Al Ameen J Med Sci 2022;15(2):148-153 ● US National Library of Medicine enlisted journal ● ISSN 0974-1143

ORIGINAL ARTICLE CODEN: AAJMBG

Exam stress and coping strategies in 2nd year undergraduate medical students – Time for introspection

Sharmila Dudani*, Vandana Gangadharan, Rachna Gulati, Navneet Nath and Ajay Malik

Department of Pathology, Army College of Medical Sciences, Brar Square, Near Base Hospital Delhi Cantt, New Delhi-110010, India

Received: 16th June 2021; ***Accepted:*** 15th February 2022; ***Published:*** 01st April 2022

Abstract: *Background:* The undergraduate medical curriculum is vast and knowledge-intensive, leading to stress in medical students. Stress at the time of exam assessment is seen to be prevalent in medical students across the globe. The stress may be so great as to cause severe physical and psychological harm. *Objective:* A cross-sectional observational study was undertaken to study the prevalence of exam stress, gender differences in anxiety scores, and coping strategies employed by students using a self-administered questionnaire. *Methods:* The study consisted of 104 undergraduate medical students at the end of the 5th semester examination in a medical college in North India. *Results:* 36.5% of students reported >36 anxiety score indicating high levels of stress. Females had significantly higher anxiety scores (35.05 ± 8.62) as compared to males (30.63 ± 9.32) (p=0.014). Hostelers vs. day scholars did not show significant differences in anxiety scores. 37% of students had a panic attack before an exam, 35.6% of students had trouble sleeping the night before the exam. Females were 2.171 times (95% CI 0.950 – 4.961) more likely to have anxiety >36 than males. Listening to music and sleeping were the most frequent coping strategies employed. Students who could alleviate their stress were 3.636 times more likely to have low anxiety. Males were 3.254 times (95% CI 1.233 – 8.585) more likely to have the stress alleviated than females. *Conclusion:* Medical students experience increased stress during exams which need to be urgently addressed.

Keywords: Undergraduate Medical Students, India, Anxiety, Medical Education, Coping, Exams, Psychological Stress.

Introduction

Stress is defined as a physical or psychological stimulus that can produce mental or psychological reactions which may lead to illness [1]. Stress is thus understood to be an imbalance between the demands encountered by medical students in daily living and the individuals' capability to respond [2]. Exam assessment is perceived to be a great source of stress for medical students and has been seen to affect students' academic performance [3].

The highly competitive nature of the MBBS course, the vast knowledge-intensive study curriculum, long years of study, parental expectations, psychological pressures, fear of failure, lack of coping strategies all contribute in considerable measure towards the stress [4]. This stress represents a significant challenge faced by medical students. Though mild stress is an inevitable part of day-to-day life and may be beneficial, greater degrees of stress may cause severe physical and psychological harm [3].

Studies from various medical institutions across the globe have reported higher anxiety symptoms among undergraduate medical students [2-3, 5-12] Compared to other professional courses. Authors have also reported that academic curriculum, frequency of examinations, competition with peers, parental expectations, and fear of failure were common sources of stress in medical students [7, 9, 13-16]. Also, during the periods of the exam assessment, the stress may appear to be at its zenith, but very few studies have studied exam-related anxiety in medical students [17-18]. As the teaching-learning methodology in medical schools is undergoing a paradigm

shift with emphasis on being primarily student-centric, a need to understand the extent of prevalence of exam-related anxiety in medical students is necessary to enable a "holistic reassessment" of the curriculum. This goal may be summarily defeated if the student is overburdened or unduly stressed in his learning journey, leaving the intended deliverables far from being achieved.

Aims and Objectives: This study was conducted to assess the prevalence of exam-related stress in 5th semester (2nd year) medical students in a medical college in a large metropolitan city. It was also proposed to study whether anxiety score was related to gender and failure to alleviate exam stress. Lastly, coping strategies adopted by the students to alleviate stress was also examined.

Material and Methods

This was a cross-sectional observational study using a self-administered questionnaire undertaken in 104 medical students in a private medical college in New Delhi who had just appeared for their II MBBS Pathology University Annual examination (at the end of the 5th semester) in December 2019. The study was conducted according to principles expressed in the Declaration of Helsinki after approval from the Institutional Ethics committee. Participation in the study was voluntary, and no incentive was offered to the students for the same. Informed Consent was obtained from all respondents, and approval for anonymized use of data for publication was taken.

An anxiety questionnaire developed by Nist and Diehl [17] (Table 1) was used to assess the overall level of stress in medical students during examinations and the methods used by students for alleviation. The internal consistency of the questionnaire was 0.8. Responses of the students were recorded on Likert scale just after the completion of the examination. The questionnaire was sent to the students by email, and they submitted their responses online wherein they were asked to rate the manifestations of stress as per the questionnaire, by choosing any one of the five typical responses- never, rarely, sometimes, often, always. Each response was given a score with “never” given a score of (1) to “always” given a score (5) as per Table 2. Based on the answers provided, the scores were calculated, which ranged from 10 to 50. A score of 10 to 19 indicated no anxiety, 20 to 35 as healthy anxiety, and >36 indicated distress or unhealthy anxiety. Investigators were blinded to individual student responses, and email ids were not collected.

Statistical Analysis was performed using SPSS version 21.0 for Windows (Armonk, NY: IBM Corp). Categorical variables are expressed as percentages and continuous variables as mean ± standard deviation (SD) or median with interquartile range (IQR). Shapiro – Wilk test was applied to assess the normality of continuous variables. An unpaired t-test or Mann-Whitney U test was used as appropriate to compare continuous variables. The Chi-square test was applied to test the relationship between categorical variables, and odds ratios with 95% confidence interval (CI) were estimated.

Results

All 104 students appearing for the exam responded. The Response rate was 100% (Of the respondents, 100 students belonged to the regular batch and 4 were repeaters.) 48 (46.2%) were males and 56 (53.8%) were females. 89 (85.6%) students were hostelers, and 15 (14.4%) students were day scholars.

On average, females had a higher anxiety score (35.05 ± 8.62) compared to males (30.63 ± 9.32), which was statistically significant ($t = 2.504$, $p = 0.014$). Students who lived at home had an average score (median with IQR) of 29.5 (11.75), and those who lived in the hostel had a score of 33.0 (14.75). This difference was not statistically significant ($U = 510.5$, $p = 0.081$).

Table 1 revealed that 39 (37%) of students had a panic attack before an exam, 37 (35.6%) students had trouble sleeping the night before the exam, 31(29.8%) students complained of going blank during the exam. 40 (38.5%) students said they could recollect all the answers once they left the exam hall. 23 (22.1%) of students always had physical symptoms, namely sweaty palms, shaky hands, and palpitations before an exam, and 19(18.3%) students felt nauseated before an exam.

Table-1: Responses to Anxiety questionnaire Nist and Diehl (1991)					
Question	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
Before the exam	**1**	**2**	**3**	**4**	**5**
I have trouble sleeping night before exam	6 (5.8%)	7 (6.7%)	36(34.6%)	19(18.3%)	37 (35.6%)
I have visible signs of nervousness such as sweaty palms, shaky hands, palpitations etc. before an exam.	14(13.5%)	15(14.4%)	29(27.9%)	25(24.%)	23(22.1%)
I feel anxious and have a nervous feeling in my stomach before an exam	11(10.6%)	16(15.4%)	27(26.0%)	18(17.3%)	33(31.7%)
I feel nauseated before an exam	30(28.8%)	22(21.2%)	16(15.4%)	17(16.3%)	19(18.3%)
During the exam	**1**	**2**	**3**	**4**	**5**
I panic before and during an exam	7(6.7%)	16(15.4%)	22(21.2%)	20(19.2%)	39(37.5 %
I read through the test and feel that I do not know any of the answers	16(15.4%)	20(19.2%)	38(36.5 %)	13(12.5%)	18(17.3%)
My mind goes blank during an exam	12(11.5%)	17(16.3%)	40 (38.5%)	14(13.5%)	31(29.8%)
I have trouble choosing or deciding answers	11(10.6%)	20(19.2%)	37(35.6%)	17(16.3%)	19(18.3%)
I make mistakes on the easy questions or put answers in the wrong places	12(11.5%)	17(16.3%)	39(37.5%)	21(20.2%)	15(14.4%)
I recollect the answers once I come out of the exam hall	4(3.8%)	6(5.8%)	25(24.0%)	29(27.9%)	40(38.5%)

38 (36.5 %) students experienced a high degree of exam anxiety (>36). 25 out of 56 female students exhibited unhealthy anxiety scores vs. 13 out of 48 males who had similar unhealthy anxiety. Females were 2.171 times (95% CI 0.950 – 4.961) more likely to have anxiety >36 than males; however, this result was not statistically significant with p = 0.0636 (Table 2).

Table-2: Chi –Square test and odds ratio for Anxietyscore vs. Gender							
Anxiety Score	**Gender**		χ^2	**Odds Ratio**	**95% CI**		**P Value**
	Male (n = 48)	**Female (n = 56)**			**Lower**	**Upper**	
< 36 (n = 66)	35	31	3.44	2.171	0.950	4.961	0.0636
≥ 36 (n = 38)	13	25					

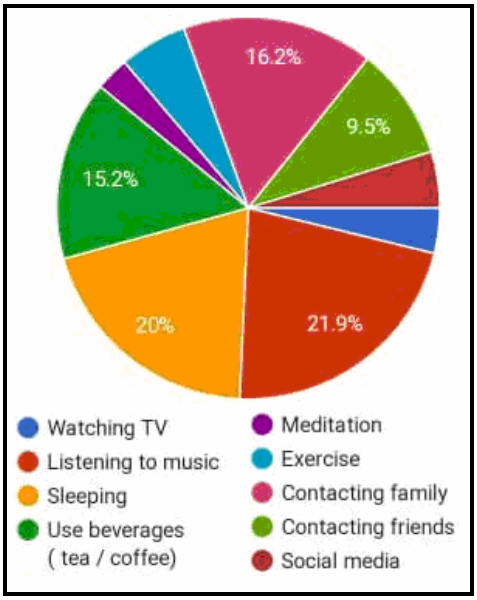
The ability to alleviate stress was associated with anxiety score. Students who could alleviate their stress were 3.636 times (95% CI 1.459 – 9.062) more likely to have low anxiety. The result was statistically significant (p = 0.0043) (Table 3).

Table-3: Chi- Square test and Odds Ratio for Anxiety score vs. Stress alleviation							
Anxiety Score	**Stress Alleviated**		χ^2	**Odds Ratio**	**95% CI**		**P Value**
	Yes (n = 77)	**No (n = 27)**			**Lower**	**Upper**	
< 36 (n = 66)	55	11	8.12	3.636	1.459	9.062	0.0043
≥ 36 (n = 38)	22	16					

Table-4: Chi- Square test and Odds Ratio for Stress alleviation vs. Gender							
Stress alleviated	Gender		χ^2	Odds Ratio	95% CI		P Value
	Male (n = 48)	Female (n = 56)			Lower	Upper	
Yes (n = 77)	41	36	6.00	3.254	1.233	8.585	0.0143
No (n = 27)	7	20					

It was observed that gender was associated with whether stress was alleviated or not. Males were 3.254 times (95% CI 1.233 – 8.585) more likely to have the stress alleviated than females. This difference was statistically significant (p=0.0143) (Table 4).

Fig-1: Coping strategies employed by students to alleviate stress



Students used various methods to alleviate stress, as depicted in Fig.1. Listening to music was prevalent among 22.1%. Sleeping was preferred by 20.2% of students. Use of stimulant beverages (tea, coffee) and contacting family members was used by 15.4% of students. Contacting friends was used as a stress buster by 9.6% of students. Social media, watching TV, exercise and meditation collectively accounted for 17.3% of respondents only.

Discussion

A high proportion (36.5 %) of 5th-semester undergraduate medical students reported unhealthy levels of exam stress (distress) before the Annual University exam. Female students constituted a large proportion of this highly distressed group. Similar studies from the subcontinent and other countries also mirror the high degree of stress among medical students using various anxiety questionnaires [8-9, 12, 17-18].

Firth et al. have reported that medical students had high levels of stress, and an alarming percentage (15 % to 26%) of them needed professional help to mitigate it [19]. As compared to a similar study undertaken in 2017 by Mittal et al [17] employing the same questionnaire, students of the present study reported more significant insomnia 35.6% vs. 12.7%, panic attacks 37.5% vs.7.3 %, increased somatic sympathetic symptoms 22.1% vs. 6.7%. Greater detrimental effects was also observed in the present study as 29.8 vs.1.3% had impaired capability of decision-making ability, 20.2% vs 1.3 % went blank during the exam, 18.3% vs.2.3% had trouble choosing the correct answers and 14.4% vs. 2.7% of students made mistakes in easy questions [17].

Though the cohorts in both studies are not comparable, a disturbing trend of greater exam stress with impairement of performance is evident among students in the present study. Increased pulse rate, systolic blood pressure (SBP) in pre-examination setting in both genders has also been reported in 1st MBBS students with detrimental effects to attention and decision making skills, with greater cognitive impairement and depressive symptoms in females [4, 20].

In our study, females exhibited a higher anxiety score (35.05 ± 8.62) as compared to males (30.63 ± 9.32), which was statistically significant (t=2.504, p=0.014). This finding has been corroborated by other workers [10,12,14,16,18,] Gender per se was not associated with anxiety scores. Though females were 2.171 times more likely to have high anxiety scores, the odds ratio was not statistically significant (p=0.0636) (Table 2).

This result was observed as the cut-off score of 36 (unhealthy stress) was taken to compute the calculation, and both male and female students reported lower mean anxiety scores than the cut-off. It has been postulated that female assessed the stressful situations more negatively than males, thus leading to high anxiety scores [3]. No gender differences in stress levels were observed by Heinen et al [2], and stress scores were reported to be higher in males as compared to females in another study [4].

Accommodation in-home or hostel did not show any significant differences in stress levels (p=0.081) as was also observed by Shah and co-workers [14]. However, another study found hostel stay as a significant determinator of stress [10]. Though some amount of stress is beneficial for motivation for achieving higher levels of academic performance, unhealthy levels of stress can prove to be detrimental, as was observed in our study. Hence, the development of skills in medical students on managing stress levels is needed as exams are an inevitable part of the education system. Researchers have reported that use active coping strategies by medical students to deal with the stress experience [17, 21]. Listening to music and sleeping were the most popular choices (Fig.1) to cope with exam stress. However, a disturbing trend of using stimulants like tea/ coffee was used by a higher proportion of our students as compared to Mittal and coworkers [17].

Interestingly, social media, a constant companion during a student's life, was not resorted to for alleviation of stress, indicating that possibly the incessant media inputs were rather irritating than soothing. Exercise and meditation were also not popular methods for alleviating stress. We observed that ability for stress alleviation was associated with anxiety scores. Students who could alleviate their stress by any method above were 3.636 times (CI 1.459-9.062) (p = 0.0043) likely to have low anxiety than those students in whom stress could not be alleviated (Table 3). Gender was associated with the ability of stress alleviation. In our study, males were 3.254 times (CI 1.233-8.585) (p=0.0143) more likely to be able to alleviate stress as compared to females (Table 4). Managing stress or the "coping reservoir" is a dynamic process leading to two possible outcomes of either burnout/stress or enhanced resilience and better mental health. Though many factors are responsible for this coping reservoir, external inputs (both positive or negative) could impact it significantly, leading to burnout or increased resilience [22]. In the present study, a large proportion of students with unhealthy levels of stress could not alleviate their stress by any of the methods adopted; this warrants a serious "call for action" and has been echoed by Dyrbe and co-workers [23]. As students report a high level of perceived stress, the approaches adopted till now for coping were seen mainly at an individual level. Institutional interventions such as stress reduction training [24] introduction of wellness courses [5], yoga [25], peer support programs [26] need to be incorporated in the study curriculum.

Conclusion

The high prevalence of unhealthy levels of exam stress among undergraduate medical students needs to be urgently addressed. Though Institutions have recognized this problem and provided mentoring / counseling support available to students it needs to be woven more proactively within the curriculum to help the "chronically anxious students". Stress triggers need to be identified and maintenance of healthy work- life balance strived for. Students need to be given adequate support in their quest for excellence so that stress does not take a toll on the physical and mental health of our future medical graduates. Prospective, larger Institutional, multicenter and multi-method studies are required to delve into the determinants of stress so that best practices may be strategized to tackle this.

Limitations: This study was conducted on a cohort of students appearing for the final 2nd Year MBBS (at the end of 5th term) summative examination only, and did not include two – three year cohorts. Post exam test scores of this cohort and triggers for the stress could not be evaluated.

Acknowledgment

Authors would like to acknowledge the contribution of Dr. S. Mangalesh in helping with the statistical analysis.

Financial Support and sponsorship: Nil **Conflicts of interest:** There are no conflicts of interest.

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Cite this article as: Dudani S, Gangadharan V, Gulati R, Nath N and Malik A. Exam stress and coping strategies in 2nd year undergraduate medical students – Time for introspection. *Al Ameen J Med Sci* 2022; 15(2): 148-153.

*All correspondences to: Dr. Sharmila Dudani, Professor, Department of Pathology, Army College of Medical Sciences, Brar Square, Near Base Hospital Delhi Cantt, New Delhi-110010, India. E-mail: drsdudani@hotmail.com