

# Association of stress with BMI among medical students

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**ABSTRACT**

**Introduction:** Medical education is considered as one of the most demanding courses. It brings with it a multitude of stressors which affects overall wellbeing of medical students.. Stress and BMI show association with each other. Stress may play a major role in the development of obesity, which is the root cause of many diseases.

**Objective:** To determine the prevalence of stress among medical students and to observe its association with BMI among students of a private medical college.

**Materials & methods:** A cross-sectional study on 204 subjects was conducted at Aziz Fatimah Medical and Dental College (AFMDC), Faisalabad. The study population consisted of first year to final year MBBS students. Stress was assessed by Perceived Stress Scale-10 (PSS-10). BMI was calculated by self-reported measures of weight and height. Data were analyzed by SPSS 23 for descriptive and comparative statistics, keeping  $p \leq 0.05$  as significant.

**Results:** The prevalence of stress was found to be as follows: low in 27(13.2%), moderate in 142(69.6%) and severe stress in 35(17.2%) medical students. The mean stress score was 20.29 indicating moderate stress. The BMI among different categories was classified as underweight in 28(13.7%), normal in 121(59.3%), overweight in 47(23%) and obese in 8(3.9%) students. A statistically significant association was found between Stress and BMI ( $p$ -value = 0.018). Pearson's correlation coefficient showed a statistically significant negative correlation between Stress and BMI ( $p$ -value = 0.008).

**Conclusion:** Significant association and statistically negative correlation between Stress and BMI was observed. The findings indicate that stress level increases as the BMI decreases.

**Keywords:** Body Mass Index; Students, Medical; Anxiety; Life style.

*The authors declared no conflict of interest. All authors contributed substantially to the planning of research, data collection, data analysis, and write-up of the article, and agreed to be accountable for all aspects of the work.*

**INTRODUCTION**

In the realm of medical education, stress has long been recognized as a pervasive and significant issue affecting the well-being of students. The demanding nature of medical training, characterized by rigorous coursework, clinical rotations, and the constant pursuit of excellence, often takes a toll on the mental and physical health of medical students.<sup>1</sup> As future healthcare professionals, medical students face unique stressors that can impact various aspects of their lives, including their dietary habits, physical activity levels, and overall health.<sup>2</sup> This research aims to delve into the association between stress levels and Body Mass Index (BMI) among medical students, shedding light on a critical yet understudied aspect of medical education and student well-being.

Stress among medical students is a multifaceted phenomenon, influenced by a myriad of factors inherent to the medical education environment. The intense academic workload, coupled with the pressure to perform well in examinations and clinical assessments, can lead to heightened levels of stress and anxiety.<sup>3</sup> Moreover, the responsibility of caring for patients, often in high-stakes clinical settings, adds another layer of stress to the already demanding medical curriculum. Additionally, the competitive nature of medical training, where students may constantly compare themselves to their peers, further contributes to the stress experienced by medical students.<sup>4</sup>

The impact of stress on the health and well-being of medical students extends beyond the realm of mental health, encompassing physical health outcomes as well. One such outcome of interest is Body Mass Index (BMI), a measure of body fat based on height and weight. BMI serves as a useful indicator of overall health and is commonly used to assess an individual's risk of developing various health conditions, including cardiovascular disease, diabetes, and hypertension.<sup>5</sup> Given the potential link between stress and unhealthy lifestyle behaviors, such as poor dietary choices and sedentary habits, it is plausible to hypothesize that elevated stress levels may be associated with alterations in BMI among medical students.<sup>6</sup>

Understanding the association between stress and BMI among medical students is not only important for elucidating the factors contributing to students' well-being but also for informing interventions aimed at promoting healthier lifestyles within the medical education community.<sup>7</sup> Previous research has highlighted the prevalence of stress among medical students and its detrimental effects on mental health, academic performance, and quality of life. However, fewer studies have specifically examined the relationship between stress and BMI in this population, representing a notable gap in existing literature.

Exploring this association is particularly relevant in the context of medical education, where students are not only expected to excel academically but also to serve as future role models for their patients.<sup>8</sup> The lifestyle habits developed during medical school, including dietary choices, physical activity levels, and stress management strategies, can significantly influence the health behaviors of future physicians and their ability to provide effective patient care.<sup>9</sup> By gaining insight into the factors influencing stress and BMI among medical students, educational institutions and healthcare organizations can develop targeted interventions to support student well-being and promote healthier lifestyle choices. Moreover, understanding the association between stress and BMI among medical students has broader implications for public health and healthcare delivery. As healthcare professionals, physicians play a central role in promoting health and preventing disease within their communities. By addressing the factors contributing to stress and unhealthy weight gain among medical students, can foster a culture of wellness within the medical profession and empower future physicians to lead by example in promoting healthy lifestyles among their patients.<sup>10</sup>

In summary, the association between stress and BMI among medical students represents a critical area of inquiry with implications for student well-being, patient care, and public health. By investigating this relationship, this research seeks to contribute to a deeper understanding of the complex interplay between stress, lifestyle behaviors, and health outcomes among medical students. Through empirical investigation and evidence-based interventions, we can strive to create a supportive and nurturing environment within medical education that fosters the holistic well-being of students and prepares them to thrive as compassionate and resilient healthcare professionals.

## MATERIALS & METHODS

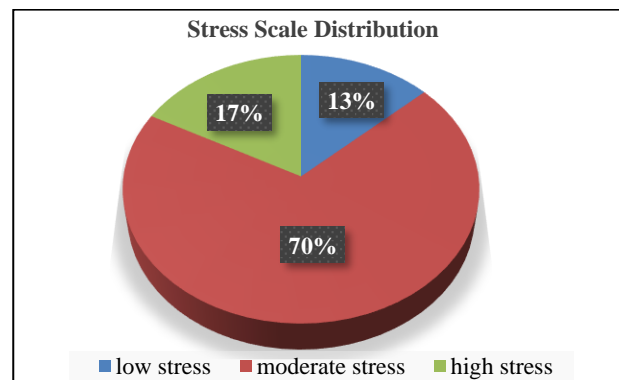
A cross-sectional correlational study was carried out in Aziz Fatimah Medical & Dental College (AFMDC), Faisalabad, for 6 months from July 2023 to December 2023. Ethical approval was taken with Ref. No.: IEC/239-23. The study population was from the 1<sup>st</sup> year to 5<sup>th</sup> year MBBS students of AFMDC. The sample size included 204 students of M.B.B.S that comprised both males and females and calculated by open epi calculator through following formula  $Npq/d^2(N-1) + PQ$ . Students from other fields and those who did not give consent were excluded. Non-probability convenient sampling technique was employed. Informed written consent was taken. The most popular psychological tool for assessing stress perception is the Perceived Stress Scale (PSS). It is a gauge of how stressful one feels about

certain circumstances in their life. Higher scores indicate higher perceived levels. Individual PSS scores can range from 0 to 40. Low stress scores would be those in the range of 0 to 13. A score in the 14–26 range would be categorized as moderate stress. A score in the 27–40 range would be regarded as high for perceived stress. Weight and Height were collected by self-reported measures and then analyzed to obtain BMI of medical students. Questionnaires were distributed and data were analyzed using SPSS version 23; a  $p \leq 0.05$  was taken as significant.

## RESULTS

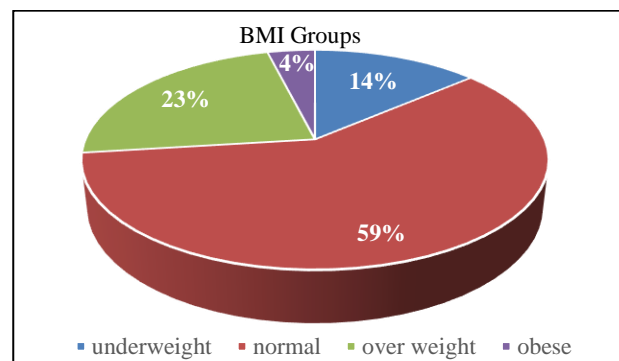
Of the 204 students, majority were females i.e. 112(54.9%) and 92(45.1%) were males. Most of the participants were from age group 20-22 years i.e. 76(37.3%). Most of the participants were from 4<sup>th</sup> year (46, 22.5%); 2<sup>nd</sup> year (45, 22.1%) & 1<sup>st</sup> year MBBS (44, 21.6%) followed by final year (35, 17.2%) & 3<sup>rd</sup> year (34, 16.7%) MBBS students.

Stress evaluation by Perceived Stress Scale (PSS-10) were perceived by most participants as "sometime" on Likert scale. Mean of students PSS-10 score came out to be 20.29 which falls in the category of moderate stress because as per PSS-10, score range of 14-26 depicts moderate stress, as shown in Figure 1 that majority of students (142, 70%) were having moderate stress.



**Figure 1: PSS-10 scale distribution among medical students (n=204).**

Mean BMI of medical students was  $22.77 \pm 3.81$ . Figure 2 shows that majority of the medical students' BMI was in normal range (121, 59.3%) while 47 (23%) medical students were overweight.



**Figure 2: Distribution of BMI Groups (n=204).**

Table 1 shows association between students' gender, age, and year of study with BMI and stress level distribution. Significant association was seen between gender and stress levels ( $p < 0.05$ ).

**Table 1: Association between participants demographics with BMI and stress (n=204).**

Variables		BMI					Stress			
		Under Weight	Normal	Over Weight	Obese	p value	Low	Moderate	High	p value
Gender	Male	10	54	24	4	0.62	20	67	5	<0.001
	Female	18	67	23	4		7	75	30	
Age Groups (years)	<18 – 20	13	38	15	1	0.78	10	43	14	0.45
	21 – 22	10	46	17	3		11	50	15	
	23- 24	4	31	12	3		4	41	5	
	> 24	1	6	3	1		2	8	1	
Year of study	1 <sup>st</sup>	8	25	10	1	0.45	6	29	9	0.93
	2 <sup>nd</sup>	10	24	9	2		5	31	9	
	3 <sup>rd</sup>	5	24	4	1		5	22	7	
	4 <sup>th</sup>	3	28	13	2		6	33	7	
	5 <sup>th</sup>	2	20	11	2		5	27	3	

Table 2 shows distribution of stress and BMI in percentages in medical students. Low and moderate levels of stress were seen mainly in students with normal BMI followed by those who were overweight. High stress levels were seen in participants with

normal BMI followed by those who were underweight. Fisher's Exact Test was applied which depicted significant association (p=0.018) between stress and BMI of medical students.

**Table 2: Association between stress and BMI (n=204).**

STRESS		BMI			
		Under Weight	Normal Weight	Over Weight	Obese
Low Stress	N	1	18	7	1
	%	3.7%	66.7%	25.9%	3.7%
Moderate Stress	N	15	89	32	6
	%	10.6%	62.7%	22.5%	4.2%
High Stress	N	12	14	8	1
	%	34.3%	40.0%	22.9%	2.9%
Fisher's Exact Test	X <sup>2</sup>	14.22			
	p value	0.018			

Table 3 shows that co-relation between stress and BMI was significant (p value = < 0.05). As indicated by the weak negative correlation (r = -0.185, p = 0.008) observed between stress and BMI, higher levels of stress tend to correspond with slightly lower BMI values. Although this statistical significance embodies a robust finding, on the other hand, clinical significance may be limited given the small effect size. This weak association may still be significant in certain subpopulations or in a multifactor model where it contributes to understanding the factors that regulate BMI. For example, chronic stress would influence eating patterns and metabolic processes that, over long periods of time, might influence BMI slightly. More studies-specifically with larger sample sizes and subgroup analyses-are suggested to explore their clinical relevance.

**Table 3: Correlation of BMI and Stress (n=204).**

Correlation		PSS
BMI	Pearson Correlation	-.185**
	Sig. (2-tailed)	.008
	N	204

**DISCUSSION**

The study was carried out to assess the prevalence of stress and observe its association with BMI among medical students. High levels of stress were seen in 35 (17%) of medical students and moderate levels in 142 (70%) while 47 (23%) were overweight.

Highest level of stress was of moderate type in our study followed by severe and low stress. A study conducted by Nimmala S et al.,<sup>11</sup> showed similar results with moderate stress leading in medical students but showed difference as its followed by low and severe stress respectively. Obesity was found in 4% of our study participants and overweight in 23%, whereas 59.3% subjects had normal BMI and 13.7% were underweight. According to the study conducted in Taiwan by Huang CF et al.,<sup>12</sup> the prevalence rates of underweight, and obesity were 17.1% and 11.0%, respectively, which are higher than the present findings while the rate of normal BMI was 57.7% which is less than our finding. Meanwhile in a study conducted in Malaysia<sup>13</sup> the mean BMI reported to be 27.2 ± 5.60 kg/m2 which is higher than our results where the mean BMI is 22.77±3.81. In a study conducted in Egypt,<sup>14</sup> meaningful

statistical association was found between stress score and increased BMI which is in consistent with our findings.

The statistically significant negative correlation is found between BMI and stress which suggest that obese people have lower stress while people with normal BMI have higher level of stress. A study conducted in a private medical college of Pakistan<sup>15</sup> shows no significant correlation between stress and BMI which is not in agreement with our findings. A study done by Yonghua Chen et al.,<sup>16</sup> showed that with increasing stress, the chances of becoming overweight also increase, which is in contrast to the results of our study. A study done by Huiyan Duan et al.,<sup>17</sup> showed positive correlation between BMI and stress which is in contrast to our results. Research done by Gao Wenjuan<sup>18</sup> showed that female students suffered more from stress than male students which is similar to results of our study. A study done by Daniela Caso et al.,<sup>19</sup> showed that unhealthy food consumption was increased during academic stress which may result in increased BMI meaning a direct association between stress and BMI which is similar to our results. A study done by Armin Aslani et al.,<sup>20</sup> showed positive association between BMI and perceived stress which is similar to our results as it shows significant association also but different in a way that our results showed negative correlation as compared to positive correlation. A study done in Makkah<sup>21</sup> showed that association between BMI and stress was not significant which is in contrast to the results of our study. A study done by Anas Molowi Khalil et al.,<sup>22</sup> showed that 3<sup>rd</sup> year female medical students depicted higher levels of stress but no significant association with gender was seen; also BMI was positively associated with stress. These results are different to our study which showed that 4<sup>th</sup> year medical students depicted higher stress levels, significant gender association with stress was seen and BMI was negatively correlated with stress. A study done by Tuba Yalçın et al.,<sup>23</sup> showed similar results to our study i.e. higher levels of stress were perceived more in underweight individuals i.e. a negative correlation between them.

The weak negative correlation observed ( $r = -0.185$ ,  $p = 0.008$ ) between stress and BMI shows that it is possible for higher stressful conditions to have lower normal BMI levels in medical students, which is contrary to stress-related weight gain. The condition is likely due to unique factors in the mentioned population. On the one hand, acute stress physiologically activates the hypothalamic-pituitary-adrenal (HPA) axis, suppressing appetite, increasing energy expenditure via

restlessness and reducing sleep. On the other hand, because of the tougher scheduling in medical schools, medical students find it hard to keep their regular eating patterns; they wait long before resorting to their next meal or end up consuming less caloric intake. Most importantly, the institutions also minimize access to calorie rich foods making them less likely to experience the stress induced overeating that is observed in others. Psychologically, they cope with stress through emotional-undereating or depending on their medical knowledge and self-control to keep eating patterns healthier. All these suggest that the stress-BMI association in medical students is defined by their peculiar academic, environmental, and psychological contexts.

## CONCLUSION

Majority of medical students had normal BMI and moderate stress levels with a weak negative though significant association between stress and BMI. The findings indicate that stress levels decrease as BMI tends to increase.

## RECOMMENDATIONS

The results can be better understood through further research examining the aforementioned mechanisms in greater detail with subgroup analyses on gender, year of study, and living conditions to establish convincing relationships.

Self-reported measures of weight and height by participants could introduce bias. Therefore, in future studies we recommend taking objective measurements.

Improving body mass index (BMI) and reducing stress are vital for overall health and well-being, especially for medical students who often face high levels of stress due to the demands of their studies. Some recommendations (not entirely based on the current study) tailored specifically for medical students include:

- Prioritize balanced nutrition and stay hydrated.
- Incorporate regular exercise and regular breaks into their study schedule to rest and recharge.
- Get sufficient sleep and manage time effectively.
- Seek social support and professional help if needed.

By incorporating these recommendations into their lifestyle, medical students can work towards improving their BMI and lowering stress levels, ultimately enhancing their overall health and well-being as a medical student.

## REFERENCES

1. Thuma T, Lawandy M, Lotfalla A, Terrell M, Lomiguen C. Mental health matters: mental health and overall well-being among first-and second-year medical students. *Health Prof Educ.* 2020;6(4):516-21.
2. Damiano RF, de Oliveira IN, Ezequiel OdS, Lucchetti AL, Lucchetti G. The root of the problem: identifying major sources of stress in Brazilian medical students and developing the Medical Student Stress Factor Scale. *Braz J Psychiatry.* 2020;43:35-42.
3. Steiner-Hofbauer V, Melser MC, Holzinger A. Focus gender—Medical students' gender-specific perception and attitudes towards the burdens of everyday student life. *GMS J Med Educ.* 2020;37(2):Doc15.
4. Joseph N, Nallapati A, Machado MX, Nair V, Matele S, Muthusamy N, et al. Assessment of academic stress and its coping mechanisms among medical undergraduate students in a large Midwestern university. *Curr Psychol.* 2021;40:2599-609.
5. Fazia T, Bubbico F, Nova A, Buizza C, Cela H, Iozzi D, et al. Improving stress management, anxiety, and mental well-being in medical students through an online mindfulness-based intervention: a randomized study. *Sci Rep.* 2023;13(1):8214.
6. Ziser K, Finklenburg C, Behrens SC, Giel KE, Becker S, Skoda E-M, et al. Perceived stress mediates the relationship of body image and depressive symptoms in individuals with obesity. *Front Psychiatry.* 2019;10:852.

7. Žnidarič M, Zavodnik I, Šrajter LL. Lifestyle of medical students. *Acta Medico-Biotechnica*. 2020;13(1):41-9.
8. Aslam F, Jawad U, Hotiana UA, Mahboob U, Ashfaq S, Jawad MY. Medical students' perspective about attributes of role models-the other side of story. *JEMDS*. 2021;10(22):1692-7.
9. Dörtkol A, Özdemir L. Evaluation of healthy lifestyle behaviors and related factors in medical students. *Cumhuriyet Med J*. 2021;43(1):20-30.
10. Greaney ML, Cohen SA, Xu F, Ward-Ritacco CL, Riebe D. Healthcare provider counselling for weight management behaviours among adults with overweight or obesity: a cross-sectional analysis of National Health and Nutrition Examination Survey, 2011–2018. *BMJ open*. 2020;10(11):e039295.
11. Nimmala S, Bhattacharya A, Ramraj B. A cross sectional study of dietary patterns and the association of perceived stress on body mass index among undergraduate medical students including compulsory residential rotatory interns. *Int J Community Med Public Health*. 2018;5(5):2086.
12. Huang C-F, Chou F-H, Chang C-H, Guo S-E, editors. The associations of body mass index, body image, perceived stress, and mental health among female nursing students: a cross-sectional study in Taiwan. *Healthcare (Basel)*. 2023 Aug 30;11(17):2426. doi: 10.3390/healthcare11172426.
13. Bo MS, Cheah WL, Lwin S, Moe Nwe T, Win TT, Aung M. Understanding the relationship between atherogenic index of plasma and cardiovascular disease risk factors among staff of an University in Malaysia. *J Nutr Metab*. 2018 Jul 4;2018:7027624. doi: 10.1155/2018/7027624.
14. Wahed WYA, Hassan SK. Prevalence and associated factors of stress, anxiety and depression among medical Fayoum University students. *Alexandria J Med*. 2017;53(1):77-84.
15. Anjum AF, Khokhar A, Ayaz H, Masud R, Rehman MU, Sadiq N, et al. Major predictor of depression among medical students: body mass index. *PJMHS*. 2021 April;15(4):790-2.
16. Chen Y, Liu X, Yan N, Jia W, Fan Y, Yan H, et al. Higher academic stress was associated with increased risk of overweight and obesity among college students in China. *Int J Environ Res Public Health*. 2020;17(15):5559.
17. Duan H, Gong M, Zhang Q, Huang X, Wan B. Research on sleep status, body mass index, anxiety and depression of college students during the post-pandemic era in Wuhan, China. *J Affect Disord*. 2022;301:189-92.
18. Gao W, Ping S, Liu X. Gender differences in depression, anxiety, and stress among college students: a longitudinal study from China. *J Affect Disord*. 2020;263:292-300.
19. Caso D, Miriam C, Rosa F, Mark C. Unhealthy eating and academic stress: The moderating effect of eating style and BMI. *Health Psychol Open*. 2020;7(2):2055102920975274.
20. Aslani A, Faraji A, Allahverdizadeh B, Fathnezhad-Kazemi A. Prevalence of obesity and association between body mass index and different aspects of lifestyle in medical sciences students: A cross-sectional study. *Nursing Open*. 2021;8(1):372-9.
21. Feda M, Alsahly SN, Al-Saadi AR, Al-Huthali AKD, Nakhil FTK, Alharbi HM, et al. Prevalence of stress and its association with body weight among medical students in Umm Al Qura university, Makkah 2021. *Ann Rom Soc Cell Biol*. 2021;25(6):21287-99.
22. Khalil AM, Almutairi NM, Alhejaili SS, Alsaedi MQ, Alharbi WK. Prevalence of stress and its association with body weight among medical students in Taibah University. *Pharmacophore*. 2020;11(4):36-45.
23. Yalçın T, Ayyıldız F, Yılmaz MV, Asil E. Relationship of perceived depression, stress, anxiety levels and hedonic hunger. *Int J Obes. (London)*. 2023;47(8):717-23.