ORIGINAL ARTICLE

Stress among Medical Undergraduates after the Introduction of CBME Curriculum by NMC of a Medical College in Assam: A Cross-sectional Study

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Abstract

Background: Stress is an inevitable phenomenon. Medical college environment is a stressful environment due to its exhaustive academic and extracurricular activities. A competency-based medical education (CBME) curriculum was introduced in 2019.

Aim: This online study was undertaken at Tezpur Medical College to explore stress among medical students from the CBME curriculum.

Materials and methods: The Medical Student Stressor Questionnaire (MSSQ) tool was applied and divided into six domains.

Results: A total of 400 students responded to the online study. Out of these, 185 were female and 215 were male. The students comprised a heterogeneous group from different batches ranging from 1st to 7th semesters with the 7th semester comprising the highest (29.5%) and the 1st semester as the lowest (19%). Academic-related stressors (ARS) have been associated with the highest stress (2.19 ± 0.85) and drive and desire-related stressor have the lowest stress (1.33 ± 0.94). The mean scores for males were lower than for females and were statistically significant. Both the overall score and ARS domain scores differ across semesters significantly. Comparable findings have been revealed in this study with studies from pre-CBME curriculum era.

Conclusion: Stress management strategies and the provision of a congenial environment in the medical college may help to reduce stress.

Keywords: Competency-based medical education, Medical student stressor questionnaire, National medical commission, Stress, Undergraduate medical students.

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Introduction

Stress is defined as "physical, mental or emotional strain or tension".[1] According to the World Health Organization (WHO), stress is "a state of worry or mental tension caused by a difficult situation".[2]

According to Hans Selye, a pioneer in the field of stress and its conceptualization, "stress is a non-specific response of the body to any demand made upon it".[3] There has been a paradigm shift in the conceptualization of stress. Adolf Meyer systematically studied stressful life events and their effects on our health. Holmes and Rahe had conceptualized stress from a health-stress and coping perspective in which stress may be considered positive or negative based on cognitive and emotional factors.[4] The most accepted transactional theory conceptualizes the occurrence of stress based on adequate vs inadequate coping strategies.[5] Stress represents an unavoidable and normal phenomenon.

Stress in the educational environment has gained more and more attention, as addressing the needs of the students in an educational system is of utmost importance. Further, high levels of stress reduce the motivation of a student and act as a barrier to academic achievement. Medical College environment is a stressful environment due to its exhaustive academic and extracurricular activities. In addition, other external factors like relationship and family life, and financial issues may act as substantial stressors. Also, this is a transition period for every medico from a conventional studentship to the role of a healthcare professional. Previous studies have revealed medical students experience higher stress compared to their peers.[6] The highly competitive nature of post-graduation and super specialization entrance examinations and the initiation of preparation for these exams as early as the first year of MBBS is another factor that has been often cited as a stressor among undergraduates. An optimal level of stress is expected in such an environment for satisfactory performance. However, when it becomes too high, it has negative consequences in all spheres including academics, social and personal life. Severe stress has significant negative consequences in the form of reduced attention span, decision-making capacity, judgment, and various mental health issues such as anxiety, self-harming behavior, depression, adjustment disorders, etc. This may result in higher dropout rates in medical colleges. The prevalence of stress among medical trainee's ranges from 20 to 90%.[7–9] According to a right-to-information response from the National Medical Commission (NMC) released in

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2022, 119 medical students died by suicide and 1166 dropped out of medical college in the last 5 years.[10] Assessment of stress and the factors associated with it will aid in the formulation and appropriate tailoring of preventive approaches for such inadvertent instances. Competency-based medical education (CBME) was introduced by the Medical Council of India in the undergraduate curriculum in 2019.[11] Competency-based learning stresses skill-based learning for a rational medical practice. This approach aims at encouraging learners to actively engage in their learning and to develop learning strategies that will aid in their lifelong journey in the medical profession. Literature pertaining to the stress of medical students in the northeastern region and Assam, in particular, is sparse. The uniqueness of this study is that participants are from the first few batches of this new medical education curriculum.

Materials and Methods

This cross-sectional online study was conducted among undergraduate students of Tezpur Medical College. Institutional ethics committee approval was obtained. The participant's anonymity was ensured throughout the study process. Students were informed regarding the study through a notification and Google form links shared among the students. Further, it was requested not to share the link with others except MBBS students of Tezpur Medical College to ensure a proper sampling frame. The students were requested not to fill the form multiple times and the same was ensured enabling only a single response from the same email id in the form. The link was kept active from February to March 2023 for 1 month. Weekly reminders were sent through the WhatsApp chat group. The form contained consent for participation in the study, brief sociodemographic information, and questions from the primary tool the Medical Student Stressor Questionnaire (MSSQ). A validation study of the tool revealed it to have good psychometric properties.[12] Its Cronbach's alpha coefficient value is 0.95 which is higher than the usual cut-off point of 0.6.[13] Students willing to provide consent were included in the study. Medical Student Stressor Questionnaire is divided into six domains, academic-related stressors (ARS), intrapersonal and interpersonal-related stressors (IRS), teaching and learning-related stressors (TLRS), social-related stressors (SRS), DRS and group activities related stressors (GARS). It consists of 40 items distributed among six domains. Each question is rated on a Likert scale of 0 to 4 that denotes no, mild, moderate, high, and severe stress. The domain-wise score is interpreted as 0–1.00 having mild stress, 1.01–2.00 having moderate stress, 2.01–3.00 having high stress, and 3.01–4.00 having severe stress. As per the manual of the scale, mild stress does not impact the student significantly. Moderate stress reasonably causes stress but the student can manage it well. High stress causes emotional disturbance in the student and severe stress hampers day to day functioning of the student.[13] This study aims to assess stress among medical undergraduates in a medical college. Further, domain-wise scores and the item with the highest score for each domain would be assessed. Another objective of the study is to evaluate stress across different semesters in the MBBS curriculum. Data were collected in the form of an Excel sheet and statistical analysis was done using IBM Statistical Package for Social Sciences (SPSS) Statistics version 29.0.0.0 subscribed and obtained permission from IBM SPSS Statistics.

Results

A total of 400 students participated in the study. Gender-wise, 185 were female, while 215 were male. The mean age of the students was 22 years with a range of 18–27 years. The students comprised a heterogeneous group from different batches ranging from 1st to 7th semesters with the 7th semester comprising the highest (29.5%) and the 1st semester as the lowest (19%) number of students. The majority (92.5%) of the students stay in hostels followed by 7.2% in a rented house or as paying guests (Table 1).

Table 1: Sociodemographic variables

Variables	*Category*	*Frequency*	*Percentage*
	Mean ± Standard deviation		
Age	21.95 ± 0.85		
Gender	Male	215	53.8
	Female	185	46.3
Staying at	Hostel	370	92.5
	Home	1	0.3
	Rented house/Paying guest	29	7.2
Semester	First	76	19.0
	Third	109	27.3
	Fifth	97	24.3
	Seventh	118	29.5

Table 2: Frequencies of moderate, high, and severe stress

Domain	*Moderate stress*	*High stress*	*Severe stress*	*Total*
MSSQ scores	1.01–2.00	2.01–3.00	3.01–4.00	
Total score	170 (43.8)	124 (32.0)	26 (6.7)	320 (82.5)
ARS domain	132 (33.0)	164 (41.0)	70 (17.5)	366 (91.5)
IRS domain	140 (35.0)	108 (27.0)	28 (7.0)	276 (69.0)
TLRS domain	164 (41.0)	88 (22.0)	24 (6.0)	276 (69.0)
SRS domain	173 (44.6)	84 (21.6)	9 (2.3)	266 (68.5)
DRS domain	131 (32.8)	46 (11.5)	23 (5.8)	200 (50.1)
GARS domain	158 (39.5)	94 (23.5)	37 (9.3)	289 (72.3)

Overall, 82.5% of the students had revealed moderate to severe stress. Out of these, 43.8% had shown moderate stress followed by 32.0% having high stress, 17.5% having no to mild stress, and 6.7% having severe stress (Table 2).

The MSSQ has 6 subscales. Academic-related stressors have been associated with the highest stress (2.19 ± 0.85) and drive and desire-related stressor is associated with the lowest stress (1.33 ± 0.94). In ARS, the item a "large amount of content to be learned" was found to be the highest stressor (2.71 ± 0.99) among the students.

The mean scores of the MSSQ scale and its subscale scores for both genders were compared using an independent samples *t*-test (Table 3). There were significant differences [t (386) = –5.481, $p \leq 0.01$] with the mean score for males (1.58 ± 0.77) lower than for females (2.01 ± 0.77). The difference in the means (mean difference = –0.43, 95% CI, –0.58 to –0.28) was significant. Similarly, there were significant differences in the mean scores of all domains between both genders except drive related stressors which is not significant.

One-way ANOVA has been applied to test differences if any in the overall and ARS domain scores of MSSQ across the four semesters (Tables 4 and 5). The ANOVA results suggest that both an overall score and ARS domain scores differ across semesters significantly (For overall score $F_{3,384} = 12.49$, $p < 0.001$) (For ARS domain score $F_{3,396} = 13.16$, $p < 0.001$). Levene's statistic is not significant, therefore, an equal variance was assumed. *Post hoc*

Table 3: Domain-wise mean scores

Domain	*Total*	*Male*	*Female*	*p-value*
Academic related stressors (ARS)	2.19	2.01	2.40	<0.001*
Interpersonal and intrapersonal related stressors (IRS)	1.66	1.39	1.98	<0.001*
Teaching and learning related stressors (TLRS)	1.56	1.37	1.77	<0.001*
Social-related stressors (SRS)	1.51	1.34	1.71	<0.001*
Drive and desire related stressors (DRS)	1.33	1.24	1.43	0.06
Group activities related stressors (GARS)	1.78	1.61	1.99	<0.001*

*Significant at <0.05

Table 4: Semester wise mean score of MSSQ

				95% Confidence interval for mean	
Total mean score	*N*	*Mean*	*SD*	*Lower bound*	*Upper bound*
First semester	74	1.45	0.66	1.2954	1.5992
Third semester	103	1.80	0.82	1.6420	1.9634
Fifth semester	94	1.64	0.73	1.4858	1.7849
Seventh semester	117	2.10	0.80	1.9492	2.2423
Total	388	1.78	0.80	1.7031	1.8623

comparisons were assessed using Tukey HSD. The mean score of total MSSQ scores for the first semester (1.45 ± 0.66) was significantly different from the third (1.63 ± 0.73) and seventh semesters (2.10 ± 0.80). Further, the mean score of overall MSSQ scores for the third semester (1.63 ± 0.73) was significantly different from the seventh semester (2.10 ± 0.80). The mean score of overall MSSQ scores for the fifth semester (1.63 ± 0.73) were significantly different from the seventh semester (2.10 ± 0.80) (Fig. 1). However, there were no significant differences between the first and fifth; third, and fifth semesters.

Discussion

This study aimed to assess stress among undergraduate medical students. To the best of our knowledge, this is the first study describing stress among medical undergraduates from Assam after CBME curriculum implementation. Overall, this study demonstrated moderate to severe stress among 82.5% of the students. Globally, literature has revealed the prevalence of stress among medical undergraduates to be higher than the general population. A prevalence of 52.4% stress was revealed in a study from Ethiopia where the same MSSQ scale was used.[14] The findings of this study are comparable to Sanmitha DG and R Krishnan Bhat's study where 81.6% of medical students had moderate stress.[15] Study by Satpathy et al. revealed perceived stress among medical undergraduates from western India as high as 91%.[9] A study by Asfaw H et al. in Ethiopia revealed 44% stress among medical students which is considerably lower than the present study.[16] A prevalence of 91.1% stress was found among medical students in their first year in a study by Gupta S et al.[17]

Academic-related stressors contain a total of thirteen items namely 'tests/examinations', 'quota system in examinations, heavy workload', 'competition in a learning context', 'a large amount of content to be learned', 'an unjustified grading process', etc.

Table 5: ANOVA for average MSSQ score and ARS score across semesters

Domain	*Sum of squares*	*df*	*Mean Square*	*F*	*p-value*
Average score of MSSQ					
Between groups	21.870	3	7.290	12.486	<0.001*
Within groups	224.211	384	0.584		
Total	246.082	387			
Average ARS score					
Between groups	25.934	3	8.645	13.158	<0.001*
Within groups	260.172	396	0.657		
Total	286.106	399			
Average IRS score					
Between groups	17.530	3	5.843	7.132	<0.001*
Within groups	324.429	396	0.819		
Total	341.959	399			
Average TLRS score					
Between groups	26.194	3	8.731	11.938	<0.001*
Within groups	289.642	396	0.731		
Total	315.837	399			
Average SRS score					
Between groups	24.683	3	8.228	13.767	<0.001*
Within groups	229.502	384	0.598		
Total	254.185	387			
Average DRS score					
Between groups	8.451	3	2.817	3.210	<0.023
Within groups	347.548	396	0.878		
Total	355.999	399			
Average GARS score					
Between groups	25.289	3	8.430	10.347	<0.001*
Within groups	322.630	396	0.815		
Total	347.919	399			

*Significant at <0.05

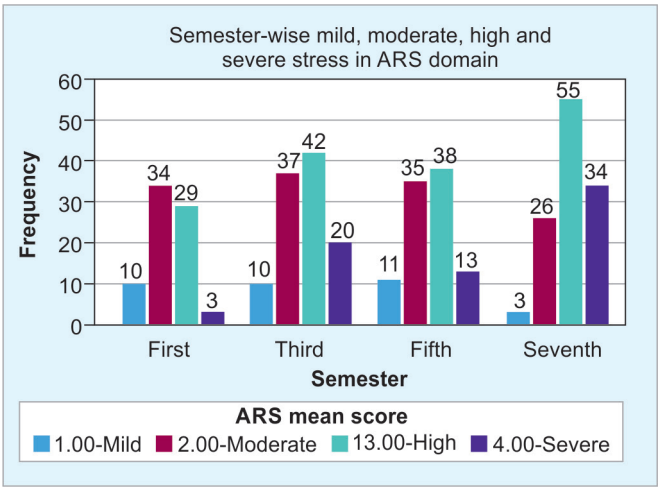

Fig. 1: Semester-wise stress levels in ARS domain

Out of this, 'a large amount of content to be learned' is causing the highest stress among ARS. About 91.5% of the students had revealed moderate to severe stress in the ARS domain. Out of this, the majority had moderate and high stress. This contrasts

with the finding of a study by Battula M et al. in which 55% of the students had revealed severe stress.[18] The vastness of the syllabus as the major stressor has been cited in previous studies too.[14,19] Academic-related stressors have been cited as a major stressor among medical students in various previous studies.[7,14,20–23] It reiterates that the MBBS curriculum is undoubtedly one of the toughest courses.

Interpersonal and intrapersonal-related stressors (IPRS) are stressors that are intra and interpersonal relationships that cause stress. In this domain, 'poor motivation to learn' and 'verbal or physical abuse by personnel' are the factors causing the highest stress. Poor motivation to learn as a stress factor reflects the fact that the students are aware of their state. Pressure from parents to opt medical field is often cited as a factor for poor motivation among medical students. Conflict with other students has been recognized as the factor with the lowest stress. It is an encouraging finding in the background of ragging instances and several reported incidents in other colleges. On a similar line, the IRS has been cited as a high-stressor domain in a study by Panchu P et al.[24]

Teaching and learning-related stressors are teaching or learning-associated factors that cause stress. 'Uncertainty of what is expected of me' causes the highest stress for TLRS. Further analysis of this factor reveals that it is highest (2.16 ± 1.20) among the seventh-semester students. The transition from a student to a medical professional and consequential conflict may lead to such high stress. Students are least stressed regarding the availability of study materials in this domain. It is understandable considering the easy availability of various online materials these days.

Social-related stressors are those community and societal relationships that cause stress. Students are highly stressed by the lack of time for family and friends, which is again highest in the seventh semester. Recreational activities, sports, and other co-curricular activities may help to reduce stress in this regard. On the other hand, students are least stressed working with computers, which is easily understandable for this digital generation.

Drive and desire-related stressors are internal or external forces that influence the student's attitude, emotions, thoughts, and behavior, leading to stress. Students are highly stressed by their family responsibilities. About 57% of students had reported mild stress related to DRS in a study by Battula et al.[18]

Group activities-related stressors include group acts and interactions that lead to stress. Students are highly stressed by the need to do well which is imposed by others. It is expected in the competitive environment of the medical field. However, too much competitive attitude may reduce the efficiency of the students.

Overall, ARS were responsible for the highest stress and drive-related stressors had the lowest score. This is analogous and parallel to the study by Battula M et al.[18] The average score of the ARS domain in this study (2.19 ± 0.85) is aligned with the study by Mamatha BV et al.[25] However, it is lower than some of the previous studies. 'Drive and desire-related stressors' as the least stressor is also revealed in the study by Mamatha V et al.[25]

Female students experience higher stress than their male counterparts overall and for all domains except drive-related stressors. This is comparable to the study by Satpathy et al. in which the perceived stress was higher in female undergraduate students.[9] Higher stress scores among female students are comparable to the findings in other previous studies too.[20,21] A study by Mamatha BV et al. revealed higher stress among males in TLRS and DRS domains which differs from the finding of the present study.[25]

During the MBBS course across four semesters, there are two peaks in mean stress levels, the first in the third and the second being the seventh semester which is the highest (Table 4). First clinical exposure in the third semester, and being at the end of the MBBS career and high workload may be probable explanations for this. This contrasts with a study by Melaku L et al. in which it was found that the highest stress occurs during the first 3 years of the medical curriculum, with a slow decline from 58.3 to 56.6% and 25% by the end of 4th and 6th years respectively.[14] This contrast may be due to differences in medical curricula, teaching methods, etc.

Competency-based medical education curriculum has been described as learner and patient-center, gender-sensitive, and outcome and context-oriented.[11] It is anticipated that this curriculum will help to generate skilled health professionals and at the same time will ensure a reduction in their overall stress. Findings from the present study are comparable to the findings of studies from the pre-CBME era. A comparative study by Goel et al. revealed a marginal reduction in perceived stress scores in students with the CBME curriculum than with non-CBME students of a medical college from North India.[26] However, it would be premature to conclude regarding stress in the CBME curriculum. Further studies will shed more light on this area when both teachers and students become more familiar with the intricacies of the curriculum.

Some of the limitations of this study are unequal representation of students from the semesters, being an online study, responses may be affected, and detailed sociodemography aspects could not be explored. Also, being a cross-sectional study without a comparator group, the dynamics of the stressors are difficult to comment upon. To reduce the limitations of the online study, the checklist for reporting results of internet E-surveys (CHERRIES) has been followed throughout the study process.[27,28]

Conclusion

A significant number of students reported moderate to high stress in the study. Academic-related stressors followed by Group activities-related stressors (GARS) and Interpersonal and intrapersonal-related stressors (IRS) were the three domains having high stress. Female students were stressed higher than male students and seventh-semester students had the highest stress. A strategy for stress reduction in the college environment for healthy coping for these future generations of medical professionals is the need of the hour.

Clinical Significance

Stress in the medical field is inevitable. However, chronic severe stress may have negative consequences leading to poor performance, maladaptive coping methods like substance use, and even dropouts. Stress management strategies and the provision of a congenial environment in the medical college may help to reduce stress. Student support systems or cells in each college may be a potential solution to the distress faced by the students. The newly introduced CBME when implemented properly may further help the students to develop healthy coping skills and learning would be interesting for them rather than being a burden and significant stressor.

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