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Research Article

Perceived stress and sources of stress among medical undergraduates in a private Medical College in Mangalore, India

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Abstract

Background: Stress and emotional disturbances among students at medical colleges are relatively common, and seemingly, this is a worldwide problem. Recently studies have reported high levels of stress among medical students.
Objectives: To assess prevalence of perceived stress and find out sources of stress among undergraduate medical students.
Materials and Methods: Cross-sectional study was conducted in a private medical college in Mangalore during March-August 2012. Data was collected with the help of self-administered questionnaire using "Perceived stress scale (PSS 14)". Academic, health related and psychological stressors were assessed using a questionnaire containing 33 items. Logistic regression analysis was done to find out determinants of stressed cases.
Results: Total 200 students completed the questionnaire. Overall prevalence of stress among study participants was found to be 42.5% (85 students out of 200). Female students reported higher prevalence of stress than males. Mean PSS score in the study population was 27.53 (95% CI: 26.4-28.7, SD = 7.01). Frequency of examination, performance in examination, academic curriculum were reported as important academic stressors. High parental expectations, lack of entertainment in the institution and quality of food in mess were reported as important psycho-social stressors by the students.
Conclusion: High levels of perceived stress existed in the first and second year undergraduate medical students. The associations between stressed cases and occurrence of academic and psychosocial stressors needs to be further tested by prospective studies.
Keywords: perceived stress, sources of stress, undergraduate medical students

1. Introduction

Stress is a term that refers to the sum of physical, mental and emotional strains or tensions on a person. The term 'stress' was first employed in the 1930's by the endocrinologist Hans Selye[1]. Stress also indicates the consequence of the failure of an organism, human or animal to respond appropriately to emotional or physical threats whether are either actual or imagined[2]. Selye published in 1975 a model dividing stress into eustress and distress. Where stress enhances function (physical or mental, such as through strength training or challenging work), it may be considered eustress. Persistent stress that is not resolved through coping or adaptation, deemed distress, may lead to anxiety or withdrawal (depression) behavior[3].

The academic atmosphere in medical colleges is very stressful which promotes competition among learners rather than co-operation. High level of stress among medical students has been reported in various studies [4-6]. The academic demands of medical education are placed on students at time of their life when they are also involved in issues related to life style and carriers. It is also reported that stress during medical education can affect the patient care negatively[7].

Various stress factors reported in studies among medical students are academic

demands, exams, inability to cope, helplessness, increased psychological pressure, mental tension and too much work load[8]. The transition from pre-clinical to clinical training has also been identified as a crucial stage of medical school regarding student stress[9]. Different studies conducted worldwide among medical students have reported prevalence of stress ranging from 27-73% [10-15]. Retrieving knowledge about presence of stress is therefore important in itself and if found should be given attention for timely intervention.

Studies on psychological morbidities are very few in our state and not many have been conducted at the medical colleges in Dakshina Kannada (Karnataka) region. This study therefore was planned to identify the prevalence of perceived stress and possible stressors responsible for it among undergraduate medical students. So that appropriate intervention strategy can be proposed to reduce stress and enhance student's abilities.

At the A.J.Institute of Medical Sciences, Mangalore, Karnataka, India , there are students from South Indian states, some North Indian states and a few from other countries. These students come from diverse cultural, socio-economic and educational backgrounds. All these students are exposed to a new learning environment, making new social circles and also adapting to a new and different world during their training at the institute.This may be a very stressful experience especially during the formative first and second years of their course. The relative paucity of information about stress and its sources during the early years of medical undergraduate training in India and especially from a private college of this part of India, warranted this study.

The objectives of our study were:

· To assess perceived stress

· To find out the sources of stress (stressors) and their severity

· To assess the determinants of stressed cases, among first and second year M.B.B.S students.

2. Material and Methods

This cross-sectional study was conducted in a private medical college in Mangalore (India) among first and second year M.B.B.S students from March-August 2012. Study protocol was approved by Institution's ethics committee.

2.1 Sample size

The estimated sample size for the study was 200 [Prevalence of stress reported among Indian medical students in different studies is close to 50%, Allowable error-15%, taking non-response rate upto 10% , sample size derived was 200.

2.2 Data Collection tools:

Perceived stress was measured using the "Perceived stress scale" (PSS-14)[9], which comprises of 14 questions with responses varying from 0 to 4 for each item and ranging from never, almost never, sometimes, fairly often and very often respectively on the basis of their occurrence during one month prior to the survey.

2.2.1 Perceived Stress Scale (PSS – 14):

The *Perceived Stress Scale* (PSS) is the most widely used psychological instrument for measuring the perception of stress. It is a measure of the degree to which situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. The scale also includes a number of direct queries about current levels of experienced stress. The PSS was designed for use in community samples with at least a junior high school education. The items are easy to understand, and the response alternatives are simple to grasp. Moreover, the questions are of a general nature and hence are relatively free of content specific to any subpopulation group. The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way. The PSS has an internal consistency of 0.85 (Cronbach a co-efficient) and test-retest reliability

during a short retest interval (several days) of 0.85. [16]

2.2.2 Scoring:

PSS scores were obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) to the seven positively stated items (items 4, 5, 6, 7, 9, 10, 13) and then summing across all scale items. The PSS-14 has a possible range of scores from 0 to 56. The range of PSS scores were also divided into stratified quartiles. The upper two and lower two quartiles were combined (28 being the operational cut off value for the upper bound) and were labelled as stressed and not stressed respectively. This cut off value was selected in accordance to a similar studies from Pakistan and Egypt[17,18].

2.2.3 Stressors

The potential stressors in the questionnaire were adapted from a similar study from Nepal by Sreerama R eddy et al[19]. A total of 33 stressors were listed and grouped as academic, psychosocial and health related. For each potential stressor the frequency of occurrence was classified as never, rarely, sometimes, often and always and will be scored as 1, 2, 3, 4 and 5 respectively. The severity of each stressor was rated using a Likert scale (1-10) ranging from not severe to very severe. The students were asked to indicate if any of the stressors had been affecting them.

2.3 Data collection:

Students from first and second year MBBS were invited to participate in this survey. The students were instructed about the objectives of the study. Informed written consent was taken from all the participants. The participants were assured of confidentiality of the information provided and had an option of refusal to participate in the survey. The questionnaire was distributed amongst students and the researchers collected the completed questionnaires.

2.4 Statistical Analysis:

Data was entered in Microsoft excel and data was analyzed with SPSS 16.0 software. The mean scores of perceived stress were calculated. The number and percentage of stressed cases were calculated according to demographic variables. We grouped the frequency of occurrence of stressors as never/rarely, sometimes, and often/always. Percentage frequency of occurrence was calculated for each of the stressors from academic, psychosocial and health domains. Logistic regression analyses were carried out to assess determinants of stressed cases. We considered perceived stress (stressed cases) as the dependent variable, demographic variables and groups of stressors (i.e. academic, psychosocial and health-related) as the independent variables. Exp (B): the estimation of odds ratio in logistic regression analysis, 95% confidence intervals of Exp (B) were calculated. The "p"-value < 0.05 was considered as significant.

3. Results

3.1 Demographic characteristics of the respondents:

Out of 207 students, issued the questionnaire, 200 completed and returned the questionnaire giving an overall response rate of 96%. Out of 200, 74 students were from First M.B.B.S and remaining 126 students were from Second M.B.B.S (the students from third term, fourth term and fifth term were included)

Fifty three students were males (32.92%) and 108 were females (67.08%). 104 (52%) students belonged to 19-20 years age group . The mean age group of the study participants was 19.7 years (Table 1). PSS (Perceived stress scale) scores were obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) to the seven positively stated items (items 4, 5, 6, 7, 9, 10, 13) and then summing across all scale items. The PSS-14 has a possible range of scores from 0 to 56. The range of PSS scores were also divided into stratified quartiles.

The upper two and lower two quartiles were combined (28 being the operational cut off value for the upper bound) and were labeled as stressed and not stressed respectively. This cut off value was selected in accordance to similar studies conducted in Pakistan and Egypt[17,18]. Overall prevalence of stress among study participants was found to be 42.5% (85 students out of 200). Female students reported higher prevalence of stress than males. Mean PSS score in the study population was 27.53 (Table 1).

Table 1 Profile of Study Participants (Age and PSS Score)

Variable	First M.B.B.S		Second M.B.B.S		Total
	Males	Females	Males	Females	
Number (%)	32 (16)	42 (21)	44 (22)	82 (41)	200 (100)
Age (years)					
Mean age	19.2	19.0	20.3	19.8	19.7
95% CI for Mean	18.8-19.6	18.7-19.3	19.9-20.8	19.5-20.1	19.5-19.8
SD	1.1	0.9	1.4	1.4	1.3
PSS Score					
Mean	29	30.1	25.3	26.9	27.5
95% CI for Mean	26.3-31.7	27.8-32.3	22.1-28.4	25.3-28.4	26.4-28.7
Median	30	28.5	25	26	27
Variance	57.7	51.3	106.2	49.3	65.6
SD	7.6	7.2	10.3	7	8.1
Minimum	13	17	7	3	3
Maximum	46	46	48	43	48
Range	33	29	41	40	45

Students responses to the PSS 14, has been shown in the form of frequency table (Table 2).

Table 2 Students' responses to Perceived Stress Scale-14

Statement	Never (%)	Almost Never (%)	Some-times (%)	Fairly Often (%)	Very Often (%)
1. In the last month, how often have you been upset because of something that happened unexpectedly ?	20 (10)	33 (16.5)	84 (42)	31 (15.5)	32 (16)
2. In the last month, how often have you felt that you were unable to control the important things in your life ?	30 (15)	34 (17)	79 (39.5)	33 (16.5)	24 (12)
3. In the last month, how often have you felt nervous and "stressed" ?	17 (8.5)	31 (15.5)	68 (34)	43 (21.5)	41 (20.5)
4. In the last month, how often have you dealt successfully with day to day problems ?	25 (12.5)	85 (42.5)	62 (31)	23 (11.5)	5 (2.5)
5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life ?	26 (13)	59 (29.5)	72 (36)	31 (15.5)	12 (6)
6. In the last month, how often have you felt confident about your ability to handle your personal problems ?	40 (20)	75 (37.5)	62 (31)	18 (9)	5 (2.5)
7. In the last month, how often have you felt that things were going your way ?	18 (90)	42 (21)	88 (44)	32 (16)	20 (10)
8. In the last month, how often have you found that you could not cope with all things that you had to do ?	21 (10.5)	44 (22)	85 (42.5)	39 (19.5)	11 (5.5)
9. In the last month, how often have you been able to control irritations in your life ?	26 (13)	58 (29)	72 (36)	29 (14.5)	15 (7.5)
10. In the last month, how often have you felt that you were on top of things ?	12 (6)	24 (12)	83 (41.5)	54 (27)	27 (13.5)
11. In the last month, how often have you been angry because of	12	38	72	51	27

things that were outside of your control ?	(6)	(19)	(36)	(25.5)	(13.5)
12. In the last month, how often have you found your -self thinking about things you have to accomplish ?	7 (3.5)	14 (7)	54 (27)	74 (37)	51 (25.5)
13. In the last month, how often have you been able to control the way you spend your time ?	24 (12)	46 (23)	72 (36)	37 (18.5)	21 (10.5)
14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them ?	30 (15)	45 (22.5)	66 (33)	37 (18.5)	22 (11)

Total thirty three stressors, divided into academic, health related and psychosocial were used in the study. The responses were rated in the form of never, rarely, sometimes, often or always. Students' responses to academic stressors has been shown (Table 3).

Table 3 Academic Stressors - Perceived severity by students

Academic Stressors	Never	Rarely/ Sometimes	Often/ Always
Frequency of examination	17(8.5)	84(42)	99(49.5)
Performance in examination	19(9.5)	93(46.5)	88(44)
Academic curriculum	29(14.5)	96(48)	75(37.5)
Dissatisfaction with class lectures	41(20.5)	108(54)	51(25.5)
Non-availability of adequate study materials	93(46.5)	87(43.5)	20(10)
Becoming a doctor	56(28)	87(43.5)	57(28.5)
Lack of time for recreation	54(27)	94(47)	52(26)
Competition with peers	54(27)	101(50.5)	45(22.5)
Performance in practicals	47(23.5)	102(51)	51(25.5)
Lack of special guidance from faculty	57(28.5)	98(49)	45(22.5)

Frequency of examination, performance in examination, academic curriculum were reported as important academic stressors. In the list of health related stressors, quality of food in mess, was an important source of stress for the students (Table 4).

Table 4 Health related stressors - Perceived severity by students

Health related stressors	Never	Rarely/Sometimes	Often/Always
Sleeping difficulties	75(37.5)	83(41.5)	42(21)
Class attendance	93(46.5)	74(37)	33(16.5)
Nutrition	71(35.5)	67(33.5)	62(31)
Exercise	76(38)	87(43.5)	37(18.5)
Quality of food in mess	39(19.5)	38(19)	123(61.5)
Physical disability	138(69)	51(25.5)	11(5.5)
Alcohol/drug abuse/smoking	168(84)	21(10.5)	11(5.5)

High parental expectations, lack of entertainment in the institution were reported as important psycho-social stressors by the students (Table 5).

Table 5 Psycho-social Stressors - Perceived severity by students

Psychosocial stressors	Never	Rarely/ Sometimes	Often/ Always
High parental expectations	62(31)	89(44.5)	49(24.5)
Loneliness	61(30.5)	93(46.5)	46(23)
Family problems	99(49.5)	77(38.5)	24(12)
Accommodation away from home	77(38.5)	83(41.5)	40(20)
Political situation in the country	133(66.5)	56(28)	11(5.5)
Relations with opposite sex	122(61)	62(31)	16(8)
Difficulty reading text books	73(36.5)	108(54)	19(9.5)
Lack of entertainment in the institution	49(24.5)	86(43)	65(32.5)
Difficulty in the journey back home	97(48.5)	72(36)	31(15.5)
Quality of food in mess	43(21.5)	37(18.5)	120(60)
Financial strain	99(49.5)	73(36.5)	28(14)
Inability to socialize with peers	77(38.5)	103(51.5)	20(10)
Living conditions in the hostel	71(35.5)	83(41.5)	46(23)
Member of fraternity or sorority	115(57.5)	66(33)	19(9.5)
Lack of personal interest in medicine	137(68.5)	50(25)	13(6.5)
Adjustment with roommate	125(62.5)	47(23.5)	28(14)

Logistic regression analysis showed lack of time for recreation, high parental expectations, competition with peers, loneliness as determinants (independent variables) of stress (dependent variable). Exercise showed negative relationship with stress (Table 6).

Table 6 Determinants of stress by Logistic regression analysis

Variable	B	S.E.	Wald	df	Significance	Exp(B)	95% CI	
							(Lower limit)	(Upper limit)
Lack of time for recreation	0.46	0.21	4.6	1	0.03	1.59	1.04	2.42
Competition with peers	0.62	0.21	8.0	1	0.005	1.86	1.21	2.86
Exercise	-0.60	0.21	7.7	1	0.005	0.54	0.35	0.83
High parental expectations	0.45	0.21	4.5	1	0.03	1.57	1.03	2.37
Loneliness	0.75	0.24	9.7	1	0.002	2.12	1.32	3.40

3. Discussion

In our study, we evaluated perceived stress among medical students including its sources and severity, which may be of importance to both medical teachers and psychologists. In this study, medical students reported a higher level of perceived stress, which was significantly higher among female students.

The overall prevalence of stress found in this study was 42.5%. Studies done in other countries and in other states of India, have reported higher prevalence of stress among medical undergraduates. A study from Saudi Arabia reported 57%[19] and a survey conducted by Saipanish reported that 61.4% of students in a Thai Medical School had come across

some degree of stress during their training period[20]. Another study, done in Sindh (Pakistan), reported that overall 85% of students felt stressed at one or other time during their study period[2]. A study done in Mumbai (India), reported that 73% of the students perceived stress at some point or the other during their medical schooling[15]. Other two studies from Pakistan, found that more than 90% students experienced stress during their course[8,22]. The amount and severity of stress experienced by medical students may vary according to the settings of the medical school, the curricula, evaluation (examination) system etc. Also, these studies have used different instruments to measure stress. This limits the comparability among these studies.

We chose the perceived stress scale since this instrument has been documented for its reliability and validity [23,24,25]. The advantage of PSS is that it can

be applied to a wide range of settings, to different subject types and includes items measuring reactions to stressful situations as well as measures of stress[23]. An important limitation of other reviewed stress scales for health professions students is that it focuses only on academic stressors, and lack of inclusion of personal issues or reactions to stressful situations (psychosocial issues), and poor applicability to broader settings.

Mean PSS score in the study population was 27.53 (95% CI: 26.4-28.7,SD = 7.01). In a study done in a medical school in Pakistan, the mean PSS score reported was 30.84 (SD=7.01)[17]. In a study done by Mane Abhay, using PSS in different disciplines like medical, dental, nursing, pharmacy, physiotherapy and engineering, the mean PSS score among medical students was: 27.0 ,n= 79, SD- 7.2 (95% CI: 25.3 - 28.6) .The overall mean PSS score in that study population was 26.6, with a SD of 6.5 (95 % CI 25.8-27.3)[26].

In our study, sample proportion (62%) of the female students was higher than their male (38%) counterparts. Mean PSS scores among female students was significantly higher than that of male students. Mean PSS score for female students in this study was 29.19 (95% CI: 27.85-30.52), while for male students it was 24.83 (95%CI: 22.93-26.73). The difference between the mean scores of PSS for females and males was statistically highly significant. (Independent samples 't' test: 3.81, p-value < 0.005). In a study which was done in Pakistan, the mean PSS scores among the female students were found to be significantly higher than that of the male students[17]. In the study by Mane Abhay, the mean PSS score ± SD of 26.2 ± 6.7 of the male students was slightly lower, as compared to the score of 26.9 ± 6.3 of the female students, the difference was not statistically significant[26]. However, Cohen has reported that there was no significant difference in stress using PSS between male and female students[24]. We lacked sufficient information, which could assist us in carrying out further analysis about this. Higher level of stress among female students was also reported by a study done in a medical college in Indore, Madhya Pradesh[27].

Frequency of examination, performance in examination, academic curriculum were reported as important academic stressors. Lack of time for recreation [odds ratio:1.59, 95% CI:1.04-2.42] competition with peers [odds ratio:1.86, 95% CI: 1.21-2.86] were found as determinants for stressed cases. Exams encourage the students to learn and serve as a standard for assessment or evaluation. But approximately 50% (49.5%) students in our study reported frequency of examination as an important source of stress and performance in examination was also reported as an important source of stress by 44% students. In a study done in a medical school in Kathmandu, Nepal including First and Second M.B.B.S students as study subjects, 39.8% students reported frequency of examination as often/always source of stress[16]. In the study done in Lahore, Pakistan also 36% of students reported performance in examination as an important (often/always) source of stress[17]. In the study done by Mane Abhay 39% of medical students reported frequent examinations as a source of stress[26]. Previous studies have also reported that exams are common sources of stress among medical students. There is an urgent need to modify and improve the system of evaluation in medical training to make it less stressful and student friendly. The Medical council of India has proposed to introduce foundation course to reduce stress level in First MBBS students, which is a welcome step but issue of stress needs to be addressed for other academic years also.

Health related stressors were also assessed in the study. Quality of food in mess, emerged out as an important stressor, as 61.5% students reported it as a source of stress often/always. In a study done in a medical school in Kathmandu, Nepal including First and Second M.B.B.S students as study subjects, also found that 60.4% students reported quality of food in mess as an often/always source of stress[16].But in the study done in Lahore, Pakistan 35% of students reported quality of food as an important (often/always) source of stress[17]. Importantly we found exercise as a stress-buster (odds ratio:0.54, CI: 0.35-0.83). Students should be encouraged to participate in sports and extracurricular activity and to enrich their hobbies, which can reduce stress.

In the psycho-social stressors, High parental expectations [odds ratio:1.57, 95% CI:1.03-2.37] and loneliness [odds ratio:2.12, 95% CI: 1.32-3.40] were found as determinants for stressed cases. In a study carried out in Nepal also reported high parental expectations as second most common source of stress. There should be functional parent counselling cell because parents should be counseled in order to avoid their over expectations about their kids. In medical school, to score and remain at the top of the class is difficult as compared to scoring in secondary school. Seniors should be counseled against ragging. They should be encouraged to flourish healthy interactions with colleagues.

In our study, 32.5% students reported lack of entertainment in the institution as often/always source of stress. The study done in Nepal, also found that 41% students reported lack of entertainment in the institution as an often/always source of stress [16]. But in the study done in Lahore, Pakistan 24% of students reported lack of entertainment in the institution as an important (often/always) source of stress[17]. In a study done in Surat, India to identify the psychological stressors among medical students did not find any association of living status with level of stress[28]. Majority of our students were residing in the hostels provided in the campus. Earlier studies have reported that psychosocial factors are important sources of stress for medical students[15,20]. There may be a need to provide more time and facilities in the campus for recreation and sports. Although these facilities were available in our institution they were felt to be inadequate by the students. These factors should be explored in detail in a future study. A longitudinal qualitative study among Swedish medical school has reported that stress and burn out is determined by individual traits and school environment[29]. The study also recommended that individual and organizational interventions may be for prevention of burn out among medical students. A study from US medical school reported that an elective in 'Mind-Body Medicine may decrease anxiety scores among preclinical medical students[30]. Another study from US has recommended that teaching stress management and self-care skills to medical students may be successful[31].

Limitations of the study

· Lack of generalisation of our results to other medical schools in India is an important limitation of this study.

· Since the information was collected on self-administered questionnaire, because of respondent's interpretation of the questions or simply because of inaccuracies of responses or desire to report their emotions in a certain way, we cannot rule out information bias.

· Cross-sectional design of our study is yet another limitation since associations presented lack of temporality.

· Prospective studies are necessary to study the associations between occurrence of stressors and incidence of stress.

4. Conclusion

High levels of perceived stress existed in the first and second year undergraduate medical students.The most frequently occurring stressors among the students were related to academic and psychosocial domains. The associations between stressed cases and occurrence of academic and psychosocial stressors needs to be further tested by prospective studies.There is need to address these stressors by peer education and counseling. The students should be taught different stress management techniques to improve their ability to cope with a demanding professional course. There is also need to bring about changes in the evaluation system.

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