ORIGINAL RESEARCH ARTICLE

Determinants of Stress and Coping Mechanisms Adopted among Medical Undergraduate Students in Coastal Karnataka, India: A Cross-Sectional Study

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ABSTRACT

Background: The progressively worsening performance of students in classroom, the health problems induced due to stress, below average academic accomplishments of students in classroom and in hospital postings is directly attributable to the tremendous stress, medical students undergo during their course to become future doctors of the country. We conducted this research survey to find out the magnitude of stress as perceived by medical undergraduate students and to measure the association of such stress with various factors which may influence it.

Methodology: About 612 students studying in private medical colleges in Mangalore from first year to final year were interviewed after obtaining their informed consent. The data collection tool used for this study consisted of a pre-designed questionnaire which contained social and demographic variables of study participants and a perceived stress scale developed by Cohen et al.

Results: The immenseness of curriculum which was the academic stressor that was cited, financial and family issues were psychological stressors and accommodation which was the environmental stressor were some of the significant factors contributing towards perceived stress.

Conclusion: Only one of the coping strategies adopted by students was found to be significantly associated with perceived stress.

Key words: Stress, medical students, coastal Karnataka

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INTRODUCTION

Variety of reasons have been attributed to the enormous stress medical students experience during their course which is in one way an inevitable part of medical students' life. On a positive note, stress drives students to challenge their limitations, stimulate them to learn and be a better version of themselves, but if it becomes excess, intensive and long term, it may trigger feelings of fright, hopelessness, anger, incompetence and guilt which may hamper learning capacity, academic progress as well as cause delay in the day-to-day activity of the student. Several studies conducted in various parts of the world have emphasized the fact that medical undergraduate students experience tremendous levels of stress which bears potential negative effects.[1-8] The stress thus experienced has a direct bearing on the cognitive functioning of students and also their learning capacity.[9] Results of several studies have stressed upon the fact that if these issues are not addressed at a very early stage, it can compel students to resort to substance abuse, get into relationship problems, lead to high levels of anxiety, depression and even push them to suicidal attempts.[9-13] Competition among peers which is seen in academics due to an obligation to triumph, uncertainty of future and the difficulties faced in integrating into the medical system are some of the key factors why students are subjected to pressure.[14-17] The cognitive ability and performance in academics may also be hampered because of the physical, emotional, social and family problems encountered by students.[18,19] Competition between the learners rather than cooperation, a system which is authoritarian and rigid is what is prevailing in most of the medical colleges which itself makes the environment very stressful.[8] Results of several research studies have conclusively proved that the magnitude of stress among medical students outweigh that of general population.[20-22] This stress may also continue during the later part of the career of those students and even when they become practicing physicians which may also reach burnt out levels.[23-27]

Students also utilize various coping mechanisms to relieve stress in medical colleges. The influence that stress has on physical and psychological wellbeing is determined by these coping mechanisms.[28] As a matter of fact, mental illness like anxiety and depression, if identified early are very much amenable to prevention, provided we identify stress levels in medical students at the very onset and also the factors associated with increasing amounts of stress. There is very meagre data on magnitude of psychology related morbidities among students studying in medical colleges of coastal Karnataka. The study focuses on medical undergraduate students in Coastal Karnataka, India. The study findings can have practical implications for policymakers, educational institutions, and healthcare providers. By identifying the determinants of stress and coping mechanisms, the study can provide evidence-based recommendations for improving the well-being and mental health support systems for medical students. Although there may be existing studies on stress and coping mechanisms among medical students, conducting this study in a specific geographical location can provide insights that may not be generalizable to other settings. By examining the determinants of stress and coping mechanisms in Coastal Karnataka, the study can contribute to a more comprehensive understanding of the factors influencing medical students' mental health in this specific region, thereby complementing and expanding upon the existing body of research

Therefore, the current study was planned to determining the magnitude of stress as perceived by students themselves and also to find out various determinants of stress along with the defence mechanisms adopted by students to combat stress.

METHODOLOGY

The present study was a cross-sectional study conducted among medical undergraduate students of private medical colleges of Mangalore city in Coastal Karnataka, India. A total of six hundred and twelve students studying Bachelor of Medicine and Bachelor of Surgery (MBBS) in all the four years of the course were included to be a part of the study. In this research study, 843 potential participants were approached with informed consent forms, which provided them with comprehensive information about the study's purpose, procedures, and the voluntary nature of participation. Out of these potential participants, 612 students provided their consent and willingly completed the Perceived Stress Scale (PSS) questionnaire, which evaluated their perceived stress levels.

Throughout the informed consent process, participants were presented with a clear and straightforward overview of the study. They were fully informed about the study's objectives, the procedures involved in data collection, and the stringent measures in place to safeguard their privacy and confidentiality. It was emphasized to all participants that they had the absolute freedom to decline participation without facing any negative consequences. Their decision to participate or not had no bearing on their academic standing or relationship with the institution.

To ensure the utmost confidentiality and anonymity, no identifying variables such as names or roll numbers were recorded during the data collection process.-A pre-tested semi structured questionnaire was used to collect data which comprised of social and demographic characteristics of subjects who participated in the study and a perceived stress scale that was developed by Cohen et al[29]. The perceived stress scale captures data on the fact that, to what extent the subjects consider their lives as uncertain, situations as out of their control and overwhelmingly dif-

ficult to handle. It takes into account the participants' stressful thoughts and feelings which are related to their life in the past one month, through a fourteen-item questionnaire.

The 14-point Perceived Stress Scale (PSS-14) is a self-report questionnaire designed to assess an individual's perception of stress in their life over the past month. Each item consists of a question with options which are rated from zero: "never" to four: "very often" on a five-point scale. Some questions were positively stated, and the scoring was reversed for these particular questions. Specifically, question numbers 4, 5, 6, 7, 9, 10, and 13 were subjected to this reversed scoring method. To diagnose stress using the PSS-14, the scores obtained from the questionnaire are analyzed. The total score on the scale can range from 0 to 56, with higher scores indicating higher perceived stress levels.[29]

Following guidelines were used to classify individuals as low stress with scores below 19, moderate stress between 20 and 37 while high levels of stress were indicated with scores of 38 and above. One of the notable qualities of this stress score is that it has good psychometric properties[30] and it has a high validity, due to which it becomes a very good tool to be used in any subjects. Moreover, the general nature of the tool, which makes it quite free of any specific content, are some of the characteristics which makes this scale usable in any population and event. In the present study we had also measured various sources of stress namely the academic stressors, psychological stressors and environmental stressors. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 16. Descriptive statistics were used to depict characteristics like socio-demographic factors, perceived stress and sources of stress.

Ethical clearance: Ethical clearance for the study was obtained from Institutional Ethics Committee of Srinivas Institute of Medical Sciences, Mangalore vide letter no. 2019/12/10/2 and Institutional Ethics committee of Kanachur Institute of Medical Sciences, Mangalore vide letter no. KIMS/IEC/A003/2022

RESULTS

The table presents the distribution of participants' characteristics in terms of age, gender, residence, and semester. Majority of participants were in the age range of 19 to 23 years, 337 were female participants (55.07%). In terms of residence, 374 participants (61.11%) were day scholars. Regarding the semester, the participants were distributed across various academic levels, with the similar representations in semester 6 (23.53%), semester 8 (23.04%) and Semester 2 (24.51%), while the remaining semesters had relatively smaller proportions. These descriptive statistics provide an overview of the demographic characteristics of the study sample, which can help in understanding the composition and representation of the participants in the study. (Table 1)

Table 1: Socio-demographic characteristics of the study participants (N=612)

Parameter	Participants (%)
Age in years	
19	84 (13.73)
20	207 (33.82)
21	168 (27.45)
22	87 (14.22)
23	66 (10.78)
Gender	
Male	275 (44.93)
Female	337 (55.07)
Residence	
Hostel	238 (38.89)
Day Scholar	374 (61.11)
Semester	
2	150 (24.51)
3	12 (1.96)
4	138 (22.55)
5	9 (1.47)
6	144 (23.53)
7	18 (2.94)
8	141 (23.04)

Table 2: Determinants of Stress among the study participants (Multiple responses)

Stressors	Participants(%)
Academic stressors	
Vastness of academic curriculum	309 (50.49)
Frequency of examination	253 (41.34)
Competition with peer group	200 (32.68)
Fear of failure or poor performance in examination	167 (27.29)
Lack of recreation	131 (21.41)
Others	98 (16.01)
Psychological stressors	
High parental expectations	200 (32.68)
Loneliness	111 (18.14)
Family problem	122 (19.93)
Financial problem	134 (21.9)
Relation with opposite sex	186 (30.39)
Others	98 (16.01)
Environmental stressors	
Travelling between college & home	231 (37.75)
Accommodation away from home	340 (55.56)
Quality of food in mess	274 (44.77)
Living conditions in hostel	297 (48.53)
Adjusting with roommates	416 (67.97)
Others	173 (28.27)

Note: The numbers/percentages might not add up to total/100 due to multiple responses.

Among the medical undergraduate students, the most prevalent stressors were identified. A significant number of students, 309 in total (50.49%), reported feeling overwhelmed by the vastness of the academic curriculum. Additionally, high parental expectations were a stressor for 200 students (32.68%), reflecting the pressure to meet these expectations. The challenges of adjusting to accommodation away from home were reported by 340 students (55.56%), while 297 students (48.53%) highlighted stressors related to living conditions in the hostel. (Table 2)

Table 3: Association of socio-demographic characteristics with perceived stress

Socio-demographic characteristics	High/Moderate Stress	Low Stress	Odds Ratio (95% CI)	P Value
Age (in years)				
19	81	3	3.56 (3.09 - 4.12)	**<.001**
20	195	12	1.30 (4.39 - 3.89)	**<.001**
21	16	8	2.64 (9.52 - 7.33)	**<.001**
22	85	2	2.88 (1.17 - 7.06)	**<.001**
23 (Ref)	64	2	.	.
Gender				
Female	336	1	1.14 (7.56 - 1.74)	**<.001**
Male (Ref)	250	25	.	.
Semester				
2	147	3	7.35 (2.21 - 2.44)	.061
3	11	1	3.50 (0.06 - 19.91)	.540
4	126	12	1.05 (0.04 - 27.100	.974
5	8	1	.37 (0.005 - 27.23)	.652
6	138	6	1.77 (0.06 - 5.00)	.736
7	16	2	2.09 (4.04 - 1.08)	.055
8(Ref)	139	2	.	.
Residence				
Hosteller	237	1	11.44 (1.44 - 90.53)	**.021**
Day Scholar (Ref)	350	24	.	

Note: p value of <0.05 considered to be significant; CI – Confidence Interval

Table 4: Association of various stressors with perceived stress (N=612)

Type of stressors	High/ Moderate Stress	Low Stress	Odds Ratio (95% CI)	P value
Academic				
Immenseness of curriculum	**22**	**405**	**1.03 (0.69 - 1.91)**	**.047**
Frequency of Exam	5	188	1.12 (0.71 - 1.79)	.626
Peer competition	**6**	**95**	**2.19 (1.29 - 3.72)**	**.004**
Fright of failing in exams	14	315	1.54 (0.96 - 2.48)	.074
Lack of Recreation	4	123	1.05 (0.60 - 1.82)	.865
Psychological				
High Parental expectation	11	224	1.15 (0.73 - 1.83)	.546
Loneliness	7	170	1.36 (0.86 - 2.14)	.183
Family problem	**1**	**68**	**2.20 (1.18 - 4.11**)	**.014**
Financial problem	**4**	**85**	**0.39 (0.18 - 0.82**)	**.013**
Relation with Opposite gender	1	22	1.11 (0.38 - 3.27)	.849
Staying far from home	24	130	0.01 (2.61 - 2.77)	.106
Guilty of not studying in the past	**6**	**82**	**0.01 (0.00 - 0.39**)	**.012**
Environmental				
Travelling	13	196	1.13 (0.69 - 1.84)	.613
Accommodation	**15**	**200**	**1.28 (0.81 - 2.01**)	**.003**
Quality of food	4	184	0.88 (0.51 - 1.50)	.635
Living conditions	2	113	0.74 (0.39 - 1.42)	.366
Adjusting with roommates	**4**	**72**	**1.46 (0.77 - 2.80**)	**.049**
Fear of getting caught up with a senior who always finds way to ask or do nonsense things	1	26	11.51 (0.14 - 967.4)	.280

Note: p value of <0.05 considered to be significant; CI – Confidence Interval

Among the coping mechanisms sleep was the most commonly utilized strategy, with 50.98% of students relying on it. Music/dance and talking with friends/family are also popular coping mechanisms, reported by 41.50% and 30.39% of students, respectively. Other strategies include watching movies (16.01%), being alone for self-evaluation (20.42%), eating (38.56%), engaging in social media (34.97%), and resorting to substance abuse (19.44%). These results provide valuable insights into the diverse ways medical undergraduate students cope with stress and can guide the development of targeted interventions to promote healthier stress management techniques.

Overall total PSS scores ranged from 14 till 47. Mean score was 30.32 with standard deviation of 4.410. The median score was 30.00, suggesting that half of the participants scored below 30 and half scored above 30. The most frequently occurring score was 29, indicating that 29 was the most common PSS total score in the sample.

Firstly, age demonstrated a strong association with the stress, with odds ratios ranging from 1.30 to 3.56 for individuals aged 20 to 19, respectively. Gender appeared to be significant, as well, with females having an odds ratio of 1.14 compared to males. Finally, residence type also showed a significant association,

with hostellers having an odds ratio of 11.44 compared to day scholars. Nonetheless, the presented findings highlight key associations between sociodemographic variables and stress.

The table presents significant results of various stressors on individuals. Among the academic stressors, the immenseness of the curriculum showed a significant association with stress levels (OR = 1.031, p = 0.047), while the frequency of exams did not. Peer competition exhibited a significant positive association with stress levels (OR = 2.189, p = 0.004). Family problems and financial problems also showed significant associations with stress levels, with odds ratios of 2.200 (p = 0.014) and 0.389 (p = 0.013), respectively. Accommodation displayed a significant positive association with stress levels (OR = 1.280, p = 0.003), while adjusting with roommates exhibited a potential positive association (OR = 1.464, p = 0.049). Other stressors did not yield significant results. [Table 4]

Table 5: Multivariate logistic regression analysis of association of coping mechanisms with perceived stress (N=612)*

Variables	Odds Ratio (95% CI)	P value
Sleep	1.24 (0.52 - 2.95)	.628
Music/dance	1.44 (0.62 - 3.35)	.400
Talking friends' family	0.85 (0.37 - 1.98)	.715
Watching movies	1.21 (0.49 - 2.99)	.676
Being alone	0.85 (0.34 - 2.11)	.722
Eating	**2.69 (1.12 - 6.44)**	**.027**
Social media	0.51 (0.20 - 1.30)	.159
Substance abuse	1.68 (0.00 - 3.12)	.983

Note: p value of <0.05 considered to be significant.
*Multivariate logistic regression full effects model.
CI – Confidence Interval

Among the compensatory mechanisms, only one showed a significant finding. Eating was found to have a significant association, with an odds ratio of 2.686 and a p-value of .027. This suggests that engaging in eating activities had a notable impact on the stress. On the other hand, the remaining mechanisms including sleep, music/dance, talking to friends and family, watching movies, being alone, social media use, and substance abuse, did not yield statistically significant results.

DISCUSSION

In the present study association was found between age, gender, semester, residence and perceived stress. Higher stress was demonstrated among females as compared to males. Similar results were found in a study conducted in another private medical college in the same area as reported that females had higher stress than males.[31] Stress levels among females were reported to be higher in another study done in a medical college in Pakistan.[32] The reason for this difference could be attributed to the fact that females convey feelings of depression, however minute they may be, with more ease than males.

The stress levels as perceived by students in the current study did not showcase any association that was significantly different between students studying in various semesters of MBBS. Results of research studies done by Anuradha R et al[14] and Satheesh BC[33] et al in two different private medical colleges in Tamil Nadu found that final MBBS students were significantly more stressed than their younger counterparts. The reason for this difference may be due to the difference in geography of the area, and the environment prevalent in those particular colleges, and also the regional, social, cultural factors which contribute to make obvious differences.

Results of the current research conducted by us depicted that on univariate analysis the academic stressors, competition among peers, immenseness of curriculum, fright of failure in exams, psychological stressors like feeling of isolation, personal and family problems, inability to cope up with parental expectations, environmental stressors like accommodation, adjusting with roommates, travelling between college and home were some of the factors that were associated significantly with perceived stress. However, on analysis using multivariate logistic regression, certain stressors emerged as significant correlates of perceived stress. Specifically, academic stressors such as the demanding curriculum and intense peer competition, psychological stressors such as financial and family problems, including the burden of past study neglect, as well as environmental stressors like accommodation challenges and difficulties in adjusting with roommates, were identified as significant factors associated with perceived stress levels. Findings of the research conducted at Tamil Nadu reported similar results wherein the immenseness of academic curriculum, fright of failing or poor performance in the examination, and lack of recreation were some of the factors which had significant association with stress as perceived by students.[14] Studies done elsewhere also have shown that academic curriculum, frequency of examinations, performance in examinations, competition with peers were common sources of stress among medical students.[32-36] Studies conducted in Mangalore and Nepal portrayed lack of time for recreation as one of the important sources of stress found among medical students.[31,37] The quality of food in mess, emerged out as an important stressor among students in a medical school in Kathmandu.[37] According to another research conducted among medical students, it has been identified that the year of study, monthly income, khat chewing, cigarette smoking, and alcohol intake are risk factors associated with stress.[38]

One of the coping strategies i.e., eating which was adopted by students was found to be significantly associated with stress in our study. A study conducted in Mysore reported that the leading coping strategy found in the study was sleep followed by mu-

sic/dancing and sharing with friends revealing that students were resorting to healthier coping mechanisms with only very few resorting to internet use and engaging in substance abuse[1]. Alcohol abuse has been evidenced in research report of studies done in other parts of the world as well, as one of the significant copings mechanism.[38]

Conclusion

In conclusion, this study shed light on the determinants of stress and coping mechanisms among medical undergraduate students in Coastal Karnataka, India. The findings revealed various factors that contribute to stress, including Immenseness of curriculum, family problems and accommodation, vast curriculum, peer competition, financial and family problems, issues in adjustments with the roommates and accommodation associated with perceived stress. Eating was the only coping mechanism that was found to be significantly associated with the perceived stress.

It is important to take into consideration the quality of life of students during their professional medical course. Counselling cells should be established in every medical college. More time has to be devoted for recreation and sports, to ease stressful life of students. Teaching yoga, meditation, stress management techniques and life-skills focussing on emotional quotient to medical students is the need of hour.

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Data Availability

If any researchers wish to have the data of the present study, it will be provided on appropriate requests to the corresponding author.

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