.94)	74 (55.22)	90 (67.91)		08 (5.97)	36 (26.86)	44 (32.83)	

Table 3 shows the data of 202 (60.5%) patients who had non-traumatic causes of spinal injuries, of which 49 (24%) were congenital type, 47 (23%) had stenosis, and 44 (22%) had other varied causes like Tuberculosis (TB), etc.

The gender distribution of the non-traumatic patients showed that the 49 subjects suffering from congenital injuries had a slight female preponderance (Males=21, Females=28). Patients with Stenosis (Male=23 & Female=24) showed no gender predilection, similar to patients with Prolapsed Intervertebral Disk

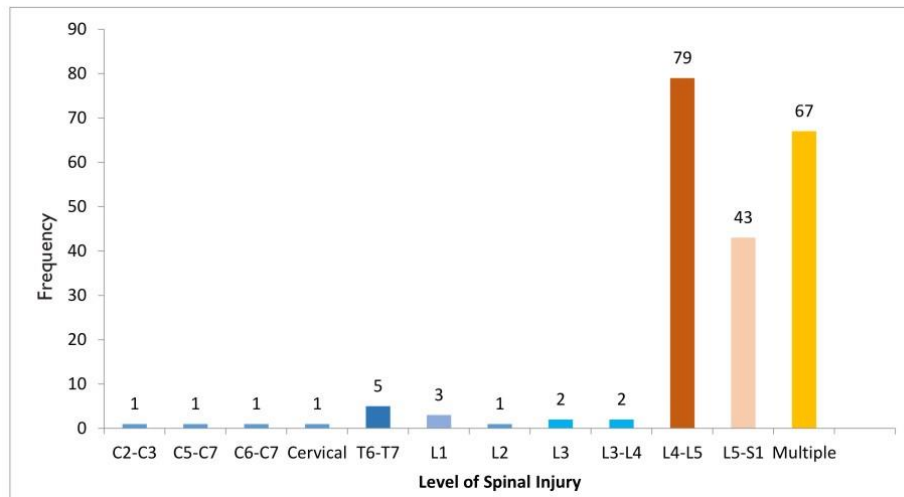
(PIVD) disease (Males=12, Females=12) and various Syndromes (Males=06, Females=07). However cases of tumors showed a marked female predisposition, with 09 (36.0%) males and 16 (64.0%) females affected. Other various causes including Tuberculosis showed a male predilection (Males=29, Females=15). None of the gender differences reached statistical significance; however the distribution of non-traumatic injuries by gender and hospitals were significant ( $p=0.006$  for males and  $p=0.001$  for females) as shown in Table 3.

**Table 3: Non-traumatic Causes of spinal cord injuries in subjects (n=202).**

Injuries	Male f (%)		Total f (%)	p value	Female f (%)		Total f (%)	p value
	HMC	LRH			HMC	LRH		
Congenital	03	18	21	0.006	08	20	28	0.001
Tumor	0	09	09		02	14	16	
PIVD	07	05	12		08	04	12	
Stenosis	03	20	23		02	22	24	
Syndrome	0	06	06		04	03	07	
Others (TB, etc.)	06	23	29		02	13	15	
Total	19 (09.4)	81 (40.1)	100 (49.5)		26 (12.8)	76 (37.6)	102 (50.5)	

Figure 1 shows levels of spinal injuries of 206 cases in which 79 subjects were having spinal injury level of L4-L5, 67 cases were having injury

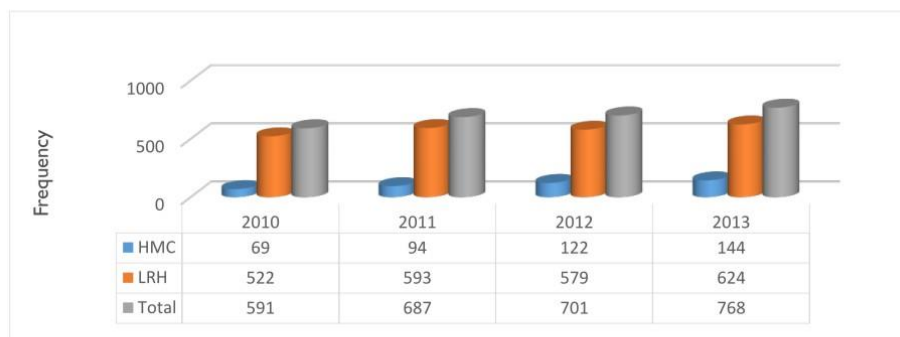
of level L5-S1; some of the subjects (n=5) also reported T6-T7 levels.



**Figure 1: Levels of spinal injuries in subjects (n=206).**

Figure 2 shows the trend of spinal injuries from 2010 to 2013 in which the increase in number of patients having spinal injuries has been

observed i.e. 29.94% increment in both the hospitals.



**Figure 2: Trend of spinal injuries from 2010-2013 in selected hospitals (n=768).**

## DISCUSSION

Spinal injury is a medically complex and life disrupting condition.<sup>2</sup> It is damage to spinal cord that results in loss of function such as mobility or feelings. It has costly consequences both for individual and society and cost of spinal injury

are higher than for comparable conditions. Most of the spinal injury patients become dependent on others.<sup>3</sup> Study done in Nigeria shows that Limb paralysis and bladder dysfunction were the commonest complications.<sup>7</sup> According to WHO

report on Dec 2, 2013 nearly 500,000 people suffer from spinal injury each year and males are at higher risk than female.<sup>2</sup> A study done in India shows that males were found to be more prone to spinal cord injury, which is similar to findings in other studies as they are more engaged in outdoor work and hence are more prone for spinal cord and/or other trauma.<sup>8</sup> In the present study males suffered more from spinal injury than females.

Frequent causes of spinal injury are traumatic (fall, FAI, RTA, wt. lifting) and non-traumatic (congenital, stenosis, tumors etc).<sup>3</sup> In the current study causes were divided into traumatic and non-traumatic. In non-traumatic causes congenital injury is the leading cause followed by stenosis, while in traumatic causes fall is the leading cause of spinal injury followed by RTA. Many reports have stated that RTAs are a very common mode of traumatic spine injuries, but there has been a decrease in traumatic spine injuries from RTA due to improvements in safety equipment and incidence of traumatic spinal cord injuries has decreased considerably over the past three decades.<sup>8</sup> Studies done in India also shows that falls (44.5%; 48.33%) were the leading cause of traumatic spinal injury followed by RTA (34.7%; 43.33%).<sup>9,10</sup> A study was conducted in Ireland in which patients presented with cervical and thoracic injuries and motor vehicle collisions were the cause of 50% of SCI.<sup>11</sup> Another study done by Chiu W<sup>12</sup> shows that falls are the leading cause of spinal injury in developing countries; however RTA is the leading cause of spinal injury in developed countries. The present study also shows that falls were the leading cause of spinal injury. Some people with spinal injury develop vertebral fractures while some have slipped discs. The study revealed that some patients with spinal injury also have vertebral fractures in which L1 vertebra is involved in maximum patients. Same study done

in India shows that maximum vertebral fractures involved were L1 in paraplegic and 5<sup>th</sup> cervical in quadriplegic.<sup>9</sup> Another Retrospective study conducted at Royal Jordanian rehabilitation center (RJRC) revealed that the mean age of patients with SCI was 33 years, whereas 31 and 35 years of age for male and female respectively.<sup>13</sup> The above stated results of RJRC support findings of our study regarding SCI age group 20-40 years of age.

## CONCLUSION

Traumatic injury was the leading cause of spinal cord injury in present study where RTA and FALL contributed the major chunk. Congenital abnormalities and spinal cord stenosis were more frequent among non-traumatic spinal cord injury. Surgical approach was the only way of management practiced for spinal cord injuries in both of the tertiary care hospitals.

## RECOMMENDATION

There is a strong need for public awareness through printed and electronic media regarding prevention from trauma like sudden fall, RTA and weight lifting. An early evaluation and treatment of both traumatic and non-traumatic injuries needs top priority consideration by the hospital.

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9. The Results should be presented in an integrated manner in tables, figures, illustrations, etc. with supportive and explanatory text. A good approach is to have a table for demographic data, followed by tables or figures with specific data to be presented. Most articles should be able to summarize their findings in up to 4 tables and 2 figures. The captions of tables should be on the top of the table serially numbered (Table 1, Table 2, etc.); the captions for figures should be at the bottom and serially numbered separately (Figure 1, Figure 2, etc.). These should be cited in relevant accompanying text so that the reader can find the results being referred to.
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## SUGGESTED READING FROM PUBMED

1. Zafar M. Medical students' perceptions of the effectiveness of integrated clinical skills sessions using different simulation adjuncts. *Adv Physiol Educ.* 2016 Dec 1;40(4):514-521. doi: 10.1152/advan.00097.2016.

### ABSTRACT

Simulation-based integrated clinical skills sessions have great potential for use in medical curricula. Integration is central to simulation efficacy. The aim of this study was to obtain medical students' perceptions toward effectiveness of integrated clinical skills sessions by using different simulation adjuncts and to know the challenges/obstacles encountered toward the implementation of such sessions. A study was conducted to obtain anonymous feedback from male (n = 156) and female (n = 179) medical students in years 2 and 3 during the 2014-2015 academic sessions at Alfaisal University about their perceptions of the effectiveness of integrated clinical skills sessions, uses of simulation adjuncts, and obstacles encountered toward the effective implementation of such sessions. The response rate was 93.4. Factor analysis showed data being valid and reliable. Cronbach's  $\alpha$ -values for effectiveness of sessions, use of simulation adjunct, and obstacles encountered were 0.97, 0.95, and 0.95, respectively. We conclude that students perceived positively the effectiveness of integrated clinical skills sessions as well as the use of simulation adjuncts, especially SPs. They suggested overcoming the obstacles and limitations of simulation. They highly valued the role of the facilitators in achieving effective sessions.

**Keywords:** basic clinical skills; curriculum integration; integrated clinical skills sessions; obstacle toward implementation; simulation; simulation adjuncts.

2. Lechien JR, Kempenaers C, Dramaix M, Linkowski P. Influence of gender and selection procedures on the academic performance of undergraduate medical students. *Acta Med Acad.* 2016 Nov;45(2):145-151. doi: 10.5644/ama2006-124.170.

### ABSTRACT

**Objectives:** To determine the impact of gender on success of students studying Medicine in Belgium from the first year (MED1) to the sixth year (MED6) of training, in the context (or not) of a selection process after three years at university.

**Subjects and Method:** Data were evaluated from two cohorts of medical students: students of the first group (n=88) were not submitted to a selection process and students of the second group (n=76) were submitted to a selection process after MED3. Students were enrolled in Brussels Medical School. The variables studied were the grades obtained after the first session of exams, and the student's gender. Variables were put into perspective in relation to the cohort/study year. STATA software was used for statistical analysis.

**Results:** Linear regression showed the significant predictability of the grade obtained in MED2 for the grade obtained in MED6 for males and females only in the context of selection ( $r=0.51$ ;



$p < 0.001$ ). The impact of grades after three years on those after six years was negative in the first group of students ( $r = -0.17$ ;  $p = 0.005$ ) and positive in the second group ( $r = 0.54$ ;  $p < 0.001$ ).

**Conclusion:** These results show a moderate link between success in MED1 and success in MED6, as long as the students undergo selection. A selection system after MED1, based on medical courses, inter alia, could speed up the maturation of students. Further studies with a higher number of candidates are necessary to confirm these results.

**Keywords:** Gender; Medical School; Selection; Undergraduate academic success.

3. Obad AS, Peeran AA, Shareef MA, Alsheikh WJ, Kalagi DA, AlAmodi AA, Khan TA, Shaikh AA, Ganguly P, Yaqinuddin A. Assessment of first-year medical students' perceptions of teaching and learning through team-based learning sessions. *Adv Physiol Educ.* 2016 Dec;40(4):536-542.

#### ABSTRACT

Team-based learning (TBL) is an emerging teaching and learning strategy being employed in medical schools. The College of Medicine at Alfaisal University has adopted a TBL approach as an instructional method for first-year medical students. The aim of the present study was to describe the TBL method employed at Alfaisal University College of Medicine and to assess first-year medical students' perceptions of this learning modality for the anatomy- and physiology-based blocks/courses in organ systems form of curriculum. A five-point Likert scale questionnaire was structured based on Kirkpatrick's theory and assessed three major domains: reaction, learning, and behavior. Confirmatory factor analysis (CFA) and Cronbach's  $\alpha$ -coefficient tests were used to assess the validity and reliability of the construct, respectively. CFA showed an adequate validity of the survey and Cronbach's  $\alpha$  revealed an acceptable internal uniformity (0.69). A total of 185 respondents rated reaction, learning, and behavior toward introduction of TBL as  $3.53 \pm 1.01$ ,  $3.59 \pm 1.12$ , and  $3.57 \pm 1.12$ , respectively. Excellent students rated TBL highly in all major domains compared with borderline students (reaction, behavior, and learning domains with P values of  $< 0.049$ ,  $< 0.035$ , and  $< 0.031$ , respectively). Students who had prior teamwork experience rated TBL higher in terms of their learning experience compared with those who were rarely involved in team work. This study demonstrated that Alfaisal University first-year medical students perceived TBL positively as a teaching and learning strategy for functional anatomy, and prior involvement in teamwork and academic performance correlates with higher ratings of TBL.

**Keywords:** functional anatomy; medical education; problem-based learning; self-rating; team-based learning.

4. Ralapanawa DM, Jayawickreme KP, Ekanayake EM, Kumarasiri PV. A study on the knowledge and attitudes on advanced life support among medical students and medical officers in a tertiary care hospital in Sri Lanka. *BMC Res Notes.* 2016 Oct 12;9(1):462.

#### ABSTRACT

**Background:** Advanced life support (ALS) and cardio pulmonary resuscitation, provided at the right time is essential for improving mortality in medical emergencies. Accurate knowledge and skills on this regard, in all medical personals is an essential part of medical education and it

should be up to date with varying protocols. The aim of this study is to assess the knowledge and attitudes among the undergraduate medical students and medical officers in the Teaching Hospital Peradeniya and provide suggestions to improve the training programme on ALS.

**Methods:** A standardized self-administered questionnaire regarding knowledge and attitudes on ALS was filled by 4th and final year medical students, and medical officers, and the data was analyzed.

**Results:** There were 411 eligible candidates and of them 130 (31.6 %) were 4th year medical students, 221 (53.8 %) were final year medical students and 60 (14.6 %) were medical officers. Of the medical officers, only 15.8 % indicated that the internship training was adequate to handle an emergency confidently. Approximately 45 % of the medical officers and 34.6 % of the final year medical students were confident of saving lives with their current ALS knowledge. However, only 22 % of 4th year medical students were confident in saving the life of a patient.

**Conclusions:** Overall, just over 10 % of participants demonstrated inadequate ALS knowledge scores. A significantly higher proportion of final year medical students had good knowledge, compared to medical officers and 4th year students. Only one-third of participants were confident in saving a life with their current ALS knowledge. Nearly all participants thought that the ALS course should be reevaluated frequently.

**Keywords:** Advanced life support; Attitudes; Cardiopulmonary resuscitation; Knowledge; Medical education; Skills.

5. Bates V. Yesterday's Doctors: The human aspects of medical education in Britain, 1957-93. *Med Hist.* 2017 Jan;61(1):48-65. doi: 10.1017/mdh.2016.100.

#### ABSTRACT

In the wake of the Second World War there was a movement to counterbalance the apparently increasingly technical nature of medical education. These reforms sought a more holistic model of care and to put people - rather than diseases - back at the centre of medical practice and medical education. This article shows that students often drove the early stages of education reform. Their innovations focused on relationships between doctors and their communities, and often took the form of informal discussions about medical ethics and the social dimensions of primary care. Medical schools began to pursue 'humanistic' education more formally from the 1980s onwards, particularly within the context of general practice curricula and with a focus on individual doctor-patient relationships. Overall from the 1950s to the 1990s there was a broad shift in discussions of the human aspects of medical education: from interest in patient communities to individuals; from social concerns to personal characteristics; and from the relatively abstract to the measurable and instrumental. There was no clear shift from 'less' to 'more' humanistic education, but rather a shift in the perceived goals of integrating human aspects of medical education. The human aspects of medicine show the importance of student activism in driving forward community and ethical medicine, and provide an important backdrop to the rise of competencies within general undergraduate education.

**Keywords:** Communication skills; Ethics; General practice; Human aspects of medicine; Medical education; Social medicine.



6. Bartlett M, Pritchard K, Lewis L, Hays RB, Mckinley RK. Teaching undergraduate students in rural general practice: an evaluation of a new rural campus in England. *Rural Remote Health*. 2016 Apr-Jun;16(2):3694. Epub 2016 Jun 17.

#### ABSTRACT

**Introduction:** One approach to facilitating student interactions with patient pathways at Keele University School of Medicine, England, is the placement of medical students for 25% of their clinical placement time in general practices. The largest component is a 15-week 'student attachment' in primary care during the final year, which required the development of a new network of teaching practices in a rural district of England about 90 km (60 mi) from the main campus in North Staffordshire. The new accommodation and education hub was established in 2011-2012 to enable students to become immersed in those communities and learn about medical practice within a rural and remote context. Objectives were to evaluate the rural teaching from the perspectives of four groups: patients, general practice tutors, community hospital staff and students. Learning outcomes (as measured by objective structured clinical examinations) of students learning in rural practices in the final year were compared with those in other practices.

**Methods:** Data were gathered from a variety of sources. Students' scores in cohort-wide clinical assessment were compared with those in other locations. Semi-structured interviews were conducted with general practice tutors and community hospital staff. Serial focus groups explored the perceptions of the students, and questionnaires were used to gather the views of patients.

**Results:** Patients reported positive experiences of students in their consultations, with 97% expressing willingness to see students. The majority of patients considered that teaching in general practice was a good thing. They also expressed altruistic ideas about facilitating learning. The tutors were enthusiastic and perceived that teaching had positive impacts on their practices despite negative effects on their workload. The community hospital staff welcomed students and expressed altruistic ideas about helping them learn. There was no significant difference between the rurally placed students' objective structured clinical examination performance and that of their peers in other locations. Some students had difficulty with the isolation from peers and academic activities, and travel was a problem despite their accommodation close to the practices.

**Conclusions:** Students valued the learning opportunities offered by the rural practice placements. The general practice tutors, patients and community hospital staff found teaching to be a positive experience overall and perceived a value to the health system and broader community in students learning locally for substantial periods of time. The evaluation has identified some student concerns about transport times and costs, social isolation, and access to resources and administrative tasks, and these are being addressed.

**Keywords:** Europe; General/Family Practice; Medical; Primary Health Care; Undergraduate.

7. Dagher MM, Atieh JA, Soubra MK, Khoury SJ, Tamim H, Kaafarani BR. Medical Research Volunteer Program (MRVP): innovative program promoting undergraduate research in the medical field. *BMC Med Educ*. 2016 Jun 6;16:160. doi: 10.1186/s12909-016-0670-9.



## ABSTRACT

**Background:** Most educational institutions lack a structured system that provides undergraduate students with research exposure in the medical field. The objective of this paper is to describe the structure of the Medical Research Volunteer Program (MRVP) which was established at the American University of Beirut, Lebanon, as well as to assess the success of the program.

**Methods:** The MRVP is a program that targets undergraduate students interested in becoming involved in the medical research field early on in their academic career. It provides students with an active experience and the opportunity to learn from and support physicians, clinical researchers, basic science researchers and other health professionals. Through this program, students are assigned to researchers and become part of a research team where they observe and aid on a volunteer basis. This paper presents the MRVP's four major pillars: the students, the faculty members, the MRVP committee, and the online portal. Moreover, details of the MRVP process are provided. The success of the program was assessed by carrying out analyses using information gathered from the MRVP participants (both students and faculty). Satisfaction with the program was assessed using a set of questions rated on a Likert scale, ranging from 1 (lowest satisfaction) to 5 (highest satisfaction).

**Results:** A total of 211 students applied to the program with a total of 164 matches being completed. Since the beginning of the program, three students have each co-authored a publication in peer-reviewed journals with their respective faculty members. The majority of the students rated the program positively. Of the total number of students who completed the program period, 35.1 % rated the effectiveness of the program with a 5, 54.8 % rated 4, and 8.6 % rated 3. A small number of students gave lower ratings of 2 and 1 (1.1 % and 0.4 %, respectively).

**Conclusion:** The MRVP is a program that provides undergraduate students with the opportunity to learn about research firsthand as they volunteer and aid in different research projects. This program also provides faculty members with the help to conduct their research projects and opportunity to influence future generations. It was shown that so far the MRVP has been successful in reaching its goals, for both students and faculty.

8. Kolber BJ, Janjic JM, Pollock JA, Tidgewell KJ. Summer undergraduate research: A new pipeline for pain clinical practice and research. *BMC Med Educ.* 2016 May 4;16:135. doi: 10.1186/s12909-016-0648-7.

## ABSTRACT

**Background:** Most medical schools fail to provide adequate training of clinicians in the treatment of pain. Similarly, despite the fact that over 1/3 of Americans suffer from chronic pain, National Institutes of Health (NIH) funding for pain represents only ~1% of the NIH budget. These issues may dissuade students from pursuing pain in their clinical and research careers. To address these gaps in training and funding, we argue that exposing students to pain science early in their careers, at the undergraduate level, may be an effective method to develop a pipeline for future pain clinicians and scientists. To highlight our argument, we will describe our recent successful implementation of a cross-disciplinary and community-

engaged biomedical summer research program. The Pain Undergraduate Research Experience (PURE) summer program involved both off-site and on-site experiences to expose undergraduate students to the range of careers in the pain field from basic science to clinical practice. The objective of the 10-week long PURE program was to evaluate whether a combination of basic science research, clinical practice visits, and patient interactions would increase student understanding of and exposure to the underlying science of pain.

**Methods:** A pre-post cohort study was used without a comparison group. Entry and exit surveys were used to evaluate students' perceptions about pain clinical practice and research, student interest in pain, and student confidence about communicating about pain and doing basic science pain research.

**Results:** Students reported significant increases to a number of questions in the survey. Questions were scored on 5 point Likert scales and there was significant increases in student understanding of what life is like with chronic pain (2.6 vs 4.3 post survey), their confidence in explaining pain to a patient (2.8 vs 4.1) or researcher (2.8 vs 4), and their comfort with pain terminology (2.8 vs 3.9).

**Conclusions:** With the PURE program, we wanted to entice top undergraduates to consider pain as a future area of study, practice, and/or research. We present a model that can be easily implemented at research universities throughout the United States.

**Keywords:** Medical education; Pain; Undergraduate education; Undergraduate medical education.