

**Original article**

**Stress in medical undergraduates; its association with academic performance**

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**Abstract:**

**Objectives:** To explore the difference in level of perceived stress among medical undergraduates of various classes and its association with their academic performance. **Methodology:** This observational study was conducted by the faculty members at University Medical & Dental College Faisalabad, Pakistan during six months period from October 2012 to March 2013. All the regular medical undergraduate students of five academic years MBBS from 2007 to 2012 were included in the study. The stress level of the students was determined by PSS 14 and the factors leading to stress were evaluated by a predesigned questionnaire. Data was analyzed using SPSS version 19. ANOVA and chi-square tests were used to compare the level of stress among various classes and its causative factors. **Results:** Mean PSS was highest for final year students. Third year MBBS had significant difference in stress level both with first year ( $p=0.042$ ) and final year MBBS ( $p=0.004$ ). High achievers were less stressed as compared to low achievers ( $p=0.006$ ). Consecutive boring lectures, lack of time for recreation, gap between students and teacher followed by difficulty selecting the reading material turned out to be the major stressors. **Conclusion:** Students of all the five academic years experience stress and the final year MBBS is the most stressed one. On the other hand low academic achievement group is more stressed as compared to high academic achievers from all the five classes. Student support programs to combat stress may be planned to improve their quality of life and their academic scores as well.

**Keywords:** stress; medical undergraduates; academic scores

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**Introduction:**

It is a common belief that medical profession is a stressful field and this stress starts right from the very first day when a medical student enters the medical school. Undergraduate medical students are the most distressed group in comparison to students of any other undergraduate program. Medical students are expected to learn a huge amount of knowledge and facts which is the leading factor that keeps them under tension. Moreover the social and personal sacrifices they make for their studies also put them at high risk to be stressed<sup>1</sup>.

A certain degree of stress is considered to be a part and parcel of the medical profession. Academically, stress can be motivating for some, but may prove otherwise for rest of the students<sup>2</sup>. Many individuals experience

the feeling of fear, uselessness, anger and incompetent in stressful environment<sup>3,4</sup>.

Academic achievements of the medical students can be measured in the form of academic scores and their learning of various skills. High level of stress can obstruct the learning of medical students by impairing their concentration, problem solving and decision making skills<sup>5,6</sup>. Level of stress may be variable among students of various academic achievement groups.

During last few years, some studies have been conducted both at national and international level to determine the level of stress in medical students, its etiological factors, how students cope with stress and its effect on academics<sup>7,8</sup>. In Western countries, this aspect of mental health has been explored deeply during last two to three decades and various com-

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bating strategies have been developed, but at our national level this data is still lacking<sup>8</sup>

Very few studies have been conducted in Pakistan so far to our knowledge to explore this issue of mental health and specifically the association of stress with academic performance of medical undergraduates has never been addressed before. Keeping in view this background, this study was conducted to determine the level of stress among various groups of students according to their academic achievements. Furthermore, their rating of various stressors according to frequency of occurrence was also compared. Generation of data representing our local population would help us establish better coping strategies and intervention programs for our own students. This information may also help us regarding planning modification in teaching methodology or medical curriculum to enhance students learning abilities.

### **Methodology:**

This research was an observational study duly approved by board of advanced studies, ethical review committee, University Medical & Dental College (UMDC), The University of Faisalabad, Pakistan and conducted during six month period i.e., October 2012 to March 2013. All the regular medical undergraduate students of five years registered in the MBBS program at UMDC from academic year 2007 to 2012 were included in the study. Students who would have been left in between the MBBS course were excluded from the study. Informed consent was taken from all the participants of the study including disclosure of their professional examination scores later on by the office record. The relevant information regarding demographic details, medium of teaching in school, high school education and marital status, was recorded on a predesigned proforma. The data was collected during mid of the ongoing academic year from each class, while academic scores of the five annual professional examination conducted by The University of Health Sciences, (UHS), Lahore, Pakistan, were collected at the end of each academic year by office record.

### **Definition of variables**

**Perceived stress** Level of stress was measured by using the Perceived stress Scale (PSS 14) which is a global measure of stress that the individuals experience in their daily lives. This scale is comprised of fourteen questions with a range of options on likert scale varying from 0 to 4 (never, almost never, sometimes, often, very often) for each item and these items are about direct queries to the happenings in last one month prior to survey.(appendix 1).It determines the degree to which ones life is being ap-

praised as stressful. The final score is reported in between a range from 0 to 56. Item number 4,5,6,7,9,10 and 13 positively stated questions and their score is reversed e.g 0=4, 1=3, 2=2, 3=1,4=0). Then scores of all the fourteen items is summed up to get the final figure. High scores show high level of stress, while low scores indicate lower level of stress. PSS has an internal consistency of 0.85 (Cronbach alpha co-efficient) and test-retest reliability during a short retest interval (several days) of 0.85.<sup>9</sup>

### **Academic performance**

Academic performance was measured in terms of scores of all the five professional examinations being conducted by UHS, Lahore, Pakistan, at the end of the academic year. Their final scores were converted into percentages. Students were classified in three groups according to their marks obtained i.e., high achievers securing  $\geq 80\%$  marks, average achievers between 50% to 80% marks and low achievers with  $\leq 50\%$  marks.

### **Stressors**

The factors leading to stress were evaluated by a predesigned questionnaire. After literature review in depth, this questionnaire was adapted from a similar study in the past conducted by Shah et al.<sup>10</sup> before launching the questionnaire, ten students were being interviewed and the potential stressors were modified somewhat according to our own circumstances. This modified questionnaire was initially pilot tested on twenty students representing all the five academic years and both boarders and non boarders group, again minor alterations were done accordingly and then administered by the researchers for final survey. Total twenty four potential stressors were categorized under three headings including academic factors (13 stressors), environmental factors (7 stressors) and family related (4 factors). The frequency of occurrence of each stressor was classified as never, rarely, sometimes, often and always.

### **Data analysis:**

Data was analyzed using SPSS version 19. ANOVA was used to compare the level the stress among various classes as well as academic achievement group. Stress level in high achievers was compared with that in low achievers to determine the association of stress and academic performance. Chi square test was used to compare the rating by high and low achiever groups to various stressors. P value  $< .05$  was taken as significant with 95 % confidence interval.

### **Results**

The questionnaire was delivered to total 513 students out of which 470 students returned the filled Performa (response rate 91%). The demographic characteristics

of the participants have been described in table I.

**Table I: Demographic profile of the participants**

Demographic characteristics	Frequency	Percentage
Residential status		
Non boarders	168	35.7
Boarders	302	64.3
Nationality		
Pakistani	465	98.9
Foreign	5	1.1
Pre Medical education		
Higher secondary school	459	97.7
A levels	11	2.3
Medium of teaching at School		
Urdu	114	24.3
English	356	75.7
Relationship status		
Single	424	90
Engaged	32	6.8
Married	14	3

Mean perceived stress score was maximum for the final year MBBS followed by 1<sup>st</sup> year and 2<sup>nd</sup> year students. Third year MBBS class proved to be the least stressed class. (Table II) 3<sup>rd</sup> year MBBS class has a significant difference in stress level as compared to 1<sup>st</sup> year MBBS ( $p=0.042$ ), as well as final year MBBS ( $p=0.004$ ).

**Table II: Mean perceived stress scale score of various classes of mbbs**

Academic year	Number of students=n	Mean pss score
First year	115	30.22±7.16
second year	110	30.12±7.04
Third year	85	28.21±6.54
Fourth year	85	28.88±7.46
Final year	72	31.38±5.69
Total	470	29.76±6.92

Fourth year MBBS class also had statistically significant difference with final year MBBS ( $p$  value 0.023).(Table III)

The mean stress level was considerably greater in students who were low achievers as compared to high achievers. (table IV) ( $p=0.006$ ). Mean PSS score of average achievers was not significantly different from that of high or low achievers. ( $p=0.168$ , 0.051 respectively)

Student's ratings to various stressors have been depicted in table V. Following factors reported to be

**Table III: Comparison of stress among various classes of mbbs**

MBBS class Being compared with	M B B S class	P value
first year	second year	.914
	third year	.042
	forth year	.169
	final year	.263
second year	first year	.914
	third year	.055
	forth year	.207
	final year	.228
third year	first year	.042
	second year	.055
	forth year	.526
	final year	.004
fourth year	first year	.169
	second year	.207
	third year	.526
	final year	.023
final year	first year	.263
	second year	.228
	third year	.004
	forth year	.023

frequently leading to stress; consecutive boring lectures, lack of time for recreation, gap between students and teacher followed by difficulty selecting the reading material.

Out of academic stressors, statistically significant difference was observed between low achievers and high achievers in rating of the following factors; Pace of studies too high, too many assessments, lack of time for recreation and lack of feedback from teachers, difficulty adapting to hostel environment and family conflicts (table V)

**Table IV: Relationship of stress and academic performance**

Academic performance groups	number of students=n	Mean pss score
High achievers	96	28.49±6.38
Average achievers	261	29.62±7.05
Low achievers	113	31.14±6.86
Total students	470	29.76±6.92

**TABLE V: Comparison of the ratings to different stressors between high achievers and low achievers**

Academic Factors	Never/ rarely (%)	Sometimes (%)	Often/ always (%)	P value
Vastness of curriculum High achievers Low achievers	21 (23) 35 (31)	31 (32) 44 (39)	44 (46) 34 (30)	0.439
Pace of studies too high High achievers Low achievers	20 (21) 35 (31)	33 (34) 47 (42)	43 (45) 31 (27)	0.005
Students don't know the method of study High achievers Low achievers	42 (44) 48 (42)	35 (36) 44 (39)	18 (19) 21 (18)	0.450
Not satisfied with teaching methodology High achievers Low achievers	40 (42) 53 (47)	35 (36) 40 (35)	21 (23) 20 (18)	0.217
Too many assessments High achievers Low achievers	31(32) 51 (45)	30 (31) 26 (23)	35 (36) 36 (32)	0.002
Lack of exam oriented guidance by faculty High achievers Low achievers	45 (41) 59 (52)	38 (40) 31(27)	13 (14) 23 (20)	0.221
Difficulty selecting the reading materials High achievers Low achievers	34 (35) 23 (20)	32 (33) 37 (33)	30 (31) 53 (47)	0.244
Difficulty in practical performance High achievers Low achievers	40 (42) 36 (32)	28 (30) 38 (34)	28 (30) 39 (34)	0.845
Attending clinical classes in ward High achievers Low achievers	62 (64) 67 (59)	22 (23) 20 (18)	12 (13) 26 (23)	0.288
Consecutive lectures are boring High achievers Low achievers	12 (13) 19 (17)	16 (17) 20 (18)	68 (71) 74 (65)	0.149
Gap between students and teacher High achievers Low achievers	25 (26) 22 (19)	38 (40) 34 (30)	33 (34) 57 (50)	0.129
Lack of feedback from teachers High achievers Low achievers	31(32) 55(49)	31 (32) 34 (30)	33 (34) 23 (20)	0.011
Lack of time for recreation High achievers Low achievers	12 (13) 29 (26)	32 (33) 33 (29)	52 (54) 51 (45)	0.001

**Discussion:**

We evaluated the level and severity of stress among various classes of MBBS in terms of mean perceived stress scale score. The mean PSS score of all the five

classes was  $29.76 \pm 6.92SD$ . In a study conducted among first two years of MBBS at Combined Military Hospital, Lahore Medical College, PSS

<b>ENVIRONMENTAL FACTORS</b>	<b>Never/ rarely</b>	<b>Some times</b>	<b>Often/ always</b>	
Ill health High achievers Low achievers	40 (42) 41 (36)	31 (32) 45 (40)	25 (26) 27 (24)	0.187
Difficulty adopting to hostel environment High achievers Low achievers	51(52) 45 (40)	13 (14) 13(11.5)	32 (33) 55 (49)	0.026
Interaction with fellow students High achievers Low achievers	35 (36) 40 (35)	26 (27) 29 (26)	35 (36) 43 (38)	0.862
Competitive environment within peers High achievers Low achievers	32 (33) 40 (35)	40 (42) 43 (38)	24 (25) 30 (26)	0.674
Home sickness High achievers Low achievers	41 (43) 33 (29)	18 (19) 27 (24)	37 (38) 53 (47)	0.229
Lack of recreational facilities High achievers Low achievers	19 (20) 29 (26)	29 (30) 21 (18)	48 (50) 63 (56)	0.124
Non familiar hospital environment High achievers Low achievers	48 (50) 52 (46)	26 (27) 33 (29)	22 (23) 28 (25)	0.192
<b>FAMILY RELATED FACTORS</b>	<b>Never/ rarely</b>	<b>Some times</b>	<b>Often/ always</b>	
Economic burden on family High achievers Low achievers	61(63) 62 (55)	26 (27) 28 (25)	9 (9.4) 23(20)	0.118
High expectations of family High achievers Low achievers	31 (32) 20 (18)	25 (26) 30 (26)	40 (42) 63 (56)	0.187
Career choice under family pressure High achievers Low achievers	71 (74) 82 (72)	8 (8.3) 19 (17)	17 (18) 12 (11)	0.108
Family conflicts High achievers Low achievers	71 (74) 68 (60)	13 (14) 32 (28)	12 (13) 1 3 (11.5)	0.045

score was  $30.84 \pm 7.01$ , which is comparable to  $30.22 \pm 7.16$  in first year MBBS and  $30.12 \pm 7.04$  in second year students in our study<sup>10</sup>. Our results show almost same level of stress among first two years of medical students followed by a sudden drop in mean PSS for 3<sup>rd</sup> year and 4<sup>th</sup> year medical students but again it was maximum in final year. These findings somewhat correlate with a study by Neimi et al. who documented progres-

sive increase in stress level during the medical training period, reaching its peak by the end of training<sup>11</sup>. This high level of stress among final year students can be explained by increased burden and more demanding courses of study in final year.

Medical schools and colleges are considered as stressful environment since long as it has been reported in various studies from different parts of the

world<sup>12,13,14,15</sup> In a study done in Indian university, level of stress was compared among students of various disciplines studying under the same circumstances. The mean PSS score was higher (29.5) in the dental and medical students (27.0), students of physiotherapy (26.6), the engineering students (26.6) and it was lower in the nursing students. The lowest mean PSS score of 23.2 was found in the pharmacy students.<sup>16</sup> Students pursuing higher professional education like MBBS have to survive in highly competitive environment that makes them more vulnerable to get stressed as compared to other students. This high level of stress is responsible for anxiety, depression and other behavioral disorders in medical students.<sup>17,18</sup> It also results in poor mental health that can further contribute towards broken relationship, substance abuse and suicidal ideation and inability to work properly.<sup>19,20</sup> It may affect their academic performance resulting in low examination scores.

In our study the mean value of PSS in high achievers of all classes was considerably low (28.49) as compared to students of low academic scores (31.14) ( $p = 0.006$ ). This finding is contrary to the findings of a study conducted in Saudi medical college where there was no statistically significant difference observed between academic grades of the students and their stress level.<sup>14</sup> Similarly in the study conducted at CMH LMC Pakistan, no such association of PSS score and academic scores could be found.<sup>10</sup> Although two other studies conducted in the past have shown negative influence of stress over academic performance, however the recent data is lacking to our knowledge both at national and international level about the cause effect relationship of stress and academic performance<sup>21,22</sup>

According to the results of our study, it is clear that low achievers are more stressed but still we were not able to determine exactly, whether increased level of stress resulted in poor academic performance or poor academic performance was responsible for such a high level of stress among our low score achievers. This issue needs to be investigated further in detail by longitudinal studies, evaluating the students throughout their stay at medical school.

In our study, following four academic factors were reported as the major stressors by majority of the students; consecutive boring lectures, lack of time for recreation, gap between students and teacher followed by difficulty selecting the reading material. Similarly vastness of curriculum and high pace of studies were also reported as very often leading to stress. This highlights the need of changing the

teaching methodology, modifying the lecture style or converting the lectures into group discussions so that it becomes more palatable for our medical students. The gap between students and teacher needs to be addressed; especially our students with low academic scores need more interaction with the teachers. We could not evaluate, whether this gap is in the form of lack of support, lack of guidance or student's internal feeling of being neglected.

In a study conducted in Nepal students rated similar type of stressors as more severe like 'dissatisfaction with the class lectures', 'vastness of academic curriculum/syllabus', 'frequency of examinations' and 'performance in the examinations'.<sup>23</sup> Final year medical students at Birmingham University considered the pressure of work in terms of acquiring professional knowledge, skills and attitude as stressful events during medical training<sup>24</sup>

We also compared the rating of high and low academic achievers to various stressors. Out of academic stressors, there was a statistically significant difference in responses to four stressors, between high achievers and low achievers i.e., too high pace of studies ( $p = 0.005$ ), too many assessments ( $p=0.002$ ), lack of feedback from teachers ( $p=0.011$ ) and lack of time for recreation ( $p=0.001$ ). It was interesting to observe here that the high achievers are taking these factors more frequently as stressors and hence they might be affecting the students in a positive sense.

Out of environmental and family related factors, lack of recreational facilities, home sickness and high family expectations were major stressors. In a study conducted at Agha Khan University, after exams and academics, relationship problem, family problem and home sickness were considered as stressors for medical students<sup>8</sup> In two previous studies Worries of the future, financial difficulties, and academic life were the most common stressors among medical students<sup>25,26</sup> Financial stressor was not a very frequent source of stress in our students.

**Limitations:** As Perceived stress scale evaluates the situation shortly in last one month and the level of stress may vary throughout the academic year, longitudinal surveys could yield better results. Long term follow up of the students would also help to determine the exact association of stress and academic performance. Here, we tried to eliminate the factor of pre exam high level stress by collecting the data in the mid of academic year well before the professional examination. The response rate was 91% which is fairly good. The study was conducted at our institutional level, which is a private woman medical

college; the results can't be generalized for all the public sector medical colleges and for both male and female sexes.

### **Conclusion:**

Medical students of all the five years are fairly facing stress during their stay at medical school as depicted by the mean PSS score of all the classes. Stress level was maximum for final year students and then initial two academic years. Similarly low achievers were

more stressed than high achievers. Whether this high level of stress resulted in low academic scores or low academic performance throughout year resulted in high stress, needs to be explored further. Students require a balanced environment for optimal learning. Student support can be planned to promote their well being and help them to develop coping strategies to combat stress.

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