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To Determine the Prevalence of Perceived Stress and Ascertain the Sources of Stress and the Coping Strategies Adopted by the Undergraduate Medical Students of A Medical College in India

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ABSTRACT
Introduction: *In recent years, there is growing appreciation of the stresses involved in medical training. It is critical for medical educators to understand the prevalence and causes of student distress, potential adverse consequences, and institutional factors that can influence student health.*
Aim: *To assess prevalence of perceived stress, identify sources of stress, their severity, determinants of stressed cases and coping strategies adopted by undergraduate medical students.*
Materials and Methods: *A cross-sectional study using self-administered questionnaires was conducted among 150 second year medical undergraduate students of Rama Medical College, Hapur. Prevalence and severity of stress was assessed using a 14-item "Perceived stress scale". Stressors related to academic, health and psychological domains were assessed using a 39- item questionnaire and common coping strategies used by the students were identified by a brief COPE inventory. Data was analyzed statically to calculate frequency distributions, odds ratio and confidence intervals. Logistic regression analysis was done to find out determinants of stressed cases. Friedman ANOVA was done to find out significant levels of utility of coping strategies.*
Results: *Total 147 students completed the questionnaire. Overall prevalence of stress was 48.98%. Mean PSS score was 27.0 ± 6.41. Female students reported significantly higher mean PSS scores than males. Stressed cases were found to be associated with female gender, occurrence of academic and health- related stressors. Quality of food in mess, high self- and parental expectations, frequency and performance in examinations, living conditions in hostel and lack of entertainment in the institution were the most frequent and severe sources of stress. Coping strategies commonly used were planning, acceptance, active coping, positive reframing, self- distraction, emotional support and religion. Perceived stress was significantly likely to engender the use of "self-blaming" and "acceptance".*
Conclusion: *A higher level of perceived stress was reported by medical undergraduate students. The main determinants were female gender, academic and health stressors. Prospective studies are required to test association between stressed cases and gender, academic and health-stressors, and the coping strategies adopted by the students.*
Keywords: *perceived stress, sources of stress, undergraduate medical students, coping strategies.*

Introduction

In recent years there is a growing appreciation of the stresses involved in medical training. High level of stress among medical students has been reported in various studies conducted worldwide ranging from 27-73% [1-6].

Stress is defined as body's nonspecific response or reaction to demands made on it or to disturbing events in the environment[7]. It is not just a stimulus or a response but a process by which we perceive and cope with environmental threats and challenges[8]. Personal or environmental events that invoke a stress response are defined as stressors[9].

Linn & Zeppa[10] have suggested that some stress in medical school training is needed for learning. However, too much stress affects learning and memory, with resultant morbidity[11,12]. Several studies have shown that intense pressures and demands of medical education can have detrimental effects on academic performance, physical health and psychological well-being of the students. Researchers have reported association of bad stress level with lowered medical students' self-esteem[10], anxiety and depression[13,14], difficulties in decision-making and establishing patient-doctor relationship[13], difficulties in solving interpersonal conflicts[15], sleeping disorders[16], increased alcohol and drug consumption[17-19], cynicism, decreased attention, reduced concentration and academic dishonesty[20]. As a result, medical students may feel inadequate and dissatisfied with their career as a medical practitioner in future[21]. Thus, many researchers have stated the importance of early diagnosis as well as stressors identification, which can prevent possible future illnesses among medical students [19,22].

Medical students are subjected to different kinds of stressors which vary by year in training. Concerns about workload, performance, and personal competence seem particularly marked in the first year, when students may have significant lifestyle changes resulting in reduced emotional wellbeing. With advancing academic program, some inherent factors (e.g., dealing with patients, disease and death; relationships with consultants; and effects on personal life) become manifest, with attendant increase in stress and mobilization of coping resources[23]. Curriculum differences among medical schools seem did not influence the overall pattern of stressors, most being academic, although frequency of some may be significantly different[24,25]. Similar stressors may be perceived differently by different students, depending on their cultural background, personal traits, experience and coping skills[24-26]. The specific coping strategies that students use may determine the effect of stress on psychological and physical health and also whether stress has a positive or negative influence[20].

It is critical for medical educators to understand the prevalence and causes of student distress, potential adverse personal and professional consequences, and institutional factors that can positively and negatively influence student health. Studies from developing countries have reported stress among medical students but have underscored the role of academics as a source of stress [6,12,27,28]. Also these studies have either not assessed the coping strategies or did not use COPE inventory.

In medical colleges of India, students come from different states thus having diverse cultural, socio-economic and educational backgrounds. All of them are exposed to a new learning and social environment during their medical training. This may be a very stressful experience. The relative paucity of information about stress, its sources and coping strategies adopted during early years of medical undergraduate training in India warranted this study with the following objectives:

- ➢ To assess the prevalence of perceived stress
- ➢ To identify the sources of stress, their severity and coping strategies.
- ➢ To assess the determinants of stressed cases

Material and Methods
Setting and participants

The present study was undertaken at Rama Medical College, Hospital and Research Centre, Hapur, India. A cross-sectional survey using self-administered questionnaire was done among 150 students of second year M.B.B.S. over a period of three months. Students were instructed about the objectives of the study. Informed written consent was taken from the participants and the study protocol was approved by the Institution's ethics committee. They were assured of the confidentiality of the information and had an option of refusal to participate in the survey.

Participants were asked to complete a set of questionnaires consisting of four parts: demographic information, 14-item perceived stress scale, 39-item list of potential stressors and the Brief COPE[29] inventory.

Data Collection tools
Perceived Stress Scale (PSS – 14)

Perceived stress was measured using "Perceived stress scale" (PSS-14) comprising 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. PSS has an internal consistency of 0.85 (Cronbach α-co-efficient) and test-retest reliability during a short retest interval (several days) of 0.85[30]. It assesses the degree to which participants evaluate their lives as being stressful during the past month. It does not tie appraisal to a particular situation; the scale is sensitive to the nonoccurrence of events as well as ongoing life circumstances. PSS-14 scores are obtained by reversing the scores on seven positively stated items (items 4,5,6,7, 9 and10), for example 0 = 4, 1 = 3, 2 = 2, etc. and then summing across all 14 items. A single score ranging from 0 to 56 is obtained with high scores indicating higher levels of stress and lower scores indicating lower levels. PSS scores were also divided into stratified quartiles. Upper two and lower two quartiles were

combined (28 being the operational cut off value for the upper bound) and labeled as stressed and not stressed respectively. This cut off value was selected in accordance to a similar study from Pakistan and Egypt[31,32].

Stressors

Potential stressors in the questionnaire were adapted from a similar study from Nepal by Sreeramareddy et al[30]. A total of 39 stressors were listed and grouped as academic, psychosocial and health related. For each stressor, frequency of occurrence was classified as never, rarely, sometimes, often and always and scored as 1,2,3,4 and 5 respectively. Also, severity of each stressor was rated using a Likert scale (1-10) ranging from not severe to very severe. Students were asked to rate the frequency and severity of any of the stressors that had been affecting them.

Brief COPE

Brief COPE, an abridged version of the COPE inventory[29] was used. It presents 28-items averaged in pairs to fourteen scales all assessing different coping dimensions[33]. Students were asked to indicate how they have been responding to stressors in the previous weeks. Response choices ranging from 'I have not been doing this at all' to 'I have been doing this a lot' were scored from 1 to 4. It can be used to assess trait coping (the usual way people cope with stress in everyday life), and state coping (the particular way people cope with a specific stressful situation). This instrument has been used in health-relevant studies. Further, these responses were reduced to binomial responses of 'No' for scores between 2-5 and 'Yes' for scores between 6-8.

Statistical Analysis

Data was entered in Microsoft excel and analyzed with SPSS 16.0 software. Mean PSS scores and the percentages of stressed cases were calculated according to demographic variables. The frequencies of occurrence of stressors were grouped as never/rarely, sometimes, and often/always and their percentage frequencies were calculated. Descriptive statistics was done

for assessing severity of stressors. 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. Adjusted odds ratios (OR) and 95% confidence intervals (95% CI) were calculated. A p-value < 0.05 was considered as significant. Friedman ANOVA was done to find out the significant levels of utility of various coping strategies.

Results
Demographic characteristics of the respondents
Out of 150 students of second year M.B.B.S., 147 completed and returned the questionnaires giving a response rate of 98%. Fifty one students were male (34.69%) and ninety six were females (65.31%). Mean age group of study participants was 19.45 $\pm$1.22 ranging from 18-25 years (Table/Fig.1). All the students were residing in the campus hostel.

Perceived stress
The overall prevalence of stress was found to be 48.98% (72 students out of 147). Mean PSS score of the study population was 27.00 $\pm$ 6.41. Mean PSS score for female students were 29.00 $\pm$ 6.24 while for male students were 23.29 $\pm$ 5.03. Female students reported significantly (p< 0.05) higher levels of perceived stress (higher PSS scores) than their male counterparts (Table/Fig.1). Students' response to PSS 14-questionnaire has been shown in the form of frequency table (Table/Fig.2)

Sources and Self-rated severity of stressors
Students' responses to academic, psychological and health-related stressors have been shown in Table/Fig.3.

The most frequently occurring academic stressors reported by students were becoming a doctor (36.73%), performance in examinations (32.65%), lack of time to review what has been learnt (32.65%), competition with peers (26.53%), frequency of examinations (24.49%) and performance in practical (22.45%). Need to do well (self-expectation) (48.98%) was the most frequently occurring psychological stressor followed by lack of entertainment in the institution (46.94%), living conditions in hostel (32.65%) and high parental expectations (28.57%). Amongst the health- related ones, quality of food in mess (46.94%) and nutrition (22.45%) were frequent sources of stress. Quality of food in mess, self-expectation, performance in examinations, becoming a doctor, living conditions in hostel, high parental expectations, frequency of examinations, lack of entertainment in the institution, lack of time to review what has been learnt, vastness of academic curriculum/ syllabus and competition with peers were rated as most severe.

Determinants of stressed-cases by logistic regression
By logistic regression analysis, stressed cases were found to be associated with female gender [OR 4.29; CI 2.07- 8.84; p<0.0001], occurrence of academic stressors [OR 6.20; CI 2.87-13.43; p< 0.0001] and occurrence of health-related stressors [OR 3.83; CI 1.42-10.32; p=0.007] (Table/Fig.4).

Common coping strategies
Coping strategies commonly employed by the students during events of stress were acceptance (mean 5.7 $\pm$ 1.46), planning (mean 5.5 $\pm$ 1.56), active coping (5.4 $\pm$ 1.70), self-distraction (mean 5.3 $\pm$ 1.37), emotional support (mean 5.3 $\pm$ 1.86), religion (mean 5.2 $\pm$1.99) and positive reframing (mean 5.1 $\pm$ 1.47) (Table 5). However, "substance use" was less used by the students. Amongst these, significant levels of utility were attained by "self-blaming", "acceptance", "venting", "denial" and "planning". Perceived stress was significantly more likely to engender the use of "self-blaming" and "acceptance" as coping strategies.

Table 1. Profile of Study Participants

Variable	Second Year M.B.B.S. Students		
	Males	**Females**	**Total**
N (%)	51 (34.69)	96 (65.31)	147 (100)
Mean Age	19.65	19.344	19.449
S.D.	1.115	1.2651	1.2258
Mean PSS score	23.29*	29*	27
S.D.	5.03	6.24	6.41

(Age and PSS Score)
*t= 5.632; d.f.= 145; p <0.0001; Highly significant

Table 2. Students' responses to Perceived Stress Scale -14 statement

S.No.	Statement	Never 0	Almost never 1	Sometimes 2	Often 3	Very often 4
1	In the last month, how often have you been upset because of something that happened unexpectedly?	30 (20.4)	12 (8.16)	72 (48.98)	24 (16.33)	9 (6.12)
2	In the last month, how often have you felt that you were unable to control the important things in your life?	27 (18.37)	27 (18.37)	54 (36.73)	15 (10.20)	24 (16.33)
3	In the last month, how often have you felt nervous and "stressed"?	15 (10.20)	33 (22.45)	60 (40.82)	15 (10.20)	24 (16.33)
4	In the last month, how often have you dealt successfully with day to day problems and annoyances?	15 (10.20)	18 (12.24)	60 (40.82)	48 (32.65)	6 (4.08)
5	In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?	15 (10.20)	21 (14.28)	75 (51.02)	21 (14.28)	15 (10.20)
6	In the last month, how often have you felt confident about your ability to handle your personal problems?	3 (2.04)	27 (18.37)	51 (34.69)	54 (36.73)	12 (8.16)
7	In the last month, how often have you felt that things were going your way?	9 (6.12)	30 (20.4)	54 (36.73)	51 (34.69)	3 (2.04)
8	In the last month, how often have you found that you could not cope with all the things that you had to do?	6 (4.08)	33 (22.45)	81 (55.10)	21 (14.28)	6 (4.08)
9	In the last month, how often have you been able to control irritations in your life?	6 (4.08)	9 (6.12)	75 (51.02)	39 (26.53)	18 (12.24)
10	In the last month, how often have you felt that you were on top of things?	24 (16.33)	52 (35.37)	60 (40.82)	15 (10.20)	6 (4.08)
11	In the last month, how often have you been angered because of things that happened and were outside of your control?	9 (6.12)	27 (18.37)	57 (38.78)	33 (22.45)	21 (14.28)
12	In the last month, how often have you found yourself thinking about things that you have to accomplish?	3 (2.04)	6 (4.08)	66 (44.90)	52 (35.37)	30 (20.4)
13	In the last month, how often have you been able to control the way you spend your time?	9 (6.12)	18 (12.24)	81 (55.10)	33 (22.45)	6 (4.08)
14	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	27 (18.37)	51 (34.69)	51 (34.69)	12 (8.16)	6 (4.08)

Figure in each cell depicts number of responses and their percentage for each question in PSS

Table 3 Response pattern of the 33 sources of stress and perceived severity (rated in a likert scale of 1-10) as reported by the students

Sources of Stress	Frequency of occurrence (%)			Severity	
	Never/Rarely	**Sometimes**	**Often/Always**	**Median score**	**IQR (Interquartile range)**
Academic stressors					
Frequency of Examinations	18 (12.24)	93 (63.26)	**36 (24.49)**	6	3---8
Performance in Examinations	15 (10.20)	84 (57.14)	**48 (32.65)**	6	4---7
Vastness of Academic Curriculum	48 (32.65)	69 (46.94)	30 (20.40)	5	3—8
Dissatisfaction with Class Lectures	57 (38.77)	87 (59.18)	3 (2.04)	5	2—6
Non-Availability of Adequate learning materials	78 (53.06)	54 (36.73)	15 (10.20)	4	2---6
Becoming a Doctor (expectations on all fronts)	57 (38.77)	36 (24.49)	**54 (36.73)**	5	4—7
Lack of time for recreation	39 (26.53)	81 (55.10)	27 (18.37)	5	3---7
Competition with Peers	51 (34.69)	57 (38.77)	**39 (26.53)**	5	3—8
Performance in practicals/clinical rotations	42 (28.57)	72 (48.98)	**33 (22.45)**	3	1---5
Lack of special guidance from faculty	66 (44.90)	63 (42.86)	18 (12.24)	4	2---6
English language as the medium of teaching curriculum	135 (91.84)	6 (4.08)	6 (4.08)	2	1---4
Unjustified grading process	72 (48.98)	63 (42.86)	12 (8.16)	3	1—5
Lack of time to review what have been learnt	24 (16.33)	75 (51.02)	**48 (32.65)**	5	3---8
Psychosocial stressors					
High Parental Expectations	39 (26.53)	66 (44.90)	**42 (28.57)**	7	3---10
Feeling of Loneliness	51 (34.69)	72 (48.98)	24 (16.33)	4	2—6

Family Problems (Health related, lack of bonding etc)	96 (65.30)	36 (24.49)	15 (10.20)	2	1—4
Accommodation away from home	69 (46.94)	66 (44.90)	12 (8.16)	4	1—8
Political situation in the country	99 (67.35)	36 (24.49)	12 (8.16)	4	1—6
Relations with the Opposite Sex	96 (65.30)	48 (32.65)	3 (2.04)	3	1—7
Difficulty reading text books	72 (48.98)	75 (51.02)	0 (0)	3	1---5
Lack of entertainment in the institution	45 (30.61)	33 (22.45)	**69 (46.94)**	3	3---8
Difficulty in the journey back home	78 (53.06)	48 (32.65)	21 (14.28)	3	1---7
Financial strain (financial instability in the family)	84 (57.14)	63 (42.86)	0 (0)	3	1---8
Inability to socialize with peers	72 (48.98)	69 (46.94)	6 (4.08)	3	1---5
Living conditions in the hostel	33 (22.45)	66 (44.90)	**48 (32.65)**	5	4---7
Member of fraternity or sorority	96 (65.30)	48 (32.65)	3 (2.04)	1	1---2
Lack of personal interest in medicine	111 (75.51)	30 (20.40)	6 (4.08)	4	2---6
Adjustment with roommate/s	87 (59.18)	36 (24.49)	24 (16.33)	1	1---5
Language as barrier for communication	99 (67.35)	27 (18.37)	21 (14.28)	3	1---5
Feeling of incompetence	87 (59.18)	57 (38.77)	3 (2.04)	1	1—2
Need to do well (self-expectation)	9 (6.12)	66 (44.90)	**72 (48.98)**	2	4—8
Health-related stressors					
Quality of food in mess	18 (12.24)	60 (40.82)	**69 (46.94)**	8	4---10
Sleeping Difficulties	84 (57.14)	45 (30.61)	18 (12.24)	3	1---5
Class Attendance	72 (48.98)	66 (44.90)	9 (6.12)	2	1---5
Nutrition	66 (44.90)	48 (32.65)	**33 (22.45)**	4	2---7
Exercise	63 (42.86)	60 (40.82)	24 (16.33)	4	1---7
Physical disability/ limitation	114 (77.55)	30 (20.40)	3 (2.04)	1	1---4
Alcohol/Drug abuse/Smoking	144 (97.96)	3 (2.04)	0 (0)	1	1---1
Illness' affecting performances in class and examinations	72 (48.98)	60 (40.82)	15 (10.20)	3	2---5

Table 4. Determinants of stressed-cases by logistic regression

Determinants	Number	Number of stressed cases (%)	Adjusted OR (95%CI)
Age (in completed years)			
<21yrs	126	81 (64.28)	1
>21yrs.	21	12 (57.14)	1.37 (0.53- 3.49)
Gender			
Male	51	21 (41.18)	1
Female	96	72 (75)	4.29 (2.07-8.84)
Occurrence of Academic stresssors			
Less than often	96	33 (34.37)	1
Often/Always	51	39 (76.47)	6.20 (2.87- 13.43)
Occurrence of Psychosocial stressors			
Less than often	69	33 (47.83)	1
Often/Always	78	39 (50)	1.09 (0.57- 2.08)
Occurrence of Health stressors			
Less than often	123	54 (43.90)	1
Often/Always	24	18 (75)	3.83 (1.42- 10.32)

Table 5 Coping strategies adopted by students during events of stress

Coping Mechanism	Over all	Stressed (N=72)	Non-stressed (N=75)	Friedman ANOVA (df)	P value
	Mean (SD)	Mean (SD)	Mean (SD)		
Positive reframing	5.1 (1.63)	5.1 (1.47)	5.1 (1.8)	0.00 (2)	1.00
Planning	5.1 (1.70)	5.5 (1.56)	4.7 (1.77)	4.08 (2)	**0.02**
Acceptance	5.2 (1.54)	5.7 (1.46)	4.7 (1.49)	7.96 (2)	**0.0004**
Active coping	5.3 (1.57)	5.4 (1.70)	5.2 (1.46)	0.29 (2)	0.74
Self distraction	5.4 (1.4)	5.3 (1.37)	5.4 (1.44)	0.13 (2)	0.87
Substance use	2.1(0.32)	2.1(0.41)	2.0 (0.2)	2.72 (2)	0.07
Emotional support	5.1 (1.71)	5.3 (1.86)	4.8 (1.55)	1.58 (2)	0.20
Instrumental support	4.9 (1.42)	4.9 (1.53)	5.0 (1.34)	0.13 (2)	0.87
Religion	4.8 (1.9)	5.2 (1.99)	4.5 (1.78)	2.49 (2)	0.08
Venting	4.2 (1.57)	4.7 (1.71)	3.8 (1.3)	6.18 (2)	**0.002**
Self blaming	4.1 (1.81)	4.8(2.10)	3.6 (1.19)	8.55 (2)	**0.0002**
Use of humor	3.2 (1.45)	3.0 (1.3)	3.4 (1.58)	1.38 (2)	0.25
Denial	3.5 (1.44)	3.9 (1.62)	3.12 (1.17)	5.42 (2)	**0.005**
Behavioral disengagement	3.7 (1.36)	3.9 (1.33)	3..56 (1.39)	1.14 (2)	0.31

Discussion

Medical students in our study reported a higher prevalence of perceived stress i.e. 48.98%. Previous studies from medical schools in different countries have reported varying levels of stress[31]. A survey conducted by Spanish using Thai stress test had reported stress in 61.4% of Thai medical students[12] while the one done in Mumbai (India) reported perceived stress in 73% of medical students[6]. Other two studies from Pakistan found stress in more than 90% medical students[24,31]. A study done in Manglore (India) [35] using PSS questionnaire had reported stress prevalence of 42.5% among medical undergraduates. This correlates with the stress prevalence seen in our study. 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[36-38]. 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[36]. An important limitation of other reviewed stress scales for health professionals is that they focus only on academic stressors, and lack inclusion of personal or psychological issues and thus having poor applicability to broader settings.

Mean PSS score in the study population was 27.00 ± 6.41. In a study done in a medical school in India, mean PSS score reported was 27.53 ± 7.01[38] while the one done in Pakistan reported mean PSS score as 30.84 ± 7.01[31]. A study done by Mane Abhay using PSS in different disciplines like medical, dental, nursing, pharmacy, physiotherapy and engineering had reported mean PSS score of 27.0 ± 7.2 among medical students (n=79) and overall mean PSS score of study population as 26.6 ± 6.5[39].

In our study, sample proportion (65.31%) of female students was higher than the males (34.69%). Mean PSS score for female students were 29.00 ± 6.24 while the same for male students were 23.29 ± 5.03. The difference between the mean PSS scores for females and males was statistically highly significant (Independent samples''t' test: 5.6321, p-value < 0.0001). In two separate studies done in Pakistan, mean PSS scores of the female students were found to be significantly higher than of the male students[31]. Similar study done in Mangalore, India had also reported significantly higher mean PSS scores of female students[35]. Study by Mane Abhay found slightly lower mean PSS score (26.2 ± 6.7) of male students as compared to female students (26.9 ± 6.3) but this difference was not statistically significant[39]. However, Cohen in his studies had reported that there was no significant difference in stress using PSS between male and female students[37]. We lacked sufficient information, which could assist us in carrying out further analysis about this.

Academic, psychosocial and health- related stressors were assessed in the study. Among the stressed cases, academic and health-related stressors occurred more frequently and were found to be their determinants by logistic regression analysis. This suggested to having a global response to a wide range of potential stressors, rather than to a few specific items. Quality of food in mess, self-expectation, performance in examinations, becoming a doctor, living conditions in hostel, high parental expectations, frequency of examinations, lack of entertainment in the institution, lack of time to review what has been learnt, vastness of academic curriculum and competition with peers were rated as most severe stressors.

Amongst the academic stressors, becoming a doctor, performance in examinations, lack of time to review what has been learnt, competition with peers and frequency of examinations were the chief sources of stress. 32.6% students had reported performance in examination as a stressor.

Previous studies have also reported academics/exams as common sources of stress among medical students[33]. Even though 'exams' are the major sources of stress, they are necessary in medical training as a tool for evaluation/assessment and to encourage student learning. In majority of medical colleges in India, present evaluation system uses subjective questions and results are declared either 'pass' or 'fail'. This system of evaluation may not measure what a student knows. Factors like self-expectation and expectation from their significant 'others' may influence students' perception of their marks. Hence the contents, teaching and learning methods, and the evaluation process, needs to be analyzed and improved. The teaching-learning schedule of medical students should be modified to encourage more student participation.

Earlier studies have reported that psychosocial factors are important sources of stress for medical students[6,12]. In our study, self-expectation was the most frequent occurring psychological stressor followed by lack of entertainment in the institution, living conditions in hostel and high parental expectations. All our students were residing in the campus hostel. 46.94% students reported lack of entertainment in the institution as a stressor. In separate studies done in Nepal and Mangalore, 41% and 32.5% students respectively had reported lack of entertainment in the institution as an often/always source of stress[33,38]. There may be a need to provide more 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.

High parental expectations and societal glamour attached to having medical graduates in one's household could exert undue pressures on the students with possible negative psychological consequences explaining why 'expectation of becoming a doctor' and 'self-expectation' was also perceived as stressful. A study carried out in Nepal had reported high parental expectations as second most common source of stress. There should be functional parent and student counseling cell where both should be counseled to avoid their over expectations.

On assessing health related stressors, quality of food in mess emerged out as an important stressor, reported by 46.94% of students. Two separate studies done in medical school in Kathmandu, Nepal and Mangalore, India found that around 60.4% students report quality of food in mess as an often/always source of stress[33]. Emphasis need to be laid on improving quality of food available in medical schools' hostels.

Coping styles

Coping strategies refer to the specific efforts, behavioral and psychological, employed to master, tolerate or minimize stressful events. 'Active coping' means exerting efforts to remove or circumvent the stressor, 'acceptance' means accepting the reality that the stressful event had occurred while 'planning' consists of thinking about how to confront the stressor. 'Positive reframing' means making the best of the situation by growing from it or seeing it in a more positive light, 'denial' is an attempt to reject the reality of the stressful event while 'behavioral disengagement' means giving up or withdrawing efforts from the attempt to attain the goal which the stressor is interfering[32]. In our study, planning, acceptance, active coping, emotional support, self-distraction, positive reframing and religion were more frequently used coping strategies by stressed cases rather than substance use and behavioral disengagement. Studies from United Kingdom have reported substance use as a common coping strategy among medical students[33]. It is encouraging to note that in our study substance use was least common used. However, we could not rule out under reporting of such behavior by students in our study in spite of assurance of maintaining anonymity and confidentiality of their responses.

The mental health status of students was assessed over a period of only few weeks in mid-year avoiding stressful time of terminal and university examinations. Therefore, the stress status measured may represent the natural level of stress

among students. A study from US medical school reported that an elective in 'Mind-Body Medicine may decrease anxiety scores among preclinical medical students[40]. Another study from US has recommended teaching of stress management and self-care skills to medical students[41]. Students should be encouraged to participate in sports and extracurricular activities and enrich their hobbies, which can reduce stress. There is a need to look at the applicability and feasibility of such measures in our medical school setting.

Limitations

Lack of generalization of our results to other medical schools in India is an important limitation of this study. Since the information was collected on self-administered questionnaires, respondent's interpretation of the questions, inaccuracies of responses or their desire to report their emotions in a certain way 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 associations between occurrence of stressors, incidence of stress and coping strategies.

Conclusion

High levels of perceived stress existed in second year undergraduate medical students. This was significant among female students. Most frequently and severely occurring stressors were related to academic and health domains. The association of stressed cases with gender and academic and health-related stressors needs to be further tested by prospective studies. There is need to address these stressors by peer education and counseling. Coping strategies commonly used were planning, acceptance, active coping and positive reframing. No new coping strategies were discovered. 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 medical curricula and evaluation system to enhance students' learning abilities. Living conditions of students and their recreational facilities should also be improved.

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