

## Original Research

# Association of Body Mass Index and Gender with Anxiety Score in Students of Medical Science

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**Abstract:** Anxiety disorders are the most prevalent mental disorders, especially in young adult population. High body mass index (BMI) is considered a risk factor for common mental disorders and anxiety disorders, particularly in medical students. **Objective:** As such we conducted a cross-sectional study to find the relationship of anxiety with obesity and gender, among students of medical science. **Material and methods:** 156 students (86 male and 70 female students) after initial screening and BMI determination were assessed using Zung self-rating anxiety scale and the association of BMI and gender with anxiety score was evaluated. **Results:** In our study we observed that out of 156 students, 100 had normal anxiety score, 56 had mild - moderate anxiety score while none of the students had severe anxiety score. Among the 70 female students only 16 (22.85%) had mild - moderate anxiety score whereas among 86 male students, 40 (46.51%) had mild - moderate anxiety score. The association of anxiety score with gender was found to be statistically significant ( $p < 0.05$ ) with Chi-square  $\chi^2 = 9.38$  suggesting increased prevalence of anxiety in males. While analyzing the association of anxiety with BMI, it was observed that 50 (40.32%) of the non-obese students had mild - moderate anxiety score and only 6 (18.75%) of the obese students had mild - moderate anxiety score; however the association of anxiety with obesity was not observed in our study population. **Conclusion:** The results of our study suggest that the males are more prone to anxiety as compared to the females. It also indicates the presence of stress in the form of increased anxiety score in the students of medical science; as such it highlights the need to focus on the measures to reduce anxiety in medical students.

**Key words:** Anxiety, Body Mass Index (BMI), Zung self-rating anxiety scale.

## INTRODUCTION

Obesity is a growing public health concern of the modern era. As of 2008, the world health organization (WHO) estimates that at least 500 million adults (>10%) are obese, with higher rates among women than men.<sup>1</sup> Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population.<sup>2</sup> The prevalence of obesity is expected to rise with urbanization and lifestyle shift towards reduced physical activity. Obesity is associated with conditions like hypertension, coronary arteriosclerosis, elevated cholesterol, type 2 diabetes, stroke and certain types of cancers.<sup>3</sup> Psychologically it is associated with several problems such as lower self-concept, negative self-evaluation, decreased self-image, anxiety and depression. The relationship between obesity and common mental health disorders is complex.<sup>4</sup> Some researchers suggest that obesity can lead to common mental health disorders, whilst others have found that psychological factors, as well as behavioral factors play part in development of obesity.

Anxiety is the most common mental health disorder. Anxiety is a physiological and psychological state characterized by cognitive,

somatic, emotional and behavioral components.<sup>5</sup> It is an expression of mood and an extremely adaptive phenomenon, something that we all experience at times. With stress comes a disturbed lifestyle which in turn affects the psychological and physical health. Medical students are more prone to anxiety and its related disorders due to the vast curriculum and hectic teaching schedule.

Various metabolic processes in the body are also influenced by the stress and anxiety. High cortisol secretion and levels during stress might play a role in the relationship of stress and depressive disorders.<sup>6</sup> On the other hand hypothalamic-pituitary-adrenal axis involvement in response to stress could also explain the increase in BMI.<sup>6</sup> Adding to the complexity anxiety can also lead to various eating disorders such as anorexia nervosa and bulimia nervosa. Therefore, in our study we have evaluated the association of obesity and gender with the anxiety score of medical science students.

## MATERIAL AND METHODS

This is a cross sectional study conducted in the department of Physiology, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur. A total of 156 medical and para-medical students

aged between 18 - 25 years, with 70 female and 86 male students, were included in the study. The research protocol was approved by the college ethical committee and an informed consent was obtained from each subject prior to inclusion in the study. Students with the history of endocrine disorders, long-term steroid therapy and congenital heart diseases were excluded from the study.

Body weight was measured while the subject was minimally clothed and without shoes. The height was measured by instructing the subject to stand in erect position with bare feet on flat floor against a vertical scale and with heels touching the wall and head straight. BMI was calculated by weight in kilograms divided by square of height in meters (Weight in kg/height in m<sup>2</sup> = Quetelet index).<sup>7</sup> Using body weight classification system recommended by WHO, BMI was categorized as; underweight (BMI < 18.5), normal BMI (18.5 ≤ BMI < 24.9) or high BMI (≥25).<sup>1</sup> Body mass index (BMI) is the most commonly used tools for assessing body composition because of its simplicity and low cost. For statistical analysis in our study, the students were divided in two groups as; 32 obese / pre-obese students (BMI ≥25) and 124 nonobese students (BMI<25).

Anxiety was assessed by Zung Self Rating Anxiety Scale questionnaire, as it is easy to understand by the participants. The students were asked to fill the Zung self-rating anxiety questionnaire without knowing the interpretation of the scoring system, in the speculated time. Zung Self Rating Anxiety Scale (SAS),<sup>8</sup> is a 20-item self report assessment device which includes measure of state and trait anxiety. Answering the statements a person should indicate how much each statement applies to him or her. Each question is scored on a Liker-type scale of 1-4. Overall assessment is done by the total score. The total scores range from 20-80 and interpreted as; 20-44 Normal Anxiety, 45-59 Mild to Moderate Anxiety, 60-74 Moderate to Severe Anxiety, 75-80 Extreme Anxiety.

#### Statistical analysis

Data analysis was performed using the SPSS windows version 16.0 software. Tests of significance were applied to find out the results and value of  $P < 0.05$  was considered statistically significant. Chi-square test was applied for statistical analysis, to correlate the association of BMI and gender with anxiety score.

## RESULTS

In our study we observed that out of 156 students, 100 had normal anxiety score, 56 had mild - moderate anxiety score while none of the students had severe anxiety score. Among the 70 female students only 16 (22.85%) had mild - moderate anxiety score whereas among 86 male students, 40 (46.51%) had mild - moderate anxiety score (Table - 1).

The association of anxiety score with gender was found to be statistically significant ( $p < 0.05$ ) with Chi-square  $\chi^2 = 9.38$  suggesting increased prevalence of anxiety in males. While analyzing the association of anxiety with BMI, it was observed that 50 (40.32%) of the non-obese students had mild - moderate anxiety score and only 6 (18.75%) of the obese students had mild - moderate anxiety score (Table - 2). The association of anxiety score with BMI was again found to be statistically significant ( $p < 0.05$ ) with Chi-square  $\chi^2 = 5.14$ ; however the association of anxiety with obesity was not observed in our study population.

**Table - 1: Distribution of anxiety score among the study population as a function of gender.**

	Male	Female	Total
<b>Normal anxiety score ( 20-44)</b>	46 (53.48%)	54 (77.14%)	100
<b>Mild-moderate anxiety score (45-59 )</b>	40 (46.51%)	16 (22.85%)	56
<b>Severe anxiety score ( 60-80)</b>	0	0	0
<b>Total</b>	86	70	156

Statistically significant ( $p < 0.05$ ),  $\chi^2 = 9.38$

The connection between obesity and anxiety is an important public health issue because both of these conditions are quiet common and have a significant impact on our health systems.<sup>9</sup>

**Table – 2: Distribution of anxiety score in non-obese and obese study population.**

	Non-obese (BMI < 25)	Obese (BMI > 25)	Total
Normal anxiety score (20-44)	74 (59.67 %)	26 (81.25 %)	100
Mild-moderate anxiety score (45-59)	50 (40.32 %)	6 (18.75 %)	56
Severe anxiety score (60-80)	0	0	0
Total	124	32	156

Statistically significant ( $p < 0.05$ ),  $\chi^2 = 5.14$

#### DISCUSSION

In the present study we observed that out of 156 students, 100 had normal anxiety score, 56 had mild - moderate anxiety score while none of the students had severe anxiety score. Among the 70 female students only 16 (22.85%) had mild - moderate anxiety score whereas among the 86 male students 40 (46.51%) had mild - moderate anxiety score (Table – 1). The association of anxiety score with gender was found to be statistically significant ( $p < 0.05$ ) with Chi-square  $\chi^2 = 9.38$  suggesting increased prevalence of anxiety in males. While analyzing the association of anxiety with BMI, it was observed that 50 (40.32%) of the non-obese students had mild - moderate anxiety score and only 6 (18.75%) of the obese students had mild - moderate anxiety score (Table – 2); however the association of anxiety with obesity was not observed in our study population. Thus the results of the present study suggest that the males are more prone to anxiety as compared to the females; it also indicates the presence of stress in the form of increased anxiety score in the students of medical science.

**Parmar et al.** observed that of the 300 students, 288 has normal anxiety score, and only 12 had mild to moderate anxiety score.<sup>10</sup> None of the students had moderate to severe or extreme severe anxiety score. Out of 117 male students, 3 (2.6%) had mild anxiety score and out of 183 female students, 9 (4.9) had mild anxiety score. Odds ratio

analysis between gender and anxiety demonstrated odds ratio of 0.51 at 95% confidence interval of 0.1348-1.9195. The association of anxiety score with BMI was found to be significantly high in males, whereas there was no statistically significant association between anxiety score and BMI in females. **Rohini et al.** in her study observed that out of 136 students, mild-moderate anxiety score was evident in 10 (7.4%), with remaining students showing normal anxiety score.<sup>11</sup>

This could be due to the majority of male students (94.3% [ $n = 50$ ]) included in the study population than the females (91.6% [ $n = 76$ ]). There was no association between overweight and anxiety scores. With odd ratio of 0.51, it was suggested that males were more prone to anxiety as compared to females [Table 2]. The other BMI groups did not appear to be related with anxiety score.

Further, **Kharche et al.** found no statistical significance in association of anxiety score with normal BMI group and overweight group.<sup>12</sup>

Obesity is associated with several problems such as lower self-concept, negative self-evaluation, decreased self-image, anxiety, and depression. Various studies have demonstrated that children and adolescents at the highest quartiles of BMI had a higher prevalence of concurrent depression, suggesting that associations between these two conditions was more likely to exist in individuals with more severe obesity.<sup>13-15</sup>

Increased anxiety and depression were associated with emotional over-eating and loss of control over eating. **Jorm et al.** observed that obesity had association with anxiety, depression and emotional well-being in different age groups.<sup>16</sup> **Warschburger et al.** found that obese children and adolescents might experience significant restriction in their emotional well-being.<sup>17</sup> As such this young population is more vulnerable to obesity, due to lack of time and opportunity for regular exercise and eating more unhealthy food to avoid the internal stress.<sup>18,19</sup>

In another study by **Anthony F et al.**<sup>20</sup> which investigated the association of obesity with anxiety, depression and emotional well-being in different age groups; it was observed that obesity had an association with anxiety, depression and lower well-being in women, but not in men. But according to some studies by **Marco Piccinelli**<sup>21</sup> and **Loewenthal K et al.**<sup>22</sup> there was no gender difference for anxiety and depression; as

determinants of gender differences in depressive disorders were far from being established and their combination into integrated aetiological models continued to be lacking.

As there is bi-directional association between obesity and common mental health disorders especially anxiety; we should encourage patients to engage in behaviors that will help to improve obesity and common mental disorders, such as stress management, exercise and lifestyle modifications. Some suggestions can be also be helpful in outlining future studies; to assess if the level of anxiety and the related problems can be reduced in medical students by Complimentary and Alternative Medicine.

### Limitations

The Zung self-assessment anxiety scale used might not give the appropriate anxiety score because subjects tend to respond in socially desirable way. Objective parameters like serum or salivary cortisol have not been assessed to correlate the findings with the questionnaire. Moderate sample size in each BMI groups is the other limitations of the study.

### CONCLUSION

In this study the association of anxiety score with male gender was found to be statistically significant, suggesting that males are more prone to anxiety as compared to females. Although this study did not demonstrate any statistical significance in the association of anxiety score with high BMI subjects; our study indicates the presence of stress in the form of increased anxiety score in the students of medical science. Since few studies have examined gender differences in anxiety and their relation to BMI patterns, nothing concrete can be put forward. However, at present in India stress in medical students is high due to increased expectations of performance; as such the present study will highlight the need to focus on the measures to reduce anxiety in medical students. Further this study will also help in detection of high anxiety in students at an early stage which will be helpful in implementation of preventive measures.

**Acknowledgments:** We sincerely acknowledge the technical and statistical help offered by Mrs. Chitra Rani Chauhan. We are also thankful to medical students who voluntarily participated in the study.

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