

## **Impact of Pre-exam Anxiety on the Academic Performance of Final Year Medical Students**

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## Impact of Pre-exam Anxiety on the Academic Performance of Final Year Medical Students

### Abstract

**Introduction:** Exams are a relatively stressful period for all students, especially undergraduate medical students. Exams bring anxiety and stress for the students. Some students experience such high stress that it hinders their academic productivity and reduces their exam performance. The aim of this study is to assess the effects of pre-exam anxiety on the academic performance of medical students.

**Methods:** Two hundred and twenty-five final year medical students completed Westside Test Anxiety (WTA) Scale one month before their exams. Grade Point Average (GPA) of these students was noted when the results were announced. Data was processed and analyzed using SPSS v 22.0

**Results:** The mean anxiety score on WTA scale was  $3.46 \pm 0.87$ . All students (100%) who scored  $\leq 2.50$  GPA were highly-extremely highly anxious. In the 2.51-3.00 GPA group, 46% were highly-extremely highly anxious, 32% were moderately anxious, and 21% had low to normal anxiety. In the 3.01-3.50 GPA group, 30% were highly-extremely highly anxious, 30% were moderately anxious, and 39% had low to normal anxiety. In the 3.51-4.00 GPA group, 29% were highly-extremely highly anxious, 23% were moderately anxious, and 47% had low to normal anxiety. The correlation coefficient between GPA and test anxiety of students was  $-.314$  which shows inverse relationship.

**Conclusion:** Pre-exam anxiety and stress imparts negative effects on the exam performance of final year medical students. Poor academic performance was associated with high to extremely high pre-exam anxiety while high achievers had relatively lower anxiety levels.

**Keywords:** Pre-exam anxiety, Poor academic performance, GPA

### Introduction:

Stress is a psychosocial phenomenon which develops as a physiological response to various environmental triggers. Stress may be experienced in academic, professional, social, or personal situations [1]. Some extent of stress acts as a motivating force to strive for better, however, severe stress can handicap individuals [2].

Among university students, various literatures has shown reported medical students and trainees to be more vulnerable to stress mainly due to their extensive academic portfolio, and the fear of performance in examinations [3]. The pooled prevalence of stress among medical students has been reported to be 51% [4]. Studies have reported medical students to be stressed from the time

of enrollment and throughout their undergraduate years, with gradual deterioration, and even persisting in training years [5]. Debilitating stress is associated with anxiety, depression, and imparts negative effects on the academic performance of students [6].

A particular stress trigger identified in these students is exams. The pressure of performing well in the examinations along with the extensive academic curriculum results in aggravated stress before the exams. Various researchers have tried to study the effects of stress on the academic performance of medical students. Hambree in 1988 [7] first reported that stress and anxiety caused poor academic performance. Students with higher test-anxiety scored lower in exams as compared to the students who were not stressed at the time of exams. These findings have been supported by many other studies later [8, 9]. Students of clinical and higher years of education have reported higher exam stress. Common coping mechanisms included praying, self-motivation, sleep, television / music [10]. However, some studies have alternately reported that stress acts as a driving force to perform better in exams [11]. Hence, we aimed this study to evaluate the frequency of pre-exam anxiety in medical students of Pakistan and compare it with their grade point average (GPA) to study the impact of pre-exam anxiety on exam performance.

## Methods:

It was a prospective survey based study conducted with final year medical students of a public medical college in Karachi. Final year students sit in their final semester exam in the month of December. In November, students do not have any academic or clinical lectures, but are given “preparatory leave” to prepare for exams at home. This is the peak time of exam preparation for the students. Students were approached through an online survey during their preparatory leave. There are roughly 350 students in every batch. All of them were approached via their social media. IRB was waived off, after request was made based on the principle that it is a cross-sectional survey on healthy individuals.

The online survey consisted of two sections. The first section comprised of informed consent. Second section included a study code, their gender, and the Westside Test Anxiety Scale (WTA Scale). WTA is a self-administered and self-assessed instrument which evaluates the extent of anxiety impairment on ten items. WTA scale has a validity score of 0.44 and an internal consistency of 0.78 [12]. Each item is graded on a five-point Likert scale where 1 equates to “not true at all” and 5 equates to “always true.” The score of all ten items is summed up and then divided by 10. Final score of anxiety severity as categorized by Driscoll and as adapted in this study is showed in table 1.

Categorization of severity of anxiety on Westside Test Anxiety Scale

Anxiety severity as categorized by Driscoll	Anxiety severity as categorized in this study
<i>Comfortably low test anxiety:</i> 1.0—1.9	<i>Low / normal test anxiety:</i> 1.0—2.9

<i>Normal or average test anxiety: 2.0—2.5</i>	
<i>High normal test anxiety: 2.5—2.9</i>	
<i>Moderately high: 3.0—3.4</i>	<i>Moderate anxiety: 3.0—3.4</i>
<i>High test anxiety: 3.5—3.9</i>	<i>High / extremely high anxiety: 3.5—5.0</i>
<i>Extremely high anxiety: 4.0—5.0</i>	

When the students received their result, they were tracked through their study coded and were requested to share their Grade Point Average (GPA). GPA was also categorized into four groups –  $\leq 2.50$ , 2.51 – 3.00, 3.01 – 3.50, and 3.51 – 4.00.

Data was processed and analyzed through SPSS for Windows version 22.0 (Armonk, NY: IBM Corp). Mean and standard deviation (SD) was calculated for GPA and WTA score. Frequencies and percentages were calculated for gender, groups of GPA and exam anxiety scores as mentioned above in table 1. Stratification was done to find the severity of anxiety in all four GPA groups and chi square was applied ( $p$  value  $\leq 0.05$  was taken as significant). One way analysis of variance (ANOVA) was applied for comparison on means and post-hoc Tukey Highest Significant Difference (HSD) was applied to determine significance of mean GPA between groups of anxiety. Two-tailed Pearson correlation was applied to determine association between mean GPA and mean anxiety score.

### Results:

The online survey was completed by 225 out of 350 students which makes a response rate of 64.3%. The mean  $\pm$  SD GPA of the students was  $2.99 \pm 0.53$  (range: 2.00 – 4.00). The mean anxiety score on WTA scale was  $3.46 \pm 0.87$  (range: 1.50 – 5.00). The frequency and percentages of student characteristics including gender, GPA group, and exam anxiety scores show that overall, in final year, there were more female students ( $n=162$ ; 72%), GPA for most students was 2.15 – 3.00 ( $n=111$ ; 49.3%), and most of the students were highly / extremely highly anxious ( $n=102$ ; 45.3%) as shown in table 2.

Frequency of characteristics of final year medical students ( $n=225$ )

<b>Student characteristics</b>	<b>Frequency n (%)</b>
<b>Gender</b>	
Male	63 (28%)

Female	162 (72%)
<b>Grade point average</b>	
≤ 2.50	24 (10.7%)
2.51 – 3.00	111 (49.3%)
3.01 – 3.50	39 (17.3%)
3.51 – 4.00	51 (22.7%)
<b>Exam anxiety</b>	
Low / normal test anxiety	63 (28%)
Moderate test anxiety	60 (26.7%)
High / extremely high test anxiety	102 (45.3%)

In order to assess the impact of anxiety on academic performance, GPA was correlated with the severity of anxiety scores on WTA scale. It was seen that students who scored on the lower end of the GPA groups were highly / extremely highly anxious on WTA – 100% of students ≤ 2.50 GPA group and 46% of 2.51 – 3.00 GPA group. Among the students of moderately higher GPA group (3.01 – 3.50), 38% showed low / normal test anxiety, 30% showed moderate test anxiety and 30% showed high / extremely high test anxiety. As the GPA group ascended towards high achievers (GPA: 3.51 – 4.00), students in low / normal test anxiety group rose to 47% and students in high / extremely high test anxiety group fall down to 29% on WTA Scale (table 3).

Severity of exam anxiety recorded on Westside Test Anxiety Scale according to the academic performance of final year medical students (n=225)

Grade point average	Exam Anxiety			P value
	Low / normal test anxiety	Moderate test anxiety	High / extremely high test anxiety	
≤ 2.50	0 (0%)	0 (0%)	24 (100%)	0.000
2.51 – 3.00	24 (21.6%)	36 (32.4%)	51 (46%)	
3.01 – 3.50	15 (38.4%)	12 (30.7%)	12 (30.7%)	

<b>3.51 – 4.00</b>	24 (47.0%)	12 (23.5%)	15 (29.4%)	
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The mean anxiety score was calculated for each group of GPA. Students with GPA  $\leq 2.50$  had mean anxiety score of  $3.60 \pm 0.57$ . Students with GPA 2.51 – 3.00 showed mean anxiety score of  $3.77 \pm 0.86$ , GPA 3.01 – 3.50 showed mean anxiety of  $3.14 \pm 1.04$ , and students with GPA 3.51 – 4.00 had mean anxiety of  $3.00 \pm 0.04$ . The differences were statistically significant ( $p = 0.000$ ). The one-way ANOVA for pre-exam anxiety demonstrated statistically significant differences in severity of anxiety among groups of GPA (table 4).

ANOVA for difference in mean GPA

Grade point average	Sum of square	df	Mean Square	F	Sig.
Between groups	9.313	2	4.656	18.731	.000
Within groups	55.187	222	.249		
Total	64.500	224			

Post analysis was done using Tukey HSD for between-group significance. The difference in mean GPAs of low / normal and moderate test anxiety groups with that of high / extremely high test anxiety group ( $p = 0.000$ ). However, low / normal and moderate test anxiety groups did not have statistically significant mean GPA ( $p = 0.470$ ) when compared to each other. Two-tailed Pearson correlation between mean GPA and mean anxiety score showed moderated negative correlation with  $r = -0.314$

## Discussion:

This study is substantial in reporting the impact of pre-exam anxiety on the academic performance of final year medical students. Poor academic performance was associated with high to extremely high pre-exam anxiety while high achievers scored low on the WTA scale. This study shows a negative relationship of pre-exam anxiety with academic performance.

The study has its limitations too. It did not compare the anxiety severity in these students when they were not preparing for exams as a control group. Hence, the bias that whether anxiety was exclusively exam-related or these students were generally anxious could not be eliminated. Other causes of low academic performance including study de-motivation and social distractions can also not be eliminated.

When first year medical students were evaluated for stress one month before their exams using the Student Stress Scale, 71% were noted to have moderate stress and 20% had high stress levels. There was moderate negative ( $-0.4$ ) and significant ( $p < 0.01$ ) correlation between academic

performance and levels of stress [13]. Similarly, when Test Anxiety Inventory was administered in medical students, a significant negative correlation was found between test anxiety and academic performance (-0.21) [14]. This study also reported a moderate significant negative (-0.3) correlation in final year students which is comparable. Kulsoom et al. compared the pre-exam and post-exam anxiety score in their students. The mean stress score pre-exam was  $8.79 \pm 5.20$  which reduced to  $7.28 \pm 4.88$  after exams ( $p < 0.001$ ) [15]. Although, they did not correlate the stress scores with academic performance but their results are crucial in establishing that students are more stressed at the time of examinations. In another study, the mean stress level was  $12.08 \pm 5.4$  when the medical students did not have any exams in the next two weeks, which increased to mean stress of  $15.31 \pm 4.9$  when the students were two weeks away from the exams ( $p=0.0001$ ). The student academic performance was negatively related to student stress (-0.21), however, the relationship was not statistically significant ( $p=0.22$ ) [8]. Among Sudanese medical students, the mean test anxiety score on WTA scale was  $3.64 \pm 1.07$  as compared to  $3.46 \pm 0.87$  in this study (the critical score on WTA is 3.50). They reported a pearson correlation of -0.47 between test anxiety and academic performance [16].

When gender difference was studied, female undergraduate medical students were found to be high on test-anxiety than male undergraduate students. In females, the participants with low test anxiety scored significantly higher GPA than students with high test anxiety score. In male students, the differences were not significant [17]. Farooqi et al. has also shown higher mean test anxiety in female students [14]. However, in a recent study with multidisciplinary university students, the mean test anxiety on WTA scale for male students was  $3.20 \pm 0.60$  while female students scored a lesser mean on WTA ( $3.13 \pm 0.77$ ), both were below critical. Their male students scored lesser GPAs than female students ( $2.8 \pm 0.47$  vs.  $3.19 \pm 0.44$ ;  $p=0.000$ ). Overall, correlation coefficient between CGPA and test anxiety was -0.317 [18]. On the other hand, in an Iranian study with mean pre-exam anxiety score of  $12.39 \pm 5.39$ , there was no statistically significant relationship between test anxiety and educational performance ( $P = 0.97$ ) [19].

This study has significantly contributed to the existing paucity of literature regarding the negative relationship of high anxiety on the academic performance of medical students. From here, more large scale studies, with students in different academic years and different colleges, should be conducted to either reinforce this relationship or negate it. Longitudinal studies following a group of students and insert an anxiety instrument at two instances – when preparing for exams and when not preparing for exams – should also be ensued to evaluate if anxiety has an exclusive relationship with exams. Factors contributing to high exam anxiety should also be studied so that strategies can be planned to overcome them in future.

Medical undergraduate programs are highly demanding and can be exhausting for physical, emotional, and cognitive health. From early years of the program, students should be encouraged to indulge in stress coping and stress management strategies. Students should prioritize their physical and psychological health and practice a balance in personal and academic life.



## Conclusion:

Medical students experience moderate to high stress before their exams. Pre-exam anxiety and stress imparts negative effects on the exam performance of these students. Poor academic performance was associated with high to extremely high pre-exam anxiety while high achievers had relatively lower anxiety levels. Medical students should engage in stress management activities, especially before their exams, to cope with this anxiety.

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