

Correlation between Stress, Self-esteem and Emotional Eating among MBBS Students in Central Gujarat, India: A Cross-sectional Study

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ABSTRACT

Introduction: Medical students are exposed to many stressors and if stress is perceived negatively or becomes excessive can affect academic performance and health. Existing literature shows that people with higher stress and lower self-esteem often use unhealthy coping mechanisms like emotional eating.

Aim: To find the prevalence of perceived stress, sources of stress and their correlation with self-esteem and emotional eating in third year MBBS students as a part of their Evidence Generating Community Health Intervention Project (EviGenCHIP).

Materials and Methods: The present cross-sectional study was conducted among third year MBBS students of Smt BK Shah Medical Institute and Research Centre in Vadodara, Gujarat, India, from June 2023 to September 2023 after obtaining Institutional Ethical approval. All students (150) of third year MBBS who gave a written informed consent were included in the study. Data was collected through online Google forms which consisted of demographic details {age, gender, place of residence and Body Mass Index (BMI)}, Perceived Stress Scale (PSS), Sources of stress scale, Rosenberg Self-esteem Scale (RSES) and Emotional Eater Scale (EES). Descriptive and analytical statistical (Pearson's correlation coefficient and unpaired t-test) methods using Statistical Package for Social Sciences (SPSS) trial version 25 software were used.

Results: A total of 134 students out of the total 150 enrolled in the study completed the form, of which 18 (13.43%) students had low stress, 106 (79%) had moderate and 10 (7.5 %) had high perceived stress. Time pressure, fear of failure, loneliness, poor motivation and poor teaching support were the most common sources of high stress. Thirty students (22.3%) had low self-esteem of which 5 (16.67%) had low stress, 19 (63.33%) had moderate stress and 6 (20%) students had high stress levels. A 75 (56%) students were emotional eaters of which 12 (16%) had low stress, 55 (73.34%) had moderate stress and 8 (10.66%) students had high stress levels. There were 11 students who had both low self-esteem and higher tendencies for emotional eating of which nine students had moderate levels of perceived stress and two had high levels of perceived stress. Those who had higher self-esteem reported lower levels of perceived stress ($r=-0.61$, $p<0.00001$) and those who experienced higher perceived stress were more likely to be emotional eaters ($r=0.27$, $p=0.0015$).

Conclusion: It is important for medical institutions to provide support and resources to manage stress effectively. This includes stress management programs, mental health services, promoting a healthy work-life balance, fostering self-esteem and developing emotional intelligence.

Keywords: Coping mechanisms, Psychological, Self-concept

INTRODUCTION

In his 1966 book, "Psychological Stress and the Coping Process", Richard Lazarus defined stress as a relationship between the person and the environment that is appraised as personally significant and as taxing or exceeding resources for coping [1]. Perceived stress refers to the subjective experience of stress that an individual perceives in response to a particular situation or event and a cognitive appraisal of their ability to cope with the demands of the situation [2]. Medical education is often regarded as one of the most demanding and stressful educational programs, due to the rigorous academic curriculum, long work hours, and high-stakes nature of the profession. The students are exposed to many stressors and if stress is perceived negatively or becomes excessive can affect academic performance and health adversely. Stress arises when the situation's demands exceed the coping abilities of the individuals, resulting in cognitive, behavioural, and emotional disturbances [3]. Perceived stress can have a significant impact on medical students, leading to negative effects on their mental health, academic performance, and overall wellbeing [4]. Higher levels of stress were also associated with lower levels of empathy and professionalism, which could have negative consequences for patient care [5]. Self-

esteem refers to an individual's subjective evaluation of their own worth or value. It is often considered an important aspect of mental health and well-being, as individuals with high self-esteem tend to have more positive self-perceptions, greater resilience in the face of stress or adversity, and better overall life satisfaction [6]. The correlation between perceived stress and self-esteem is an area of active research in psychology. Some studies have found that higher levels of perceived stress are associated with lower self-esteem, while others have found no significant relationship or even a positive relationship between the two constructs [7,8].

Emotional eating, which describes an urge to eat in response to negative feelings, rather than hunger or nutritional needs can be a maladaptive coping strategy, as it often leads to overeating of primarily energy-dense and palatable food items which can contribute to weight gain and associated health problems [9,10]. Food intake can be affected both positively and negatively by stress, depression and anxiety. Several factors can contribute to emotional eating, including using food as a coping tool for unpleasant emotions or confusing internal hunger and satiety signals with emotions-related physiological changes [11]. Numerous studies have focussed on the relationship between emotional eating and perceived stress [12-15].

For instance, a study published in the Journal of Health Psychology discovered that in a group of college students, emotional eating was positively linked to perceived stress [12]. Likewise, a research published in the journal Appetite found a positive correlation between emotional eating and perceived stress in a sample of overweight and obese adults [13]. Another study that appeared in the same journal discovered that people who have low self-esteem are more prone to engaging in emotional eating. The study also found that negative affect, which refers to feeling upset or bad, mediated this association [14]. According to a study published in eating behaviours, individuals with low self-esteem are more likely to rely on food as a means of coping with negative emotions. Furthermore, the study found that this link was more robust among women than men [15]. A vicious cycle of emotional eating and low self-esteem might develop as a result of this pattern, which can eventually lead to deteriorated self-esteem. On the other hand, research suggests that individuals who have high self-esteem are less likely to use food as a coping mechanism. They have better impulse control, are more resilient, and can handle negative emotions in a more constructive way [16].

Many studies in India have focussed on perceived stress, sources of stress, self-esteem and emotional eating in medical students but there have been very few studies of correlations of these factors with each other [17,18]. The interplay between stress, emotional eating, and self-esteem is particularly pertinent in the context of medical education, where mental health issues can negatively impact academic performance and the ability to cope with professional demands. Use of appropriate validated and standardised scales for measuring perceived stress, self-esteem and emotional eating will help to find out the correlations amongst these factors. Understanding these correlations is essential for developing targeted interventions to promote mental health, healthy eating habits, and improved self-esteem among medical students. Such interventions can enhance overall well-being and academic success, ultimately leading to better professional competence.

The present study aimed to explore the intricate relationships between stress, emotional eating, and self-esteem in medical students which can provide a foundation for effective preventive strategies and support systems tailored to this unique population. The current study also found out the prevalence of stress, of low self-esteem and emotional eating tendencies amongst the study population. It also aimed to teach research methodology to third year MBBS students as a part of their EviGenCHIP programme.

MATERIALS AND METHODS

A cross-sectional study was conducted amongst all third year MBBS students (convenient sampling) of Smt BK Shah Medical Institute and Research Centre in Vadodara, Gujarat, India, from June 2023 to September 2023. Necessary permissions were obtained from the university's Institutional Ethics Committee (Number -SVIEC/ON/Medi/SRP/June/23/83) to conduct this study. All students (150) of third year MBBS were enrolled in a study as a part of their Evidence Generating Community Health Intervention Project (EviGenCHIP) where they were taught about research methodology [19].

Inclusion and Exclusion criteria: All students were assured about the confidentiality of their data. All students who were above 18 years of age and who gave a written informed consent were included in the study. Those students who did not give an informed consent or those who sent incomplete forms (16 students) were excluded from the study.

Study Procedure

The students were explained how to fill the case study form. Data was collected through online Google Forms which consisted of demographic details (age, gender, place of residence and BMI), PSS, Sources of stress scale, RSES and EES.

The sources of stress questionnaire was based on the one used in the study to find out the stressors in medical students in Sudan by Ragab EA et al., wherein they designed a questionnaire comprising of 19 items of potential stressors in three subcategories of academic, psychosocial and teaching related stressors for MBBS students and each stressor was rated on a 3 point likert scale (1: not at all stressful, 2: somewhat stressful, 3: highly stressful) [20]. The PSS comprises of 10 items measured on a five point Likert scale (0: never, 1: almost never 2: sometimes 3: fairly often 4: very often). The PSS construct demonstrates a two factor structure; the first being "general stressors" and the second being "the ability to cope". The PSS score is obtained by summing the scores of all the items, with reverse coding for items 4, 5, 7, and 8 as they are positively stated. The PSS score ranges from 0 to 40, with the 40 point score representing the highest PSS score. The PSS has an adequate internal consistency reliability ($\alpha=0.78$) [21].

The RSES comprises of 10 items measured on a four point Likert scale (1: strongly agree, 2: agree, 3: disagree, 4: strongly disagree) with a reverse scoring in items 2, 5, 6, 8 and 9. The RSE demonstrates a Guttman scale coefficient of reproducibility of 0.92, indicating excellent internal consistency. Test-retest reliability over a period of 2 weeks reveals correlations of .85 and 0.88, indicating excellent stability [22]. The EES comprises of 10 items which are measured on a Likert scale (0: Never, 1: Sometimes, 2: Generally, 3: Always). Internal consistency showed that Cronbach's alpha was 0.773 for the "Dishinibition" subscale, 0.656 for the "Type of food" subscale and 0.612 for the "Guilt" subscale. The test-retest stability was $r=0.70$ [23].

STATISTICAL ANALYSIS

All the collected data was compiled in a Microsoft Excel Worksheet and was analysed using the SPSS trial version 25 software. Mean scores with standard deviation were calculated and Pearson's correlation coefficient and unpaired t-test were used to find out the correlations amongst the various factors.

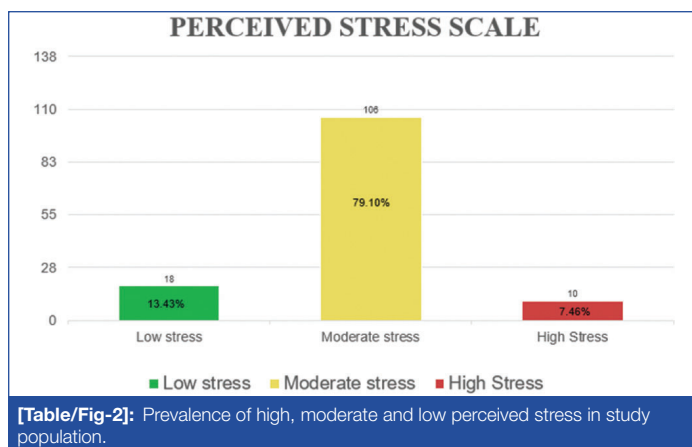
RESULTS

A total of 134 students who completed the survey were enrolled in the study. The mean study population age was 21.2 years. (range=20-23 years). [Table/Fig-1] shows the sociodemographic profile of the study population [24].

Demographic variables	Frequency, n (%)
Gender	
Male	50 (37.31)
Female	84 (62.69)
Current Residence	
Home	20 (14.92)
Hostel	114 (85.07)
Chose MBBS	
By choice	125 (93.28)
Not by choice	9 (6.71)
Body Mass Index (BMI) [24]	
Underweight (<18.5)	18 (13.43)
Normal (18.5-22.9)	58 (43.28)
Overweight (23-24.9)	27 (20.14)
Obese I (25-29.9)	26 (19.4)
Obese II (>30)	5 (3.73)

[Table/Fig-1]: Demographic variables (N=134).

According to PSS scoring, scores between 0-13 are considered having low stress, 14-26 have moderate stress and a score of 27 or more indicate high stress. The mean PSS score for our population was 19.47 (SD=5). The prevalence is shown in [Table/Fig-2]. [Table/Fig-3] shows

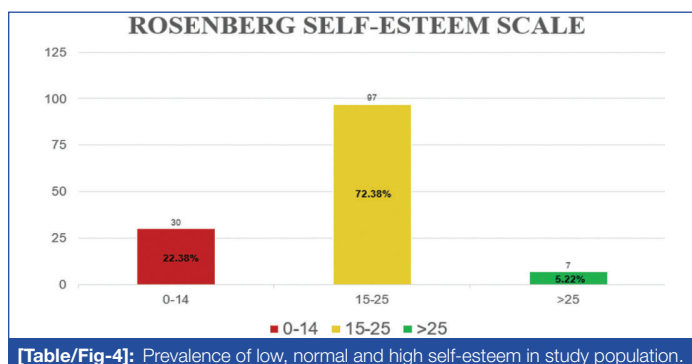


the various sources of stress with its prevalence on the basis of sources of stress questionnaire.

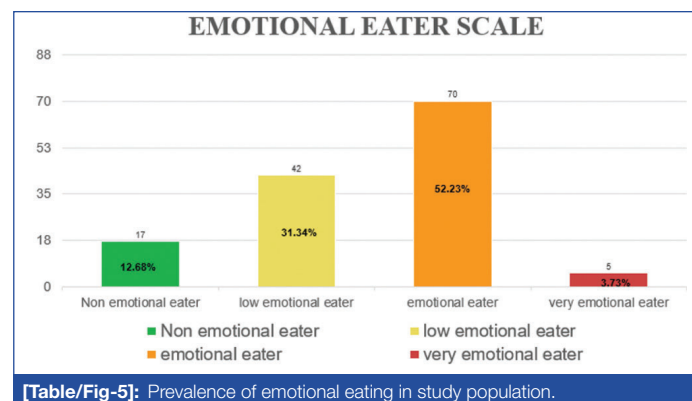
Stress source	A lot (%)	Some (%)	Not at all (%)
Academic factors			
Exam frequency	41 (30.59%)	78 (58.20%)	15 (11.19%)
Fear of failure	44 (32.83%)	69 (51.49%)	21 (15.67%)
High self-expectation	45 (35.58%)	74 (55.22%)	15 (11.19%)
Competition with peers	23 (17.16%)	73 (54.47%)	38 (28.35%)
Tight Schedule	39 (29.10%)	72 (53.73%)	23 (17.16%)
Heavy workload	34 (25.37%)	79 (58.95%)	21 (15.67%)
Time pressure	57 (42.53%)	65 (48.5%)	12 (8.95%)
Attendance	44 (32.83%)	70 (52.23%)	20 (14.92%)
Psychosocial factors			
Poor motivation	26 (19.40%)	76 (56.71%)	32 (23.88%)
Financial problems	22 (16.41%)	70 (52.23%)	42 (31.34%)
Family problems	18 (13.43%)	63 (47.01%)	53 (39.55%)
Lack of family support	11 (8.20%)	45 (33.58%)	78 (58.20%)
High parental expectation	17 (12.68%)	64 (47.76%)	53 (39.55%)
Relationship with opposite sex	17 (12.68%)	53 (39.55%)	64 (47.76%)
Study away from home	13 (9.7%)	70 (52.23%)	51 (38.05%)
Loneliness	26 (19.40%)	65 (51.49%)	43 (32.08%)
Teaching related factors			
Poor teaching skills	27 (20.14%)	68 (50.74%)	39 (29.10%)
Poor teacher support	28 (20.89%)	72 (53.73%)	34 (25.37%)
Difficulty understanding lectures	19 (14.17%)	69 (51.49%)	46 (34.32%)

[Table/Fig-3]: Sources of stress in the study population.

According to RSES scoring, scores from 0 to 14 indicate a low self-esteem, scores of 15-25 have a normal self-esteem and a score of 26 or more indicate a high self-esteem. In the present study, the mean RSES was 17.57 (SD=4.36). [Table/Fig-4] depicts the prevalence of different levels of self-esteem in the study population. Thirty students (22.3%) had low self-esteem of which 5 (16.67%) had low stress, 19 (63.33%) had moderate stress and 6 (20%) students had high stress levels.



According to EES scoring, scores from 0-5 are non emotional eaters, scores of 6-10 are low emotional eaters, scores of 11-20 are emotional eaters and a score of 21-30 indicate very emotional eaters. Here, 75 (56%) students were emotional eaters of which 12 (16%) had low stress, 55 (73.34%) had moderate stress and 8 (10.66%) students had high stress levels. [Table/Fig-5] depicts the prevalence of emotional eating in the study population.



There were 11 students who had both low self-esteem and higher tendencies for emotional eating of which nine students had moderate levels of perceived stress and two had high levels of perceived stress. The descriptive measures of the various scales (mean, standard deviation, standard error of mean) have been mentioned in [Table/Fig-6].

Variables		Males	Females	Unpaired t-test for comparison of mean scores	p-value for difference of means based on t-test
PSS	Mean	18.62	19.98	1.5251	0.1296
	SD	5.15	4.87		
	SEM	0.73	0.53		
RSES	Mean	18.22	17.20	1.3122	0.1917
	SD	4.26	4.39		
	SEM	0.60	0.48		
EES	Mean	10.92	12.01	1.1453	0.2542
	SD	5.84	5.02		
	SEM	0.83	0.55		

[Table/Fig-6]: Comparison of descriptive measures of PSS, RSES and EES between genders.

It was found that females reported a higher perceived stress, lower self-esteem and more emotional eating tendencies as compared to males but this difference was not statistically significant.

Pearson's correlation coefficient was used to find out the correlation between BMI, PSS, RSES and EES and these values are shown in [Table/Fig-7]. These results show that students who had a higher perceived stress had lower levels of self-esteem and were more likely to be emotional eaters. It is also seen that students with higher self-esteem had less tendency for emotional eating. All these were statistically significant according to the p-values.

Variables	Correlation Coefficient (r)	Interpretation	p-value (95% CI)
Perceived stress and Self-esteem	-0.61	Strong negative correlation	<0.00001
Perceived stress and emotional eating	0.27	Weak positive correlation	0.0015
Self-esteem and emotional eating	-0.188	Weak negative correlation	0.0296
BMI and self-esteem	-0.0877	Weak negative correlation	0.3119
BMI and emotional eating	0.0584	Weak positive correlation	0.5056

[Table/Fig-7]: Correlation between different variables.

It also indicates that with increasing BMI, the self-esteem tends to decrease and tendency for emotional eating increases but these values were not statistically significant. Amongst academic factors, time pressure, followed by high self-expectation, attendance and fear of failure were most common sources of high stress. Amongst teaching factors, poor teacher support and poor teaching skills were most common whereas in psychosocial factors, the most common sources of high stress were poor motivation and loneliness.

DISCUSSION

In a study conducted in government medical college in Mysore by Bhavani Nivetha M et al., the mean PSS score was 17.7 (SD=5.5) and the prevalence of mild, moderate and severe stress was 20%, 74% and 6%, respectively which was comparable with the current study [17]. Abdelkefi M et al., conducted a study amongst the medical students of Tunisia and found that in their institute 69.5% students had moderate stress and 21.1% students had severe stress levels [25]. Also, a systematic review which studied psychological distress amongst US and Canadian medical students found that medical students had an increased overall psychological distress than the general population [26]. These results indicate that most medical students irrespective of geographical locations and various cultural differences have moderate to high perceived stress scores which is concurrent with our study.

In the current study, the mean RSES score was 17.57 (SD=4.36). 22.38% students had a low self-esteem which was in concordance with a study conducted by AIIMS Patna by Aarif SM and Mishra BN where the mean RSS score was 18.97 and the prevalence of low self-esteem was found to be 18% [18]. In a study conducted in Tunisia by Abdelkefi M et al., they found that self-esteem was low in 34.7% of the medical students [25].

Studies have demonstrated that stress can bring changes in the hormones that are responsible for appetite regulation. Acute stress typically results in 'active fight-and-flight response' with activation of the sympathetic-adrenal-medullary system and consequent release of catecholamines (adrenaline and noradrenaline). Noradrenaline has shown to suppress appetite during acute stress. Chronic stress results in hyperactivation of Hypothalamic-Pituitary-Adrenal (HPA) axis with resultant CRH, Adrenocorticotrophic Hormone (ACTH) and glucocorticoids (cortisol) production which leads to increase in appetite [27].

In the present study, on the basis of EES scores, the prevalence of non emotional eaters, low emotional eaters, emotional eaters and very emotional eaters was 12.68%, 31.34%, 52.23% and 3.73% students respectively which was comparable with a study done by Skolmowska D et al., in Polish adolescents where they found that the respective prevalence was 26.9%, 34.2%, 33.4% and 5.3% [28].

In the present study, females reported a higher perceived stress, lower self-esteem and more emotional eating tendencies as compared to males but this difference was not statistically significant. A similar finding has been corroborated in multiple other studies [20,25,28,29].

The negative correlation between perceived stress and self-esteem which we found in our study was in line with the study conducted on medical students in Tunisia [25]. Also, the positive correlation between perceived stress and emotional eating was comparable to a study conducted by Carpio-Arias TV et al., in Ecuadorian adults where they found a statistically significant association between the emotional eating score and perceived stress [30]. A similar finding was seen in the study conducted by Shehata WM and Abdeldaim DE in the faculty of medicine in a university in Egypt [31]. There was also a significant negative correlation between self-esteem and emotional eating in our study which is similar to the finding in the study conducted in adolescents of Pakistan by Malik AR et al., [16]. The negative correlation between BMI and self-esteem of our study is comparable to a study done in students of Rowan University, USA

[32]. A positive correlation was seen in the present study between BMI and emotional eating which indicates that students with higher BMI have more tendencies for emotional eating which was similar to the findings of a review article by Dakanalis A et al., [33].

Amongst the students who were moderately to severely stressed, high self-expectation (34.78%), fear of failure (33.91%) and exam frequency (33%) were the most common sources of academic stress; loneliness (21.73%) and poor motivation (20.86%) were the most common sources of psychological stress and poor teacher support (20%) and poor teaching skills (19.13%) were the most common sources of teaching related stress. In a similar study conducted by Ragab EA et al., in undergraduate medical students across six medical colleges in Sudan, it was found that the most frequently occurring sources of academic stress were time pressure (60.12%), heavy workload (58.50%), fear of failure (52.02%), and exam frequency (44.57%). The high parental expectation was the highest-scoring psychosocial stressor (33.22%). Also, inadequate or poor support by teachers ranked the highest as a source of stress for the medical students (33.06%) [20].

Perceived stress can trigger emotional eating through various mechanisms. When individuals experience high levels of stress, they often feel negative emotions like anxiety or sadness, leading them to seek comfort in high-calorie foods [9]. Stress hormones such as cortisol increase appetite, particularly for sugary, fatty, or carbohydrate-rich foods. This hormonal response disrupts mindful eating habits, causing people to eat quickly and without attention to hunger cues, resulting in overeating [34]. Cravings for comfort foods become pronounced under stress, creating a negative feedback loop where guilt and increased stress from emotional eating drive further consumption [35]. Additionally, some individuals develop food as a coping mechanism from a young age, making it an ingrained response to stress [36]. Conversely, those with higher self-esteem exhibit better emotional regulation, handling stress through healthier methods like social support or positive activities. They have a strong sense of self-worth and are more resilient, using adaptive coping strategies such as exercise or meditation, prioritising self-care and mindful eating, and thus reducing the reliance on food for comfort [37].

Limitation(s)

The present study primarily focused on academic and psychosocial stressors and was limited to one batch of students in a single institution. Future research should explore these stressors more comprehensively, examining individual factors and their effects on students' mental health and career outcomes.

CONCLUSION(S)

The current study highlights the significant correlation between perceived stress, self-esteem, and emotional eating among third-year MBBS students. A majority of students experienced moderate stress, with time pressure, fear of failure, and loneliness being key stressors. A strong negative correlation was observed between perceived stress and self-esteem, indicating that higher stress levels were associated with lower self-esteem. Additionally, a positive correlation between stress and emotional eating suggests that students experiencing higher stress were more likely to engage in emotional eating behaviours. These findings emphasise the need for targeted interventions such as stress management programs, self-esteem enhancement strategies, and emotional regulation training to support medical students in coping with academic and psychological challenges effectively.

Acknowledgement

The authors would like to thank the Institutional Ethics Committee for the permission to carry out the study, the respondents for their support and timely response, and the university for infrastructure.

We would also like to thank the following students who were a part of the EviGenCHIP project - Pritika Jain, Priyal Jain, Ragini Sucklecha, Rajat Jain, Rhea Pujari and Rashi Jain who helped us with data collection, compilation of the study and who learned about research methodology from this study.

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AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Oct 23, 2024
- Manual Googling: May 02, 2025
- iThenticate Software: May 04, 2025 (11%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

Date of Submission: **Oct 22, 2024**
Date of Peer Review: **Jan 23, 2025**
Date of Acceptance: **May 06, 2025**
Date of Publishing: **Nov 01, 2025**