Association of anxiety with body mass index (BMI) and waist to hip ratio (WHR) in medical students

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Abstract

Background: Medical students represent a highly educated population under significant pressures. For mental and anxiety disorders in medical students, obesity is considered as a risk factor.

Objective: A cross-sectional study was conducted to find out the relationship of anxiety with obesity and gender among these students.

Materials and Methods: After initial screening of 202 students (90 males and 102 females), their BMI and WHR were assessed. By using Zung self-rating anxiety scale and the association of body mass index (BMI) and waist hip ratio (WHR) with anxiety score was evaluated.

Result: Anxiety score was normal (79 females and 83 males), mild to moderate (21 females and 5 males), moderate to severe (2 females and 2 males). By using Student's unpaired t test, no significant difference of anxiety score among students with BMI > 23 kg/m² and with BMI ≤ 23 kg/m² in both sexes has been found. Also, there was no significant difference of anxiety score among students with higher WHR (males > 0.88 and females > 0.81) and with lesser WHR (males ≤ 0.88 and females ≤ 0.81). Using Pearson's correlation, no significant correlation of BMI and WHR with anxiety score in both sexes has been found.

Conclusion: The present study suggests the presence of stress in the form of increased anxiety score in medical students; but anxiety score has no direct association with BMI as well as with WHR. So, the concentration was needed on different risk factors for anxiety disorders in medical students and to take efforts to reduce them.

KEYWORDS: Anxiety, body mass index, waist hip ratio, Zung self-rating anxiety scale.

Introduction

Medical students represent a highly educated population under significant pressures. They encounter multiple emotions during the transformation from insecure students to young knowledgeable physicians. As far as academic stressors are concerned, academic performance, dissatisfaction, and being overburdened with test schedule are significantly associated with anxiety.[1] The modern age has been called the age of anxiety. Anxiety is a general term for several disorders that cause nervousness, fear, apprehension, and worrying. Remarkably vast curriculum, new environment in hospital, separation from parents, apprehension towards teachers, and senior students are important factors affecting the coping of medical students during their first year of MBBS. Major factors responsible for development of stress in medical students are moving away from home for the first time, which can necessitate leaving all previously learned support systems such as parents, siblings, and high school friends, developing entirely new social contacts, taking responsibilities for their own needs, increased expectations, higher academic competition, difficulty in managing time, and particularly important is developing the clinical competence.[2]

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.[3] Corticotropin-releasing hormone (CRH) plays a central role in the regulation of the hypothalamic-pituitary-adrenal (HPA)-axis, i.e., the final common pathway in the stress response. The HPA-axis is hyperactive in depression, due to genetic factors or due to aversive stimuli that may occur during early development or adult life.[4]

Worldwide, obesity has doubled since 1980. In 2014, more than 1.9 billion adults were overweight. Among these 600 million were obese with high rates in women than men.[5] Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity. Obesity has reached epidemic proportions in India in 21st century, with morbid obesity affecting 5% of country's population.[6]

The relationship between obesity and common mental health disorder is complex. Some researchers suggest obesity can lead to common mental health problems while others have found that people with such disorders are prone to obesity. Depression and obesity both have synergistic negative effects on health when the two disorders coexist.[7] Hence the present study is aimed to assess level of anxiety in medical students and to correlate anxiety levels with BMI and waist hip ratio (WHR).

Materials and Methods

This is a cross sectional study conducted in the department of physiology at Shri VNGMC, Yavatmal for the period september 2015 to december 2015. After taking proper history, about 202 students (90 males and 102 females) healthy volunteers from first and second MBBS were included in this study. Subjects with history of cardiac or respiratory diseases, severe anemia or history of smoking and alcohol were excluded from study. After taking proper written informed consent, students were given Zung self-rating anxiety questionnaire, a 20-item self assessment device and were given time of 10 min.[8] 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 total score. The total scores range from 20 to 80.That are again divided into score with 20–44 as normal range, 45–59 as mild to moderate anxiety levels, 60–74 moderate to severe anxiety levels, 75–80 as extreme anxiety.[8]

The circumferences in waist and hip were obtained using a retractable measuring tape to the nearest 0.1 cm while,

maintaining close contact with skin and without compressing the underlying tissues. Waist was measured horizontally between the lower costal rib and the upper border of the iliac crest. Subjects were in standing position and the measurement was made at the normal minimal respiration. With light summer clothing hip was measured at the maximum circumference of the buttocks. In females, all the measurements were taken by female author. The WHR was calculated from above measurements by using the formula, WHR = waist circumference (cm) /hip circumference (cm). Body weight was measured while the subject was minimally clothed and without shoes and 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 using the formula: weight in kg/height in m^2 (kg/m^2).

The considered cutoff values for normal BMI was 23 kg/m^2 in both sexes while for normal WHRs was 0.88 for males and 0.81 for females as per the study conducted among Asian Indian adults.[9] Statistical analysis of data was done by student's unpaired *t* test for comparison between groups of females and males. Pearson's correlation was used to find out correlation of BMI and WHR with anxiety score for both males and females. *p* value of less than 0.05 was considered as significant.

Result

Table 1 shows that about 79 females and 83 males had normal anxiety score. 21 females and 5 males had mild to moderate anxiety score. Only 2 females and 2 males had moderate to severe anxiety score. No student had extreme anxiety score.

In Table 2, males and females were divided into group I (BMI > 23 kg/m^2) and group II (BMI ≤ 23 kg/m^2). In females difference was significant for weight (*p* = 0.00) and BMI *p* = 0.00) but not for height (*p* = 0.25) and anxiety score (*p* = 0.28) among these groups. While in males difference was significant for height (*p* = 0.00), weight (*p* = 0.00), and BMI (*p* = 0.00) but not for anxiety score (*p* = 0.43) among two groups.

In Table 3, considering the cut off value for normal WHR 0.81 for female and 0.88 for male, two groups were made. In female the difference was significant for waist circumference (*p* = 0.00) and WHR (*p* = 0.00) but not for hip circumference

Table 1: Level of anxiety in males and females according to anxiety score on Zung self-rating anxiety scale

	Anxiety score			
Anxiety level	**Normal**	**Mild to Moderate**	**Moderate to Severe**	**Extremely severe**
Anxiety score	**20–44**	**45–59**	**60–74**	**75–80**
Female	*N* = 79	*N* = 21	*N* = 2	*N* = 0
mean ± SD	33.51 ± 5.74	47.95 ± 2.43	61.5 ± 70	
Male	*N* = 83	*N* = 5	*N* = 2	*N* = 0
mean ± SD	34.59 ± 5.69	49.8 ± 3.34	63.5 ± 2.12	

Table 2: Comparison of Height, weight, BMI and anxiety score with unpaired *t* test, among groups of males and females grouped according to BMI

	Body Mass Index							
	Females				Males			
	Group I (>23)	Group II (< 23)			Group I (>23)	Group II (< 23)		
	N = 23	N = 79	t	p	N = 21	N = 69	t	p
	mean ± SD	mean ± SD			mean ± SD	mean ± SD		
Height	1.57 ± 7.15	1.59 ± 6.50	-1.16	0.25	174.05 ± 5.40	168.49 ± 8.06	2.95	0.00**
Weight	62.13 ± 5.17	49.13 ± 5.93	9.50	0.00	82.04 ± 11.19	53.98 ± 6.62	14.25	0.00**
BMI	25.15 ± 2.58	19.37 ± 1.93	11.63	0.00	27.05 ± 3.29	19.01 ± 1.90	14.03	0.00**
Anxiety score	35.34 ± 10.09	37.53 ± 8.04	-1.08	0.28	34.90 ± 8.64	36.43 ± 7.47	-0.79	0.43

** *p*<0.01 – statistically highly significant

Table 3: Comparison of waist circumference, hip circumference, WHR and anxiety score with unpaired *t* test, among groups of males and females grouped according to WHR

	Waist Hip Ratio							
	Females				Males			
	Group I (> 0.81)	Group II (< 0.81)			Group I (> 0.88)	Group II (< 0.88)		
	N = 20	N = 82	t	p	N = 11	N = 79	t	p
	mean ± SD	mean ± SD			mean ± SD	mean ± SD		
WC	78.00 ± 8.69	68.68 ± 6.43	5.39	0.00	97.00 ± 9.61	75.05 ± 8.86	7.61	0.00**
HC	92.45 ± 11.30	91.15 ± 6.67	0.66	0.51	107.82 ± 9.74	92.75 ± 6.90	6.42	0.00**
WHR	0.84 ± 0.05	0.75 ± 0.03	9.88	0.00	0.89 ± 0.01	0.80 ± 0.05	5.40	0.00**
Anxiety score	36.05 ± 8.47	37.28 ± 8.59	-0.58	0.57	38.09 ± 9.82	35.79 ± 7.44	0.92	0.36

** *p*<0.01 – statistically highly significant

(p = 0.51) and anxiety score (p = 0.57) among both groups. In males the difference was significant when waist circumference (p = 0.00), hip circumference (p = 0.00), WHR (p = 0.00) were considered and there was no significant difference for anxiety score (p = 0.36) among both groups.

In Table 4, BMI, WHR and anxiety score for total males and females were compared using unpaired *t* test. There was no statistical significant difference for BMI (p = 0.68) and anxiety score (p = 0.42). There was significant difference when WHR (p = 0.00) was considered and it is found to be more in males.

Table 5 shows correlation of BMI and WHR with anxiety score for total males and females. There was no significant correlation of BMI and WHR with anxiety score in both sexes.

Discussion

In present study, the authors tried to find out relationship of BMI and WHR with anxiety score. But, no significant correlation was found. In the present study, there was no association between obesity and anxiety in medical students. Obesity and depression are each complex multifactorial conditions that often have roots in childhood and are influenced by genetics as well as family, social, and environmental context.[10] Multiple social, demographic, behavioral, and academic factors have

Table 4: Comparison of BMI, WHR and anxiety score among males and females with unpaired *t* test

	Female N = 102	Male N = 90	t	p
	mean ± SD	mean ± SD		
BMI	20.67 ± 3.20	20.89 ± 4.11	-0.40	0.68
WHR	0.77 ± 0.05	0.81 ± 0.06	-5.77	0.00**
Anxiety score	37.03 ± 8.54	36.07 ± 7.74	0.81	0.42

***p*<0.01 – statistically highly significant

been found to be significantly associated with most of the studied psychological morbidities; among them, gender, residence, feeling loneliness, the inability to share families in social activities, presence of insomnia and chronic physical illnesses, studying in English language, problems with exams' criteria, and the organization of lectures' timetable were the most common. Organized interventions should be initiated to prevent anxiety.[11]

Some other researchers also had similar findings. Gupta et al.[12] conducted study at MG Medical College, Jaipur on 150 first year medical students and found low prevalence of anxiety amongst medical students. There was no statistically significant difference in the stress on the basis of gender

Table 5: Assessment of correlation of BMI and WHR with anxiety score among males and females.

	Pearson's correlation					
	BMI mean ± SD	Anxiety score mean ± SD	*p*	WHR mean ± SD	Anxiety score mean ± SD	*p*
Females	20.67 ± 3.20	37.03 ± 8.54	0.215	0.77 ± 0.05	37.03 ± 8.54	0.121
Males	20.89 ± 4.11	36.07 ± 7.74	0.254	0.81 ± 0.06	36.07 ± 7.74	0.801

although the females had a greater percentage as compared to males for severe anxiety during the examination period. Kharche et al.[13] demonstrated no statistically significant difference in anxiety scores of overweight and normal weight young adults. Also, there is no statistically significant association between anxiety and BMI.

Rohini et al.[14] observed that, out of 136 students, mild–moderate anxiety score was evident in 10 (7.4%) with remaining students showing normal anxiety score. 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.

Parmar et al.[15] found significant association of anxiety score with BMI in males whereas, there was no statistically significant association between anxiety score and BMI in females. Thus, it suggested that males are more prone to anxiety compared to females, especially in subjects with high BMI. Borse et al.[16] carried out study on 121 medical students and found academic performance was significantly less in males with higher WHR and also less in females with higher WHR but difference was not significant.

Brain processes in response to stress and the hypothalamic–pituitary–adrenal axis could explain the increase in BMI.[3] Gariepy et al.[17] found moderate evidence supporting a weak but positive association between anxiety and obesity. But, the causal effect of obesity on anxiety disorders could not be inferred from data. But in the present study, there was no association between obesity and anxiety.

Conclusion

The present study suggests the presence of stress in the form of increased anxiety score in medical students; but anxiety score has no direct association with BMI as well as with WHR. So, the concentration is needed on different risk factors for anxiety disorders in medical students and to take efforts to reduce them. Limitation of this study was small sample size and there might be ethnic and demographic variables. Self-assessment anxiety scale used might not give the appropriate data because subjects tend to respond in socially desirable way.

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