A Cross-Sectional Study Assessing the Relationship between Stress and Academic Performance among First-Year Undergraduate Medical Students

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Abstract

Aim: The aim of the present study was to estimate the prevalence of stress, main stressor, major coping strategy adopted and the relation between stress and academic performance was studied among the first-year undergraduate medical students.

Methods: This cross-sectional study was conducted under the Department of Physiology with a convenience sample of 100 first-year undergraduate medical students in ANMMC, Gaya, Bihar, India.

Results: Mean PSS score was 18.52 ± 6.14 in male students, 21.18 ± 5.28 in female students and 19.16 ± 5.35 in all the students. Mean PSS score was highly significantly more in female students when compared to male students with a p-value of 0.005. The main source of the stressor was academic-related, followed by social-related stressors, teaching and learning related stressors, group activities related stressors, Intra and interpersonal related stressors, drive and desire related stressors in the decreasing order. The majority of the students were using active coping, acceptance, planning, positive reframing and using instrumental support to cope stress. Substance abuse was the least coping strategy employed. In the mild group, not significant negative correlation was seen in between PSS vs. theory and practical marks. A positive, not significant correlation was observed between PSS vs. Viva-voce marks in mild group. Although the negative correlation was observed in between PSS vs. theory, practical and viva-voce marks in moderate and severe stress groups, highly significant negative correlation was observed only in moderate stress group as $p < 0.005$.

Conclusion: Our study revealed a higher prevalence of stress among females. Academic related stressors were major stressors. Majority of students were employing positive coping strategies. A negative correlation was observed between stress and academic performance in theory marks. So, regular counselling to decrease stress might improve the academic performance of the students.

Keywords: Academic performance, coping strategy, stress, stressor, undergraduate medical students

Introduction

Medical students face different kinds of stressors in their studies and in life. Previous researchers have found high levels of stress among medical students. [1,2] According to Lazarus [3], stress is the result of an individual's perception that they do not have the resources to cope with a perceived situation from the past, present, and future. Stress occurs when an individual is confronted with a situation that is perceived as overwhelming and with which they cannot cope. [4] Too much stress or chronic stress can affect mental and physical health and increase the risk of premature mortality. [5] Adverse effects of stress result from the interaction between stressors and individual perceptions of and reaction to these stressors. Musculoskeletal disorders, high blood pressure, disturbed metabolism (associated with the risk for type 2 diabetes mellitus), and cardiovascular problems may result from stress. [5]

Medical students perceive themselves as being more likely to become ill than others.[6] Deterioration in the health of students may affect learning ability and academic performance as well as goal achievement. [7] In addition, stress also affects social relationships within and outside the university [7], thus impacting on mental health. In a Swedish study, 2.7% of students had made suicide attempts. [2] Previous studies [8,9] identified some important academic and non-academic stressors among medical students. Academic stressors include excessive

homework, unclear assignments [8,9], lack of time management skills, uncomfortable classrooms, weekly tests and assignments, the pressure to earn good grades, and receiving a lower grade than expected. [9] Depression, anxiety, and stress have been seen to lead to outcomes such as impaired functioning, burnout, and other health problems that can adversely affect individuals and society at large. [10] Stress has been linked to all leading physical causes of death—heart disease, cancer, and stroke. [11] Excessive stress has also been reported to result in physical and mental health problems and reduced self-esteem, as well as affect academic achievement and personal and professional development. [12]

Coping strategies are defined as frequently changing cognitive and behavioral efforts by an individual to control specific external or internal demands perceived to be taxing or exceeding the resources of the individual. [13] Active coping strategies include behavioral and psychological responses to changing circumstances or the stressor itself and include planning, instrumental support, venting, positive reframing, humor, and acceptability. [14] Avoidant coping strategies lead people into activities (such as drug use) or mental states (such as withdrawal) that keep them from directly addressing stressful events. [14,15]

The aim of the present study was to estimate the prevalence of stress, main stressor, the major coping strategy adopted and the relation between stress and academic performance was studied among the first-year undergraduate medical students.

Materials and Methods

This cross-sectional study was conducted under the Department of Physiology with a convenience sample of 100 first-year undergraduate medical students in ANMMC, Gaya, Bihar, India for one year.

Inclusion Criteria: All healthy first-year undergraduate medical students.

Exclusion criteria: Students on anti-depressant medication were excluded from the study. Institutional Ethical committee clearance was taken before the commencement of the study and written informed consent of students was taken. Each subject was put on a series of tests using a pre-tested, pre-structured study questionnaire. Stress was assessed by perceived stress scale one week before the exam. The PSS-10 taps into the student's life as a whole more than the past 1 month and does not just pertain only to academics. The PSS-10 had demonstrated good internal (intra-observer) reliability with Cronbach's alphas ranging from 0.78 to 0.91 and test–retest reliability coefficients ranging from 0.55 to 0.85.[16] PSS Questionnaire contains 10 questions. The respondent was given a score for each question on a Likert scale. The PSS scores were computed by reversing responses (i.e., 0= 4, 1= 3, 2 = 2, 3 =1 and 4= 0) to the four positively stated items of 4, 5, 7 and 8. [16]

The scores were finally summated and according to assessment score students were divided into 3 groups' mild (0-13), moderate (14-26) and severe stress (27-40) groups. Academic performance was assessed by theory, practical and viva-voce. Sources of stress were assessed by Medical Student Stressor Questionnaire [17] which consists of 6 domains assessed by 40 item questionnaire. Mean of 6 domains will be calculated and the degree of that stressor affecting students was assessed accordingly. Coping up strategies was assessed by Brief COPE questionnaire [18] which consists of 28 items grouped into 14 domains. The responses anticipated from participants were based on their kind of reaction to different stressful circumstances in the learning environment tabulated on a four-point Likert-type scale. Response choices ranged from ''1. I have not been doing this at all'' to 4: ''I've been doing this a lot.'' The students made their choices according to the coping tactic most frequently used to manage the stressful events experienced by them. Mean of 14 domains was calculated. The data obtained was analysed with statistical package for social sciences software (SPSS-10). Data was expressed as mean ±SD. Statistical results were considered significant at p<0.05 and highly significant at p <0.005. The relation between stress level and academic performance was assessed by Pearson correlation coefficient. Major stressor and main stress coping strategy in first-year undergraduate medical student were assessed.

Results

Table 1: Prevalence of stress among first-year medical students with PSS 10

	Male N=45	Female N=55	Total
Mild stress	10	5	15
Moderate stress	32	43	75
Severe stress	3	7	10
Mean PSS score	18.52 ± 6.14	21.18 ± 5.28	19.16 ± 5.35

Mean PSS score was 18.52 ± 6.14 in male students, 21.18 ± 5.28 in female students and 19.16 ± 5.35 in all the students. Mean PSS score was highly significantly more in female students when compared to male students with a p-value of 0.005.

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Table 2: Source of stressors assessed by Medical student stressor questionnaire

Domains	Mean ± SD
Academic related stressors	1.95 ± 0.065
Intra and interpersonal related stressors	1.14 ± 0.076
Teaching and learning-related stressors	1.28 ± 0.075
Social related stressors	1.36 ± 0.058
Drive and desire related stressors	0.68 ± 0.062
Group activities related to stressors	1.26 ± 0.064

The main source of the stressor was academic-related, followed by social-related stressors, teaching and learning related stressors, group activities related stressors, Intra and interpersonal related stressors, drive and desire related stressors in the decreasing order.

Table 3: Stress coping strategies assessed by the Brief COPE questionnaire

Domains	Mean ± SD
Active coping	5.38 ± 0.122
Planning	5.18 ± 0.144
Positive reframing	5.04 ± 0.142
Acceptance	5.28 ± 0.144
Humour	3.96 ± 0.144
Religion	4.26 ± 0.146
Using emotional support	4.85 ± 0.149
Using instrumental support	5.03 ± 0.157
Self-distraction	4.76 ± 0.144
Denial	4.32 ± 0.492
Venting	4.24 ± 0.126
Substance use	2.74 ± 0.114
Behavioural disengagement	4.16 ± 0.124

The majority of the students were using active coping, acceptance, planning, positive reframing and using instrumental support to cope stress. Substance abuse was the least coping strategy employed.

Table 4: Pearson correlation calculated between PSS vs. theory, practical and viva-voce marks

Stress Groups	PSS vs. Theory	PSS vs. Practical	PSS vs. Viva-voce
Mild r value	-0.218	-0.344	0.216
P value	0.398	0.19	0.42
Moderate r value	-0.298	-0.126	-0.114
P value	0.0017	0.208	0.256
Severe r value	-0.37	-0.212	-0.116
P value	0.239	0.52	0.724

In the mild group, not significant negative correlation was seen in between PSS vs. theory and practical marks. A positive, not significant correlation was observed between PSS vs. Viva-voce marks in mild group. Although the negative correlation was observed in between PSS vs. theory, practical and viva-voce marks in moderate and severe stress groups, highly significant negative correlation was observed only in moderate stress group as $p < 0.005$.

Discussion

Stress is defined as "a physical or psychological stimulus that can produce mental or physiological reactions that may lead to illness". [19] The term 'stress' was first employed in the 1930s by the endocrinologist -Hans Selye. [20] Stress is caused by an existing stress-causing factor or "stressor." A stressor can be viewed as a double- edged weapon that may stimulate and motivate the students to peak performance or reduce the students to ineffectiveness. [21] To meet this stress, students are using coping strategies. Coping strategies are behavioural or psychological efforts employed to master or minimize stressful events, affect the medical residents variably. Studies have revealed that active coping strategies such as positive reframing, acceptance, and planning affect the mental health outcome favourably whereas avoidant strategies such as denial, drug, or alcohol use worsen

the situation. [22] The stressed condition can lead to many psychological responses such as anxiety, hopelessness, irritability, depression, or a general feeling of being unable to cope with life. But beyond some point, "stress" becomes "distress." The act which may lead to distress varies significantly from person to person. [23] In the first- year undergraduate medical students, the prevalence of mild stress is 14.8%, moderate stress is 68.4% and severe stress is 16.8%. [24]

Mean PSS score was 18.52 ± 6.14 in male students, 21.18 ± 5.28 in female students and 19.16 ± 5.35 in all the students. Mean PSS score was highly significantly more in female students when compared to male students with a p-value of 0.005. In contrast, studies done by Anandalakshmi et al [25] and Sunni and Latiff[26] found out that males have not significantly higher PSS scores when compared to females. The main source of the stressor was academic-related, followed by social-related stressors, teaching and learning related stressors, group activities related stressors, Intra and interpersonal related stressors, drive and desire related stressors in the decreasing order. The majority of the students were using active coping, acceptance, planning, positive reframing and using instrumental support to cope stress. Substance abuse was the least coping strategy employed. In the mild group, not significant negative correlation was seen in between PSS vs. theory and practical marks. Academic related stressors and drive and desire related stressors were the major and minor stressors stated by students in the current study similar to Bhavani et al. [27] Studies done by Kakoli Ghaushal et al [28], Chowdary et al [29] and Panchu et al [30] showed academic-related stressors were leading contributors of stress in undergraduate medical students. The requirement of in-depth knowledge of the vast medical syllabus, less time to study different subjects and lack of awareness to prepare answers by their own are leading to make academic stressors as a major stressor.

A positive, not significant correlation was observed between PSS vs. Viva-voce marks in mild group. Although the negative correlation was observed in between PSS vs. theory, practical and viva-voce marks in moderate and severe stress groups, highly significant negative correlation was observed only in moderate stress group as $p< 0.005$. As the studies were conducted in the western world, substance abuse was the main coping strategies in those studies. In the current study, the relation between stress and theory academic performance was a negative correlation in all the three stress groups. However, the negative relation only in moderate stress group was significant. A negative non-significant correlation was seen between stress and practical mark in all stress groups. A non-significant negative correlation was observed between stress and viva marks in moderate and severe stress groups whereas a non-significant positive correlation was observed in mild stress group. A study done by Shakir et al [31] showed a negative significant correlation between stress and academic performance. A non-significant negative correlation was observed by Shah et al. [32]

Conclusion

Our study revealed a higher prevalence of stress among females. Academic related stressors were major stressors. Majority of students were employing positive coping strategies. A negative correlation was observed between stress and academic performance in theory marks. So, regular counselling to decrease stress might improve the academic performance of the students.

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