

## Knowledge of First Aid Skills Among Medical and Non-Medical Students of Karachi

Nazeer Khan<sup>1</sup>, Syed Muhammad Tariq Rafiq<sup>2</sup>, Paras Yousuf<sup>3</sup>, Sehrish Rafiq<sup>3</sup>, Ufaq Rasool<sup>3</sup> and Amna Abid<sup>3</sup>

### ABSTRACT

**Objective:** To compare the level of knowledge of First Aid (FA) among medical and non-medical undergraduate students of Karachi

**Methodology:** This study was conducted in October and November 2017. One thousand fifty-three students of the age range of 17-25 years from the first-year to the fourth-year from three medical and three non-medical institutions were included. A self-administered questionnaire containing 22 questions was distributed among the consenting students in the class rooms. Participants were assessed regarding their knowledge on common emergency situations like epistaxis, fractures, road traffic accidents, foreign body in the eyes/ears, fits, burns, asthma, shock etc. Univariate test of Chi-square was applied to determine the association of type of students and previous training of First Aid with other independent factors. Furthermore, multivariate linear regression was utilized to determine best possible model for estimation of FA knowledge.

**Results:** Out of 1053 respondents, 521 were medical and 532 were non-medical students. Medical students showed significantly higher knowledge in all the nineteen questions of first aid as compared to non-medical students, except the knowledge of the priorities of treatment (TRIAGE). Mean number of correct answers from medical and non-medical respondents were  $9.82 \pm 3.35$  and  $5.6 \pm 2.07$ , respectively. Only 20.6% of the students showed good knowledge. Twenty percent students reported that they had attended a First Aid (FA) seminar/workshop. Among them 149 (28.6%) were medical and 66 (12.4%) were non-medical students. The model developed by linear regression for knowledge of FA consisted of type of institution (medical/non-medical), FA training, universities, years of study, and age. Regression coefficient showed that type of institution and FA training increase FA knowledge by more than double. Eighty percent of the respondents indicated that FA training should be the part of the curriculum.

**Conclusion:** Study showed that the knowledge of undergraduate students of Karachi institutions is not satisfactory, and therefore needs further enhancement, especially in non-medical students. Regression analysis showed that medical education and FA training doubles, while increase in age negatively affects the FA knowledge.

**Key words:** First Aid knowledge, First Aid knowledge of medical students, First Aid training

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عنوان: کراچی کے انڈرگریجویٹ طب کے طلباء اور دیگر طلباء میں ابتدائی طبی امداد کی معلومات کا موازنہ۔

طریقہ کار: یہ مطالعہ سال 2017 میں اکتوبر اور نومبر کے مہینوں میں کیا گیا جس کے لیے کراچی کی تین میڈیکل اور تین غیر میڈیکل جامعات کے سال اول سے چوتھے سال کے طلباء جنکی عمریں 17-25 سال کے درمیان تھیں، سے انکی اور اساتذہ کی اجازت کے بعد 22 سوالوں پر مشتمل ایک سوال نامہ پُر کروایا گیا۔ جس میں فوری طبی امداد کے حوالے سے سوالات پوچھے گئے۔ طلباء نے اپنی معلومات کے مطابق ایمرجنسی کی صورت میں فریکچر، جھلس جانے، ٹریفک حادثات، آنکھ اور کان میں کسی چیز کے گھسنے اور سانس لینے میں دشواری وغیرہ جیسی صورتحال سے نمٹنے کے لیے ابتدائی طبی امداد کے جوابات دیے۔ فوری طبی امداد سے متعلق 19 سوالات میں سے 11 صحیح جوابات پر طلباء کی معلومات کو اطمینان بخش قرار دیا گیا۔ طلباء کی طب کے شعبے سے تعلق کی قسم اور انکی ابتدائی طبی امداد کے حوالے سے گزشتہ تربیت کو دوسرے عوامل کے ساتھ تعلق کو (کائی-اسکوئر) ٹیسٹ کے ذریعے معلوم کیا گیا۔ جبکہ فوری طبی امداد کی معلومات کے تخمینہ کے بہترین ماڈل کے لیے multivariate linear regression کا استعمال کیا گیا۔

نتیجہ: حاصل شدہ نتائج کے مطابق سوال نامہ پُر کرنے والے 1053 طلباء میں سے 521 میڈیکل کے طالب علم تھے اور 532 طلباء کا تعلق دوسری جامعات سے تھا۔ میڈیکل کے طلباء نے دوسرے طلباء کے مقابلے میں فوری طبی امداد سے متعلق پوچھے گئے 19 سوالات کے جوابات بہتر پرکے سوائے علاج کی فوجیت سے متعلق پوچھے گئے سوالات کے۔ دونوں قسم کے طلباء کے صحیح جوابات کا اوسط اندراج  $9.82 \pm 3.35$  طب کے طلباء کے لیے جبکہ دوسرے طلباء کا  $5.6 \pm 2.07$  تھا۔ صرف 20.6 فیصد طلباء کے پاس فوری طبی امداد کے حوالے سے اچھی معلومات تھیں۔ بیس فیصد طلباء نے بتایا کہ انھوں نے فوری طبی امداد کے حوالے سے ورکشاپ یا سیمینار میں شرکت کی ہے۔ جس میں سے 149 (28.6) فیصد میڈیکل کے طلباء اور 66 (12.4) فیصد غیر میڈیکل کے طلباء تھے۔ 80 فیصد طلباء کا کہنا تھا کہ فوری طبی امداد کی تربیت ہمارے نصاب میں شامل ہونی چاہیے۔

حاصل مطالعہ: اس مطالعہ سے پتا چلا کہ کراچی کی جامعات کے طالب علموں میں فوری طبی امداد کی معلومات اطمینان بخش نہیں ہے۔ اوسط صحیح جوابات 19 میں سے زیادہ سے زیادہ 7.69 تک ریکارڈ کئے گئے۔ اس لئے طلباء میں خاص کر غیر میڈیکل طلباء کی تربیت میں مزید توجہ کی ضرورت ہے۔

1. Department of Research<sup>1</sup>/Vice Chancellor<sup>2</sup>, Jinnah Sindh Medical University, Karachi, Pakistan

3. House Officer, Jinnah Postgraduate Medical Center, Karachi, Pakistan

**Correspondence:** Nazeer Khan, Professor of Biostatistics, Advisor to VC for Research, and International Relations & Liaison, Department of Research, Jinnah Sindh Medical University, Karachi, Pakistan

**Email:** nazeerkhan54@gmail.com

## INTRODUCTION

First Aid (FA) is the process of treatment to save an injured person or patient in life threatening situation or to prevent worsening the injury or sickness without any medical intervention with minimum or no medical support/ material until professional care is accessible<sup>1-3</sup>.

In modern lifestyle, the rate of accidents and emergencies has increased manifold. Road accidents, electric shocks, cardiovascular problems etc. are serious risks to people from all walks of life<sup>4</sup>. Knowledge and skills of First Aid has become an important factor to save the lives of injured persons and patients<sup>5</sup>.

Educated young people, like college students could play a vital role in delivering FA services. Therefore, they should have adequate knowledge to utilize at the time of accidents and emergencies. Many studies have been conducted to assess the knowledge of medical or non-medical students all over the globe<sup>1-8</sup>. Investigators have also conducted studies of the First Aid knowledge of undergraduate students regarding some particular diseases/emergencies<sup>9-12</sup>. Studies have also been published on the knowledge of First Aid among teachers<sup>13-15</sup> and in general public<sup>16</sup>. The studies among teachers indicate that their knowledge was quite low, regardless of where the teachers were from: India<sup>13</sup>, Ethiopia<sup>14</sup> or Turkey<sup>15</sup>. The study on the general public of United Arab Emirates has also shown that the respondents' knowledge about First Aid was not sufficient. However, significant differences in FA knowledge existed between the respondents who had undergone training for FA and those who had not<sup>16</sup>. Literature regarding the knowledge of FA among Pakistani undergraduate students is scarce, especially among medical and non-medical students. The main aim of the study was to compare the level of knowledge of First Aid among medical and non-medical undergraduate students of Karachi.

## METHODOLOGY

The literature regarding FA knowledge, especially among the undergraduate students, was searched using google scholar and references from the searched articles. This cross-sectional study was carried out between October 2017 to November 2017 using convenient sampling in six institutions of Karachi, of which three were medical: Sindh Medical College (SMC), Sir Syed College of Medical Sciences (SSCMC), and United Medical and Dental College (UMDC); and three were non-medical institutions: University of Karachi (UoK), Sir Syed University of Engineering and Technology (SSUET), and Federal Urdu University of Arts, Science, and Technology (FUUAST).

Ethical approval was obtained from Institutional Review Board of Jinnah Sindh Medical University (JSMU). All the institutions were visited and signed permission was secured from the relevant heads of the institution/department. A pilot study was conducted on the students of JSMU for questions' validation. The study institutions were visited on allotted dates and time for the survey.

After taking permission from the teachers and consent from the students, a self-administered questionnaire containing 22 questions, including the age and years of education, were distributed among the consenting students in the classrooms. One thousand and one hundred (1100) questionnaires were distributed. Forty-seven (47) of them were not fully completed, therefore only 1053 were used for computations. Five hundred and twenty-one (49.5%) of them were from medical institutions. Undergraduate students up to fourth year of their degree programmes consenting for the study were included. First year medical students were not available due to examination preparation leave during the survey period.

Participants were assessed regarding their knowledge on common emergency situations like epistaxis, fractures, road traffic accidents, foreign body in the eyes/ears, fits, burns, asthma, shock etc. The questionnaire consisted of multiple-choice questions and options were shaped according to the priority of management. The sum of responses with 0 (wrong knowledge) and 1 (right knowledge) of nineteen questions related to knowledge of FA could give the maximum possible score of 19 and minimum of 0. Students who scored 11 or more were considered to have good knowledge, those scoring 6-10 were considered adequately informed, and those scoring less than 6 were sorted as having poor knowledge of first aid. The selection of institutions was based on permission given by the institution administration to carry out data collection.

Sample size was calculated using the frequency of 36% of good knowledge of first aid (at least 50% score) from Khan et al<sup>4</sup>. With 95% confidence interval and  $\pm 3\%$  of maximum error in estimate, the sample size was 983. Adding 10% for non-response, the sample size was about 1100.

Data was entered and analyzed using Statistical Package for Social Sciences, SPSS [version 17].

Chi-square test was applied to determine the association of type of students (medical/non-medical) and previous training of first aid (yes/no) with other independent factors. Multivariate Linear regression was employed

to determine the significant factors affecting the knowledge of FA. Step-wise method was used for selection of significant independent factors. Age, type of university (medical/non-medical), year of study, universities, and FA training were taken as independent variables.  $P < 0.05$  was taken as statistically significant.

## RESULTS

A total of 1053 fully completed questionnaires were received. Out of which 521 (49.5%) had been filled by medical students. Mean age of the respondents was  $20.5 \pm 1.4$  years [R: 17-25 years]. Sixty nine percent of the respondents were in the age group of 20-22 years. Figure 1 showed the age and class distributions. Forty four percent of the medical college students were from the fourth year, while majority of the respondents (40.2%) of non-medical colleges were from the first year. Figure 2 showed that 20.4% of the students had previously attended a First Aid (FA) seminar/workshop, of whom 149 (28.6%) were medical and 66 (12.4%) were non-medical students.

Table 1 shows the percentage of responses of the questions related to FA for medical and non-medical students. All the nineteen questions about First Aid showed statistically significant better knowledge among medical students as compared to non-medical students ( $p < 0.05$ ), except the knowledge about the priorities of

treatment (TRIAGE) ( $p = 0.065$ ). Only 22.9% of medical students correctly answered this question. About ninety-two percent of medical students reported correct definition of FA, while only 72.4% of non-medical students indicated the correct definition and the difference was statistically significant ( $p < 0.0001$ ). Reference to the question of 'First thing to do on reaching the scene of accident', only 29% of the medical students responded correctly. Responses regarding 'Management of Epistaxis' were also low (27.9%) for the medical students.

Table 2 shows the comparisons between age-groups, year of studies, universities, discipline (medical/non-medical) and FA workshops/seminars attended. Mean number of correct answers from total sample was  $7.69 \pm 3.49$ . However, mean number of correct answers from medical and non-medical respondents were  $9.82 \pm 3.35$  and  $5.6 \pm 2.07$ , respectively, the difference was statistically significant ( $p < 0.0001$ ). Only 20.6% of the students showed good knowledge (11 or more correct answers). Comparing between medical and non-medical students showed that 40.1% of medical and 1.5% of non-medical students showed good level of knowledge. The responses of students of all the non-medical colleges/universities were not much different from each other and were statistically insignificant ( $p > 0.05$ ) (Table 2). The percentage of good knowledge was

Table 1: Correct Responses by Medical and Non-Medical Students

Questions Asked	Percentage of correct answers			
	Medical	Non-Medical	P-value	Total
1. Definition of First Aid	91.9	72.4	<.0001	82.2
2. First thing to do on reaching the scene of accident	29.0	20.2	0.001	24.5
3. Things you should NOT do while attending the casualties	53.6	22.0	<.0001	37.7
4. Priority of managing a casualty	76.8	35.0	<.0001	56.2
5. If your casualty is NOT breathing, what will you do first	51.0	40.9	0.001	45.9
6. What NOT to do in C-Spine injury	66.7	30.8	<.0001	48.8
7. Management of bleeding	71.7	50.8	<.0001	61.2
8. DRABC abbreviation	56.5	24.1	<.0001	40.2
9. When to start CPR	68.5	28.6	<.0001	48.4
10. CPR ratio	41.4	9.1	<.0001	25.3
11. Management of choking	48.1	36.8	<.0001	42.4
12. Management of seizures	45.1	28.4	<.0001	36.7
13. Management of household burns	55.8	44.5	<.0001	50.0
14. TRIAGE	22.9	18.2	0.065	20.5
15. Management of foreign body in eye	56.9	36.1	<.0001	46.4
16. Management of epistaxis	27.9	9.8	<.0001	18.7
17. Recognition of shock	47.8	22.1	<.0001	34.7
18. After recognition of a shock patient, what should you NOT do?	41.5	26.9	<.0001	34.1
19. Management of acute asthma without any prescription	53.7	23.3	<.0001	38.5

Table 2: Distribution of Knowledge of First Aid with Respect to Age Group, Year of Study, University, Disciplines and FA Workshop Attended

	Poor	Adequate	Good	p-value	Total
Age Group					
17-19	95 (39.4)	119 (49.4)	27 (11.2)		241
20-22	189 (26.1)	353 (48.7)	183 (25.2)	<0.0001	725
23-25	34 (39.1)	46 (52.9)	7 (8.0)		87
Year of Study					
First	111 (51.9)	100 (46.7)	3 (1.4)		214
Second	72 (29.9)	137 (56.8)	32 (13.3)	<0.0001	241
Third	77 (28.1)	139 (50.7)	58 (21.2)		274
Fourth	58 (17.9)	142 (43.8)	124 (38.3)		324
Universities					
KU	85 (51.8)	74 (45.1)	5 (3.0)		164
FUUAST	119 (50.9)	114 (48.7)	1 (0.4)		234
SSUET	58 (43.3)	74 (55.2)	2 (1.5)	<0.0001	134
SSCMSG	24 (32.0)	46 (61.3)	5 (6.7)		75
JSMU	23 (6.0)	176 (46.0)	184 (48.0)		383
UMDC	9 (14.3)	34 (54.0)	20 (31.7)		63
Disciplines					
Non-Medical	262 (49.2)	262 (49.2)	8 (1.5)		532
Medical	56 (10.7)	256 (49.1)	209 (40.1)	<0.0001	521
FA workshop					
Yes	47 (21.8)	77 (35.6)	92 (42.6)		216
NO	271 (32.4)	441 (52.7)	125 (14.9)	<0.0001	837
Total	318 (30.2)	518 (49.1)	217 (20.6)		1053

Table 3: Linear Regression Model for the Students' Knowledge of First Aid

Variables	Regression Coefficient ()	Standard Error	t value	p-value	95% Confidence Interval of Odd Ratio	
					Lower	Upper
Constant	7.356	1.823	4.035	<0.0001	3.779	10.933
Medical vs non-medical	2.007	0.453	4.428	<0.0001	1.118	2.89
FA training	-1.040	0.212	-4.906	<0.0001	-1.456	-0.624
Universities	0.508	0.130	3,891	<0.0001	0.252	0.764
Year of study	0.463	0.126	3.669	<0.0001	0.216	0.711
Age	-0.184	0.089	-2.056	0.040	-0.359	-0.008

Dependent variable: Number of correct responses  
 $R^2 = 0.399$

between 0.4 to 3.0. However, the students of JSMU showed the highest number of correct answers with good knowledge of 48% and their mean value of  $10.6 \pm 3.1$  was statistically higher than the students of all other colleges/universities. As expected, the highest percentage of 38.3 for 'good' knowledge was attained by fourth year students, while very low percentage of 1.4 was attributed to first year students.

Table 3 shows the regression model using number of correct responses as the dependent variable. All the entered variables (type of studies: medical/non-medical), FA training, universities, year of studies, and age) showed significant contribution for estimating the FA knowledge. The regression coefficient of type of studies showed that the medical students contribute double of the knowledge as compared to non-medical



students. Similarly, the students who attended any workshop or seminar related to FA training, showed double knowledge as compared to those who did not. Age showed little but negative impact on the knowledge of FA.  $R^2$  of this model indicates that this model covers almost 40% of the variability of FA knowledge.

About eighty percent (n=844) of the respondents indicated that FA training should be the part of the curriculum. Among them 389 (76%) were non-medical and 455 (89%) were medical students. About 33% students indicated that their institutions are providing a ‘good’ level of knowledge for FA. The percentages among medical and non-medical students for a ‘good’ level of knowledge provided by their institutions were 31.6% and 34.7%. The difference was statistically insignificant ( $p=0.181$ ).

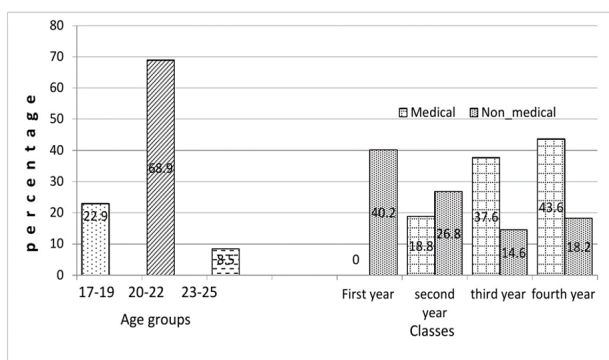


Figure 1: Distribution of age groups and professional year

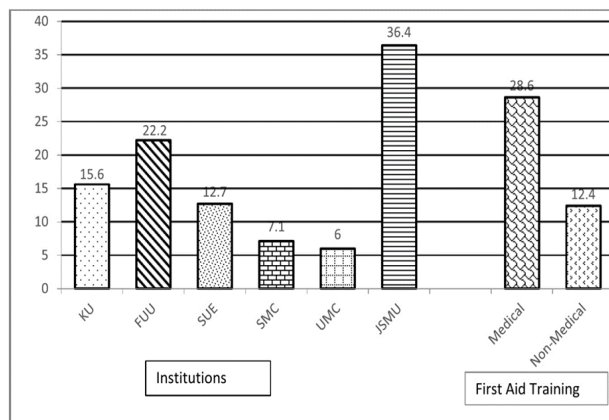


Figure 2: Distribution of responses by institutions and first aid training

Figure 3 shows mean correct answers reported by the students categorized by FA training. The mean number of correct answers with and without prior training were  $9.36 \pm 4.0$  and  $7.26 \pm 3.2$ , respectively. They were statistically significant ( $p<0.0001$ ). However, the mean difference of ‘with’ and ‘without’ prior FA training among non-medical students were  $5.48 \pm 2.2$  and  $5.62 \pm 2.05$ , respectively and did not show any significant difference ( $P=0.614$ ). Nevertheless, the difference of

mean correct answers between ‘with’ and ‘without’ FA training was highly significant among medical students ( $p<0.0001$ ). Furthermore, the mean number of correct answers between medical and non-medical students who gained some training of FA were 11.09 and 5.48, respectively, and the difference was strongly significant ( $p < 0.0001$ ).

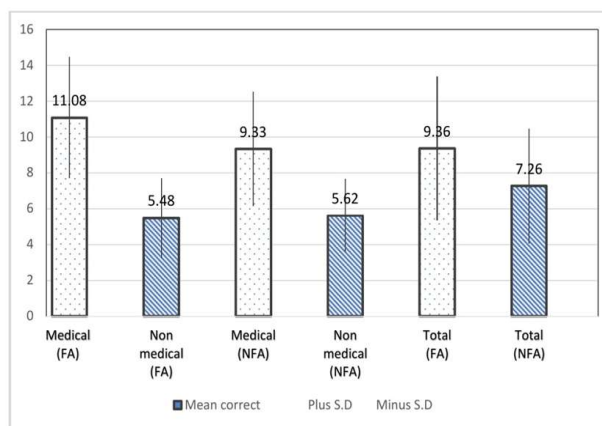


Figure 3: Mean correct answers given by students categorized by first aid training

## DISCUSSION

This study shows that medical students had significantly better knowledge than non-medical students in all the questions related to FA mentioned in Table 1, except TRIAGE (priorities of treatment). Age group of 20-22 showed significantly higher knowledge of FA than other age groups. Furthermore, percentage of ‘good’ knowledge showed increasing trend along with the year of study. Students of public medical university showed strong significantly higher value for ‘good’ knowledge than other universities. Consequently, the students of medical universities showed significantly better knowledge than the students of non-medical universities. This study also showed that the students who attended workshops/seminars on FA had significantly better knowledge than those who did not. Multivariate regression analysis showed that type of studies, prior FA training, universities, year of studies and age of the students contribute significant effects on FA knowledge.

This study showed that one of the five students had previous training of FA through seminars or workshops and about 29% of medical students positively responded for this question. This result was close to one Pakistani study<sup>4</sup>, but lower than other Pakistani studies<sup>8</sup>. However, foreign literature showed that these results were higher than the Indian study<sup>1</sup>, but lower than Jordanian<sup>2</sup>, and Saudi Arabian<sup>3,7</sup> studies. Even the general population of United Arab Emirates indicated higher percentage of FA training than this study<sup>16</sup>. However, if this result is compared with the studies conducted on teachers,

Indian teachers were less frequently exposed to FA training<sup>13</sup>, but Turkish teachers indicated higher percentage of earlier FA training<sup>15</sup>. It shows that the First Aid lecture/workshop provided to our students are quite less frequent than other countries.

This study showed that more than 4 out of 5 students reported the correct definition of FA and almost 92% of medical students knew the correct meaning of FA. This result is almost the same as the result of an Indian study<sup>13</sup>. However, the study of Joseph et al<sup>1</sup> showed extremely low percentage regarding the responses of correct definition of FA. Only one out of four respondents indicated correct response for 'first thing to do on reaching the scene of the accident'. Medical students of Taibah<sup>3</sup> indicated slightly higher correct response regarding this question. About fifty percent of the medical students indicated correct answer regarding casualty without breathing. Al-Musa<sup>7</sup> showed 40% correct respondents related to this question and Alhejali<sup>3</sup> reported 30% respondents with correct responses. AlMusa<sup>7</sup> reported almost the same results as this study regarding knowledge of FA in C-Spine injury among medical students. Midani<sup>16</sup> showed almost the same result as of this study among the medical students' knowledge against the 'Management of bleeding'. However, the knowledge of medical students of Saudi Arabia<sup>3,7</sup>, Jordan<sup>2</sup> and an earlier study of Pakistan<sup>8</sup> showed inferior knowledge compared to what this study reports. The correct response of DRABC of Indian school teachers<sup>13</sup> was significantly lower compared to the results of this study. The correct knowledge of CPR (Cardiopulmonary resuscitation) of medical students of Taibah University, Saudi Arabia<sup>3</sup> was almost the same as compared to this study, while the students of Abha, Saudi Arabia<sup>7</sup>, Jordan<sup>2</sup> and the earlier study of Pakistan<sup>4</sup> showed inferior knowledge. Surprisingly, the people of United Arab Emirates<sup>16</sup> showed significantly better knowledge of management of choking as compared to this study. Furthermore, the medical students of Taibah University, Saudi Arabia<sup>3</sup> and earlier study of Pakistan<sup>8</sup> also showed much better knowledge regarding choking than this study.

Nevertheless, the medical students of Abha, Saudi Arabia<sup>7</sup> showed lower percentage of correct answers than this study. The percentage of correct response regarding seizure was relatively low as compared to Alhejalli et al<sup>3</sup> but better than Joseph et al<sup>1</sup>. About half the respondents of this study indicated correct answers for the First Aid procedure of household burns situation. This result is better than the study conducted in United Arab Emirates<sup>16</sup>; Abha, Saudi Arabia<sup>7</sup>; Jordan<sup>2</sup>; Mangalore, India<sup>1</sup> and earlier study of Pakistan<sup>4</sup>. However, the study conducted in Taibah University,

Saudi Arabia<sup>3</sup> showed better knowledge than this study.

It is surprising that the difference in the knowledge of TRIAGE in medical and non-medical students was not statistically significant. The percentage of correct answers was less than a quarter in both the groups. Since there were four options for each question, therefore, these responses could be attributed to chance instead of real knowledge. First aid knowledge for the foreign body in eyes showed significantly higher than the results of Joseph et al<sup>1</sup> study. The percentage of correct answers for the management of epistaxis was very low. The study of Baser<sup>15</sup>, Musa<sup>7</sup>, Alhejali<sup>3</sup>, Khatatbeh<sup>2</sup> showed higher percentage of correct knowledge than this study. However, Joseph<sup>1</sup> showed little bit lower than this study result. The study conducted in Taibah University<sup>3</sup> and earlier study of Pakistan<sup>8</sup> showed better knowledge of students regarding management of asthma than the result of this study.

This study showed that one out of five respondents indicated 'good' (11 out of 19 correct answers) level of knowledge. The percentage of 'good' knowledge dropped sharply in the last age group of 23-25 years. Most of the students complete their 4<sup>th</sup> year of university studies by the age of twenty-two. Study showed that the students with low intellectual level usually graduate late<sup>17</sup>. Therefore, the correct knowledge of late graduates could be inferior to the normal students who graduate on time.

The data clearly showed that the students who are studying in medical colleges have significantly better knowledge than non-medical students. Among the medical colleges, JSMU students showed better knowledge than students of other medical colleges. Since JSMU is a government medical college and offers admissions on merit with a very nominal tuition fee, therefore most of the top students are admitted in this college. Conversely, private medical colleges offer admissions with very high level of tuition fee. Furthermore, among the private medical colleges, the students pick up the colleges which have better teaching, laboratory and clinical facilities and better track record of success of graduates from those colleges. The non-medical colleges chosen for this study were the University of Karachi, a general public institution; Federal Urdu University of Arts, Science and Technology (FUUAST), a general public institution and Sir Syed University of Engineering and Technology, a private engineering college. Even though, FUUAST is a general public university, but the success rates of the graduates of this university is not as good as KU, therefore, the intellectual level and knowledge of the students of this university is not at par with KU. These

factors are quite visible in the knowledge of students among the six colleges. Comparing with other studies of the literature showed that the knowledge of the students of this study is better than Joseph<sup>1</sup>, Al-Musa<sup>7</sup> and Devashish<sup>13</sup>, but poorer than Gore<sup>6</sup> and Midani<sup>16</sup>. In summarizing all the above univariate analyses, the multivariate regression analysis indicated that the first most important variable for the FA knowledge is the type of study (medical or non-medical). Regression coefficient showed that medical students have more than double the knowledge of non-medical students. The second most important factor is the prior training of FA. It also showed that the students who attended any workshop or symposium showed double the knowledge than those who did not. Age was also one of the factors entered into the model. However, it showed negative impact on the knowledge of FA. Nevertheless, the  $R^2$  value was less than 0.4, which indicate that there are many other factors, which are not considered here, affecting the knowledge of FA.

This study was conducted on a larger sample to verify the results of a study<sup>4</sup> conducted few years back. The non-medical colleges in earlier study<sup>4</sup> were Architecture, Engineering and Business colleges and did not cover any general larger university of the city. Hence the sample of non-medical side was not very well representative. Furthermore, the sample of medical and non-medical was not balanced. Hence, this study is more representative than the other one published earlier.

Number of respondents were almost the same for medical and non-medical colleges/universities. Therefore, the sample was balanced with respect to medical and non-medical respondents.

One of the limitations of the study was that there were no first year classes of medical colleges during the study period. Therefore, larger number of students of higher grades of medical colleges were included as compared to non-medical colleges. Hence the results should be read with caution.

Only one third of the students indicated that their institutions are providing some type of training of FA to the students. Furthermore, more than 80% mentioned that FA teaching should be included in their curriculum. These outcomes are clearly indicating the fact that there is a need of insertion of FA module or course in the undergraduate teaching. Furthermore, a short course or workshops along with firefighting could be arranged in the evenings or week-ends on the union council (Mohallah) basis, like it is implemented in India. These trainings prepare the young people to fight against any emergency, like wars or disasters along with doctors, firefighters or paramilitary forces.

## CONCLUSION

Study showed that the knowledge of undergraduate students of Karachi institutions is not up to the mark, mean value was 7.69 with maximum possible limit of 19, and therefore it needs further enhancement, especially in non-medical students. Regression analysis showed that medical education and FA training doubles the FA knowledge, while increase in age affects negatively on the FA knowledge.

**Recommendation:** A module or course on FA should be included in undergraduate curriculum.

**Authors' contribution:** Paras Yusuf and Sehrish Rafiq conceived the idea, worked on data collection, data analysis and searched the literature. Syed Mohammed Tariq Rafi and Dr Nazeer khan facilitated in securing permissions from other institutions and reviewed the final manuscript. Dr Nazeer analysed the data and worked on the final manuscript. Ufaq Rasool and Amina Abid contributed in data collection and worked on introduction.

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