The Relationship of Eating Disorders Risk with Body Mass Index, Body Image and Self-Esteem among Medical Students

Bhushan Chaudhari, Abhinav Tewari, Jyotsna Vanka, Saurav Kumar, Daniel Saldanha
Department of Psychiatry, Dr. D. Y. Patil Medical College, Pimpri, Pune, Maharashtra, India

Abstract

Background: Eating disorders are rapidly increasing in young population. College students, particularly medical students have shown vulnerability for developing eating disorders. Different sociodemographic factors, BMI, body image and self-esteem have complex interaction with eating disorders risk. However, there has been very little research exploring these relationships in Indian population. Aim: To evaluate relationship of sociodemographic factors, BMI, body image and self-esteem with eating disorders risk. Materials and Methods: A cross-sectional study was conducted in 193 medical students with the help of semi structured proforma consisting of sociodemographic information, self-reported height and weight to calculate BMI, Body Shape Questionnaire 16-item Short Form (BSQ-16) to assess perceived body image, Rosenberg Self-esteem Scale (RSES) to assess self-esteem and Eating Disorder Examination-Questionnaire (EDE-Q) to assess eating disorder risk. Results: We found male students to be at slightly more risk than female students for developing eating disorders. Male students also had significantly higher BMI and more body image dissatisfaction than female students. Eating disorders risk was significantly associated with elevated BMI and body image dissatisfaction. However, there was no significant correlation between eating disorders risk and self-esteem. Conclusion: The present study brings out the vulnerability of male students for developing eating disorders and highlighted elevated BMI and body image dissatisfaction as potential risk factors associated with eating disorders risk. The present study gives insight into early identification and prevention or early treatment of eating pathologies in these students.

Keywords: Eating disorders risk, Body mass index, Body image, Self-esteem, Medical students

Introduction

In recent years, eating disorders have been a cause for concern especially due to their increasing prevalence in all racial, ethnic and socioeconomic groups.[1-3] Traditionally, eating disorders were considered to be restricted to the population of industrial and developed western countries.[4] In contrary, non-western population was thought to be relatively protected from eating disorders because of their cultural differences of symbolizing fatness for beauty, affluence and fertility.[3,4] But with increasing globalization, the western concept of lean and thin body shape as ideal body shape is spreading in non-western population also, increasing body dissatisfaction and unhealthy eating attitudes and behaviours in this population.[3-8]

Though the literature in this regard in Indian population is scarce, researchers have shown that the Indian adolescent girls have similar body ideals as that of western girls in relation to body image disturbance and eating disorders[8,9] and also that the rates of clinical and subclinical eating disorders are on increase in the Indian community.[10-13]

There has been consensus among researchers that certain groups in community are at more risk than the others for developing these disorders. Adolescents and teenage population is particularly vulnerable for eating disorder risk because of transitional nature of this life phase with respect to family relations, friendship, one’s self concept and goal for future. [14] Higher education students also showed similar high risk behaviours leading to eating disorders. Separation from parents, relatively independent lifestyle, establishment of new social relations, gaining acceptance in social relations, need for increased perfectionism, competitive environment and influence from peers can lead to this change in eating behaviours among these higher education students.[15,16]

Some researchers have established that medical students are more at risk for developing eating disorders.[17-19] The vulnerability of medical students can be explained by multiple factors. Stress has been found out to be one of the important triggers for precipitating disordered eating behaviours and it is a well-known fact that medical education is associated with stress. Stigma surrounding eating disorders and mental disorders in general may lead to denial or affect their treatment seeking behaviour. Even it may lead to self-treatment. These factors may delay early identification and treatment of early

phase symptoms, landing student in more severe and resistant phase of eating disorder.[20]

The risk for eating disorders arises from a complex interaction of biological, developmental, sociocultural as well as important psychological factors.[21] Sociocultural influence is thought to be an important determinant for eating disorder risk. Cultural influence on the attitude towards weight has been considered as one of the important factor for determining eating disorders risk in the particular community.[22] Changes in sociocultural structure of the community may influence body image perception of the individuals.[23] Mismatch between perceived body image of self and desired ideal body image creates several issues including eating disorder, depressive disorder and low self-esteem.[24] There have been several reports establishing strong correlation between disturbed body image and low self-esteem.[25]

It is a well-accepted fact that eating disorders characteristically involve disturbed body image and several researchers have established this link between disturbed body image and eating disturbances.[26-28] Some of the researchers have pointed out that low self-esteem can be a mediating link between dissatisfaction with body image and abnormal eating behaviours[29,30] while others have failed to establish this connecting link.[31,32] It has been also shown that the relation between low self-esteem and disordered eating behaviours may be modified by other factors like age, gender, Body Mass Index (BMI) and culture. [33] There have been varied results in varied studies regarding this relationship indicating the role of sociocultural and sociodemographic factors to be taken in consideration.

Most of the studies exploring relationship among eating disorders risk, body image and self-esteem have been done in western population. Research in this regard in Indian population and that to in vulnerable medical students is very limited. The relationship among body image, self-esteem and eating disorder risk has still remained unexplored in this population. In this view, we planned this study to explore this relationship so that students from each stage would get comparable representation in the study sample. A written informed consent was obtained from each participant and all of them were assured that the information given by them would be anonymous and confidential to avoid reporting bias. The study was started after approval from Institution Head and Institutional Ethical Committee.

Participants were administered with a semi structured proforma consisting of sociodemographic information, self-reported height and weight to calculate BMI, body shape questionnaire 16-item short form (BSQ-16) to assess perceived body image, Rosenberg Self-esteem Scale (RSES) to assess self-esteem and eating disorder examination-questionnaire (EDE-Q) to assess eating disorder risk. The scales used are described below.

**Body shape questionnaire 16-item short form (BSQ-16)[24]**

It is a shortened and validated version of Body Shape Questionnaire used to measure individual’s concern about weight, body shape, appearance and body dissatisfaction. It is a self-reported 16-item questionnaire consisting of questions regarding one’s opinion about his/ her body appearance over past 4 weeks scored on Likert scale 1 to 6. The cut off points for the scale are-less than 38-no concern with body shape, 38-51-mild concern, 52-66-moderate concern, more than 66-marked concern with body shape [Appendix-I].

**Rosenberg self-esteem Scale (RSES)[25]**

It is a 10-item self-reported scale widely used to assess global self-esteem scored on Likert scale 0 to 3, the possible score range being 0 to 30. The score below 15 is considered as indicative of low self-esteem while scores of 15 and above are considered normal [Appendix-II].

**Eating disorder examination-questionnaire (EDE-Q 6.0)[26]**

It is a 28-item self-report questionnaire widely used to assess attitudes and behaviours related to eating and body image over past 28 days. Respondent rates each item on 7-point (0 to 6) rating scale. It provides four subscale scores which are Restraint, Eating Concern, Shape Concern and Weight Concern, the possible score range being 0 to 6. The Global score is average of four subscales. A higher score indicates more severe eating psychopathology [Appendix-III].

BMI was calculated by dividing weight (in kilogram) by the square of height (in meter). BMI less than 18.5 was considered under-weight, less than 25 was considered normal, 25 to 29.9 was overweight and 30 or above obese. Chi square test was applied to analyse qualitative variables and one-way ANOVA test was applied to analyse quantitative variables. Forward linear regression analysis was used to find out predictive value of sociodemographic factors, BMI, body image and self-esteem for eating disorder risk as a dependent variable. A p value of <0.05 was considered as significant for all statistical correlations. Statistical analysis of data was done using SPSS 21 software.
Results

In the present study, a total of 193 students completed the questionnaire. The sociodemographic and other characteristics of the students depending on BMI, BSQ score, RSES score and EDE-Q score are depicted in Table 1. Out of 193 students, 76 (39.4%) were males and 117 (60.6%) were females. The mean age of the study sample was 23.4(2.6) years. Male students were slightly more in their mean age as compared to female students [24.1(3.5) vs 23(1.7) years]. In these students, undergraduate (MBBS) students were 86 (33 males, 53 females), interns were 51 (16 males, 35 females) and postgraduate (MD/MS) students were 56 (27 males, 29 females).

The average BMI of the study sample was 24.5(5.3) kg/m². Male students had significantly higher BMI as compared to female students (p<0.01). When divided according to BMI, 16 (8.3%) students were under weight, 88 (45.6%) students were normal, 57 (29.5%) students were overweight and 32 (16.6%) students were obese. Significantly higher numbers of male students were overweight and obese compared to female students (p<0.01).

The average BSQ score was 38.9(17.3) with significantly high score in male students compared to females (p<0.001). 104 (53.9%) students had no concern about their body shape, 43 (22.3%) students had mild concern about body shape, 34 (17.6%) students had moderate concern about body shape and 12 (6.2%) students had marked concern about their body shape. Significantly higher proportion of male students reported higher concern about body shape in comparison to female students (p<0.001).

The mean RSES score was 19.6(4.9) with no gender difference between the mean scores. A total of 28 (14.5%) students had low self-esteem while 165 (85.5%) students were normal regarding their self-esteem. However, when compared for the gender differences a significantly higher proportion of female students had low self-esteem compared to male students (p<0.001).

The mean Global Scores for EDE-Q scale was 1.9(1.4) while mean scores for subscales were Restraint score 1.6(1.4), Eating Concern score 1 ± 1.1, Shape Concern score 2.3(1.5) and Weight Concern score 2.2(1.6). Though there was no significant gender difference for Global score, Restraint score, Shape concern score and Weight concern score, the eating concern score was significantly higher in males compared to females (p<0.01).

Table 2 compares the means of EDE-Q Global and subscale scores in the different groups divided on the basis of BMI (underweight, normal, overweight and obese). EDE-Q Global and all four subscale scores were significantly associated with BMI. Higher scores were observed in overweight and obese students (p<0.001 for all scores). Similarly, when EDE-Q scores were compared in groups divided on the basis of BSQ scores as shown in Table 3, it was found that body image was significantly correlated with EDE-Q scores (p<0.001 for all scores). Students who had moderate or marked concern about their body shape scored high on EDE-Q scores in all subscales and Global score.

Table 4 shows correlation of EDE-Q scores with self-esteem. The results showed that Global score, Restraint score, eating concern score and weight concern score were not significantly associated with self-esteem but Shape concern score was significantly associated with low self-esteem (p=0.02).

Forward linear regression analysis taking sociodemographic

<table>
<thead>
<tr>
<th>Variable</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students</td>
<td>76 (39.4%)</td>
<td>117 (60.6%)</td>
<td>193 (100%)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>Age [Mean(SD)]</td>
<td>24.1(3.5)</td>
<td>23(1.7)</td>
<td>23.4(2.6)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>33 (43.4%)</td>
<td>53 (45.3%)</td>
<td>86 (44.6%)</td>
<td>0.20 †</td>
</tr>
<tr>
<td>Intern</td>
<td>16 (21.1%)</td>
<td>35 (29.9%)</td>
<td>51 (26.4%)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>27 (35.5%)</td>
<td>29 (24.8%)</td>
<td>56 (29%)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>BMI [Mean(SD)]</td>
<td>26.1(4.3)</td>
<td>23.5(5.7)</td>
<td>24.5(5.3)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>Underweight</td>
<td>0 (0%)</td>
<td>16 (13.7%)</td>
<td>16 (8.3%)</td>
<td>0.01 †</td>
</tr>
<tr>
<td>Normal</td>
<td>31 (40.8%)</td>
<td>57 (48.7%)</td>
<td>88 (45.6%)</td>
<td>&lt;0.001 †</td>
</tr>
<tr>
<td>Overweight</td>
<td>32 (42.1%)</td>
<td>25 (21.4%)</td>
<td>57 (29.5%)</td>
<td>&lt;0.01 †</td>
</tr>
<tr>
<td>Obese</td>
<td>13 (17.1%)</td>
<td>19 (16.2%)</td>
<td>32 (16.6%)</td>
<td>0.01 †</td>
</tr>
<tr>
<td>BSQ-16 score [Mean(SD)]</td>
<td>45.9(19.6)</td>
<td>34.1(13.9)</td>
<td>38.9(17.3)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>No concern about body shape</td>
<td>26 (34.2%)</td>
<td>78 (66.7%)</td>
<td>104 (53.9%)</td>
<td>0.01 †</td>
</tr>
<tr>
<td>Mild concern about body shape</td>
<td>17 (22.4%)</td>
<td>26 (22.2%)</td>
<td>43 (22.3%)</td>
<td>&lt;0.001 †</td>
</tr>
<tr>
<td>Moderate concern about body shape</td>
<td>24 (31.6%)</td>
<td>10 (8.6%)</td>
<td>34 (17.6%)</td>
<td>&lt;0.001 †</td>
</tr>
<tr>
<td>Marked concern about body shape</td>
<td>9 (11.8%)</td>
<td>3 (2.6%)</td>
<td>12 (6.2%)</td>
<td>&lt;0.001 †</td>
</tr>
<tr>
<td>RSES score [Mean(SD)]</td>
<td>19.6(4.6)</td>
<td>19.6(5)</td>
<td>19.6(4.9)</td>
<td>0.97*</td>
</tr>
<tr>
<td>Low self-esteem</td>
<td>3 (4%)</td>
<td>25 (21.4%)</td>
<td>28 (14.5%)</td>
<td>&lt;0.001 †</td>
</tr>
<tr>
<td>Normal self-esteem</td>
<td>73 (96.1%)</td>
<td>92 (78.6%)</td>
<td>165 (85.5%)</td>
<td>&lt;0.001 †</td>
</tr>
<tr>
<td>EDE-Q Global score [Mean(SD)]</td>
<td>1.9(1.2)</td>
<td>1.8(1.5)</td>
<td>1.9(1.4)</td>
<td>0.53*</td>
</tr>
<tr>
<td>EDE-Q Restraint score [Mean(SD)]</td>
<td>1.7(1.2)</td>
<td>1.6(1.4)</td>
<td>1.6(1.4)</td>
<td>0.65</td>
</tr>
<tr>
<td>EDE-Q Eating Concern score [Mean(SD)]</td>
<td>1.3(1.2)</td>
<td>0.8(1)</td>
<td>1(1.1)</td>
<td>&lt;0.01 †</td>
</tr>
<tr>
<td>EDE-Q Shape Concern score [Mean(SD)]</td>
<td>2.5(1.6)</td>
<td>2.2(1.5)</td>
<td>2.3(1.5)</td>
<td>0.29 †</td>
</tr>
<tr>
<td>EDE-Q Weight Concern score [Mean(SD)]</td>
<td>2.3(1.5)</td>
<td>2.1(1.6)</td>
<td>2.2(1.6)</td>
<td>0.40 †</td>
</tr>
</tbody>
</table>

* - ANOVA test, † - Chi square test. P value <0.05 is statistically significant.
Table 2: Correlation of EDE-Q Global and Subscales scores with different weight categories based on BMI

<table>
<thead>
<tr>
<th>EDE-Q Score [Mean(SD)]</th>
<th>Underweight</th>
<th>Normal</th>
<th>Overweight</th>
<th>Obese</th>
<th>P value (ANOVA test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Score</td>
<td>0.6(0.5)</td>
<td>1.2(0.8)</td>
<td>2.4(1.1)</td>
<td>3.3(1.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Restraint Score</td>
<td>0.4(0.6)</td>
<td>1.1(1.1)</td>
<td>2.3(1.1)</td>
<td>2.5(1.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Eating Concern Score</td>
<td>0.3(0.5)</td>
<td>0.7(0.8)</td>
<td>1.2(1.2)</td>
<td>1.8(1.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Shape Concern Score</td>
<td>1(0.9)</td>
<td>1.7(1.2)</td>
<td>3(1.2)</td>
<td>3.5(1.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Weight Concern Score</td>
<td>0.7(0.6)</td>
<td>1.5(1.2)</td>
<td>3(1.3)</td>
<td>3.5(1.5)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

P value <0.05 is statistically significant

Table 3: Correlation of EDE-Q Global and Subscales scores with different body shape concern categories based on BSQ-16 score

<table>
<thead>
<tr>
<th>EDE-Q Score [Mean(SD)]</th>
<th>No concern for body shape</th>
<th>Mild concern for body shape</th>
<th>Moderate concern for body shape</th>
<th>Marked concern for body shape</th>
<th>P value (ANOVA test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Score</td>
<td>1.3(1.3)</td>
<td>2.1(1)</td>
<td>2.7(0.9)</td>
<td>3.8(1.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Restraint Score</td>
<td>1.1(1.1)</td>
<td>2.1(1.3)</td>
<td>2.3(1.2)</td>
<td>2.9(1.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Eating Concern Score</td>
<td>0.6(0.7)</td>
<td>0.8(0.7)</td>
<td>2(1.2)</td>
<td>2.9(1.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Shape Concern Score</td>
<td>1.5(1)</td>
<td>2.8(1.3)</td>
<td>3.3(1.1)</td>
<td>4.8(2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Weight Concern Score</td>
<td>1.4(1.2)</td>
<td>2.4(1.4)</td>
<td>3.3(1)</td>
<td>4.6(1.7)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

P value <0.05 is statistically significant

Table 4: Correlation of EDE-Q Global and Subscales scores with different self-esteem categories based on RSES score

<table>
<thead>
<tr>
<th>EDE-Q Score [Mean(SD)]</th>
<th>Low self-esteem</th>
<th>Normal</th>
<th>P value (ANOVA test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Score</td>
<td>1.9(1.2)</td>
<td>1.9(1.4)</td>
<td>0.86</td>
</tr>
<tr>
<td>Restraint Score</td>
<td>1.5(1.1)</td>
<td>1.7(1.4)</td>
<td>0.47</td>
</tr>
<tr>
<td>Eating Concern Score</td>
<td>1(1.4)</td>
<td>1(1.1)</td>
<td>0.97</td>
</tr>
<tr>
<td>Shape Concern Score</td>
<td>2.9(1.7)</td>
<td>2.2(1.5)</td>
<td>0.02</td>
</tr>
<tr>
<td>Weight Concern Score</td>
<td>2.3(1.4)</td>
<td>2.2(1.6)</td>
<td>0.75</td>
</tr>
</tbody>
</table>

P value <0.05 is statistically significant

Factors, BMI, body image (BSQ-16 score) and self-esteem (RSES score) as predictor variables and eating disorder risk (EDE-Q Global score) as an outcome variable showed mild positive correlation with male gender (Regression coefficient=0.19, Pearson Correlation Coefficient= -0.05, p<0.001) and moderate positive correlation with BMI (Regression coefficient=0.4, Pearson Correlation Coefficient=0.59, p value=0.001) and body image (Regression coefficient=0.45, Pearson Correlation Coefficient=0.6, p<0.001) [Table 5]. There was no correlation of eating disorder risk with other sociodemographic factors and self-esteem.

Discussion

We had some important findings from the present study. One of the important finding from our study showed that male students were at slightly more risk of developing eating disorders than female students. Traditionally eating disorders are considered as disorders of female gender and most of the studies in past showed female preponderance in eating disorder patients. [37,38] However, recent studies in this regard have shown that prevalence of these disorders in males has been underreported, under diagnosed and underestimated. Infact, the trends of these disorders are on rise in male population dramatically.

However, lack of awareness of eating disorders in males may lead to underreporting of early symptoms of eating disorders and delay in seeking help by males. [30] It has been stated that eating disorders in males may present clinically in a different way than in females. Males have more eating disorder not otherwise specified (EDNOS) diagnoses than females [31] and they may not show similar weight related and dieting symptoms as females. [42] Lack of understanding of this fact on part of health care professionals may lead to under diagnosis and undertreatment of eating disorders in males. [42] Our study had pointed out the necessity to realise the magnitude of eating disorder related problems in male population.

Our findings also suggested higher proportion of overweight and obese male students based on BMI calculations which was relevant with the findings in other studies in student population. [43] Male students in our study showed more body image dissatisfaction than female students. This is contrary to the findings of many other similar studies which show that females have more body image dissatisfaction compared to males. [43,44] However, recent research on male body image dissatisfaction shows that the prevalence of body image dissatisfaction is increasing in males. [45] Though the body dissatisfaction in adult males is not as straightforward as in adult females the level of body dissatisfaction increases with increasing BMI. [46]

In the present study, we found eating disorder risk was associated with elevated BMI. This relationship between elevated BMI and eating disorder risk has been established in previous studies in both western and Asian setting. [47,48] Chang et al [1] who studied medical students in China also had similar findings. This shows the possible link between being overweight and disturbed eating attitudes. The disparity between actual body weight and desired ideal “thin” body as in western culture drives students to have changes in their eating attitudes. It has been shown than weight control strategies used by overweight people are often ineffective and actually results in weight gain and eating disturbances such as binge eating which further increases risk of obesity. This indicates that elevated BMI and disturbed eating attitudes may be mutually exacerbating. [49]
Another finding from our study showed that body image dissatisfaction was significantly associated with eating disorders risk. It has been consistent with findings of other researchers and the role of body image dissatisfaction in inducing disturbed eating attitudes and eating disorders risk has been implicated in varied sociocultural and ethnic setting.\(^{[13,22,27,28]}\) Body image dissatisfaction may lead to eating disorders either directly or indirectly through self-esteem or negative emotions such as depression, anxiety or social phobia.\(^{[27,50]}\)

Our study showed no correlation between self-esteem and eating disorders risk. Researchers have assessed role of self-esteem in inducing eating disorders and had conflicting results depending on study setting and methods of assessment. Some of them found correlation of self-esteem with eating disorders\(^{[51,52]}\) while others have not found such relationship.\(^{[53,54]}\) Further investigation in this regard is warranted to ascertain the role of self-esteem in causation of eating disorders.

There are some limitations in the present study. Firstly, it was a cross-sectional study which made it difficult to determine the direction of causal association among the variable studied. Secondly, data was collected through self-reported questionnaire which may cause reporting bias of the information given. So, we propose a prospective case control study with face to face interview with study participants in future.

### Conclusion

The present study underlines the fact that elevated BMI and body image dissatisfaction are related to increased risk for developing eating disorders in medical students and probably this relationship is direct, not mediated by disturbances in self-esteem. This will be of clinical implications to both medical students and health care professionals to prevent or detect eating pathologies as early as possible by identifying students at risk. Our study brought out the vulnerability of male students for obesity, body image dissatisfaction and development of eating disorders. Increasing awareness of these facts in students, especially male students, may help them seeking appropriate medical help. It is important for health care professionals also to be aware of these facts so that assessment of eating pathology to be done in all persons at risk.

### Conflict of Interest

None declared.

### References


