

Factors associated with social anxiety disorder in a group of obese Turkish female patients

Akatlı Kürşad ÖZŞAHİN^{1*}, Ebru ALTINTAŞ²

¹Department of Family Medicine, Faculty of Medicine, Başkent University, Yüreğir, Adana, Turkey

²Department of Psychiatry, Faculty of Medicine, Başkent University, Yüreğir, Adana, Turkey

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Background/aim: Mental disorders may accompany obesity. This study aims to evaluate the association between social anxiety disorder (SAD) and obesity and the risk factors for SAD in obese female patients.

Materials and methods: A total of 114 obese patients and 110 healthy controls were included. The Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), State and Trait Anxiety Inventory (STAI I-II), and Liebowitz Social Anxiety Scale (LSAS) were administered to assess anxiety, depression, and social anxiety levels. Scale scores were analyzed statistically.

Results: The rate of SAD in obese female patients was found to be 8.8%. Anxiety, depression, and social anxiety levels were significantly higher in the obesity group compared to the control group ($P < 0.05$). According to linear regression analyses, a significant association between LSAS anxiety level and age, prior surgery, social support, history of being teased, BDI, and BAI was found.

Conclusion: The present study shows that many factors are related to obesity and SAD in obese female patients. The clinical implications of these findings should be considered. Interventions for these factors may help prevent SAD in obese female patients.

Key words: Obesity, social anxiety disorder, risk factor, anxiety, depression

1. Introduction

Excess body weight and obesity have become serious health problems in the world, even reaching epidemic proportions. Obesity is defined as a preventable excessive fat accumulation that may impair health. Since 1980 it has more than doubled; 13% of adults aged 18 years and over (11% of men and 15% of women) were obese in 2014 (<http://www.who.int/mediacentre/factsheets/fs311/en/>). Obesity incidence in adults doubled between 1990 and 2010, reaching 36% from 18.8% in Turkey (1).

Although easily diagnosed by physical appearance, the degree of obesity is assessed by body mass index (BMI) measurement. Obesity as an independent risk factor is known to be associated with cardiovascular and many systemic diseases and mental disorders. It has also been found to be associated with depression, bipolar disorder, panic disorder, social anxiety disorder (SAD), agoraphobia, suicidal ideation, suicide, and posttraumatic stress disorder (PTSD) (2,3).

Despite mental disorders that are shown to develop more in women than men, there are studies that found no intergender differences (2,3). There is an interactive relation

between obesity and mental disorders. Mental disorders may accompany obesity and obesity may develop during the course of mental disorders. Dysregulation in the hypothalamic–pituitary–adrenocortical axis, eating habits, declined physical activity, weight perception of the individual, genetics, and physical disorders related to obesity can be reasons for mental disorders developing in obese people (4–6).

Obese people may develop SAD as a result of cultural stigmatization, fear of being negatively evaluated because of their physical appearance, and the association of other mental disorders, predominantly depression (3). SAD is defined as an excessive and meaningless fear of being scrutinized and judged by others in social or performance situations that leads to avoidance. Encountering a frightening situation triggers the physiologic symptoms of anxiety and the individual copes with these symptoms through avoidance. Avoidance causes impairment in the quality of social, occupational, and individual life. The incidence of SAD is 7.1%–12.1% in the general population. Speaking, eating, or drinking in front of a group of people, where the individual is somehow subject to judgment, causes excessive fear and anxiety (7).

* Correspondence: kozsahin@gmail.com

Contradictory results were obtained by a few studies on the association between BMI and SAD. Incidence of SAD in obese patients was found to be 5.86%–59% (8,9). A specific association between high BMI and social anxiety is seen, especially in women (9,10). There are studies in obese patients that have found no significant association between BMI and SAD and showed that the anxiety is due to body image dissatisfaction and appearance-based SAD (9,11).

The aim of the present study was to determine the relation between SAD and obesity and factors associated with social anxiety disorder in obese female patients. Sociodemographic features, state and trait anxiety, comorbid psychiatric disorders, and eating attitudes were also assessed.

2. Materials and methods

This study was undertaken in the endocrinology and psychiatry outpatient clinics of Başkent University Adana Hospital between January 2015 and April 2017. It adhered to the tenets of the Declaration of Helsinki and was approved by the Başkent University Institutional Review Board and Ethics Committee (Project No: KA 16/60). It was supported by the Başkent University Research Fund.

One hundred and fourteen women between 18 and 56 years of age, diagnosed with obesity according to BMI, were included. The control group consisted of 110 women of normal weight whose age and level of education were matched. BMIs for all participants were calculated after weight and height were measured without shoes. Those with a BMI value of 18–25 were considered as normal and overweight and those with >30 were considered as obese.

A structured clinical interview according to the DSM-5 and the Liebowitz Social Anxiety Scale (LSAS) were established by a psychiatrist; the Beck Anxiety Inventory (BAI), Beck Depression Inventories (BDI), and State-Trait Anxiety Inventory (STAI-I, STAI-II) were completed by the patients.

Those with psychotic disorders, mental retardation, bipolar disorder, history of substance abuse, and chronic organ diseases were excluded. Written consent was obtained from every participant after they were informed about the aim and features of the study.

2.1. Measures

2.1.1. Sociodemographic Variable Form (SDVF)

Age, level of education, occupation, marital status, number of children, place of living, medications, prior surgery history, social support, diet, and exercise for weight loss were recorded. Participants were asked if their eating behavior was related to their emotional status. Stressful life events during the weight gain period (births, deaths, marriage, being unemployed, marital problems, financial problems, school problems, problems with friends, change of housing) were also investigated.

2.1.2. Beck Depression Inventory (BDI)

The BDI is a self-assessment scale consisting of 21 questions developed by Beck in 1961 to measure the level of depressive symptoms and change of severity (12). A Turkish validity and reliability study was done by Hisli in 1989 (13). The scale has twenty-one 4-point Likert-type items and overall scores are obtained with the addition of item scores. The Turkish reliability and validity study was conducted previously and a score of 17 was reported as the cut-off for clinically significant depressive symptoms.

2.1.3. Beck Anxiety Inventory (BAI)

The BAI measures the frequency of anxiety symptoms of an individual. It is a Likert-type self-assessment inventory consisting of 21 items scored between 0 and 3. The sum of total points shows the level of anxiety that a person experiences. A high total score indicates high levels of anxiety. It was developed by Beck in 1988 and the Turkish validity and reliability was established by Ulusoy et al (14,15).

2.1.4. State and Trait Anxiety Inventory (STAI I-II)

STAI-I determines how an individual feels at a certain time under certain conditions, while STAI-II determines how an individual feels independently of present conditions. This scale was developed by Spielberger and it contains a total of 40 questions prepared in two Likert forms. The total score from both scales is between 20 and 80. A higher score indicates a higher anxiety level. The validity and reliability of both tests was established by Le Compte and Öner (16,17).

2.1.5. Liebowitz Social Anxiety Scale (LSAS)

This scale was developed by Liebowitz et al. to determine fear and/or avoidance levels of patients with SAD (18). The form is administered by the interviewer and has overall 24 items, 11 of which focus on social interaction and 13 on performance status. Each subscale has 0–72 points. High scores indicate high social anxiety and avoidance. The Turkish form's validity and reliability was established by Dilbaz (19).

2.1.6. Eating Attitude Scale (EAS)

This worldwide used scale was developed by Garner and Garfinkel (20). It is a self-assessment scale developed to determine possible impairments in eating behavior, both for patients with eating disorders and for normal individuals. It is a Likert-type scale that consists of 40 items and six steps as always–never. High total scores indicate high pathology. The Turkish validity and reliability was determined and no cut-off point for the Turkish form was calculated (21).

2.2. Statistical analysis

All statistical analyses were carried out using SPSS 23.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as number and percentages, while

continuous measurements were summarized as mean and standard deviation (for normal data) and median, minimum, and maximum where needed.

If continuous variables were normal, they were described as the mean ± standard deviation ($P > 0.05$ in the Kolmogorov–Smirnov test or Shapiro–Wilk ($n < 30$)), and if the continuous variables were not normal, they were described as the median. The continuous variables were compared by the use of the Student t-test or Mann–Whitney U test depending on parametric or nonparametric values, respectively. The chi-square test was used for comparing categorical variables. Linear regression analysis was performed to identify variables that affected the LSAS fear/anxiety. The association of inventories was determined by Spearman correlation test. For all tests, the level of statistical significance was considered to be $P = 0.05$.

3. Results

3.1. Sociodemographic features

Sociodemographic features are given in Table 1.

Of the obese patients, 71.6% had a self-reported psychiatric diagnosis. These were, from most to least common, depressive disorder in 29.8% ($n = 34$), anxiety disorder in 19.2% ($n = 22$), obsessive compulsive disorder in 11.4% ($n = 13$), panic disorder in 2.6% ($n = 3$), eating disorder in 2.2% ($n = 2$), somatoform disorder in 1.1% ($n = 1$), and special phobias in 6.1% ($n = 7$).

3.2. The comparison of inventories

Mean eating attitude scores for the obesity and the control group were 29.5 ± 13.2 and 17.3 ± 8.06 , respectively, which was statistically significant. Mean scores for the BDI, BAI, STAI I and STAI II, and LSAS anxiety and avoidance were significantly higher in the obesity group compared to the control group ($P < 0.05$) (Table 2).

The correlation analysis conducted between the scales showed that eating attitude was significantly related to anxiety, depression, and social anxiety level ($P < 0.05$). The correlation between inventories was determined by the Spearman correlation test (Table 3).

3.3. Linear regression analysis

In the first stage of identifying the risk factors possibly associated with social anxiety in obesity, LSAS anxiety was determined as the dependent variable. In the second stage of the model, the association between obesity and possible related factors (age, level of education, marital status, place of living, prior surgery, continuous drug use, social support, exercise, history of being teased, BDI, and BAI) was analyzed. Significant association between LSAS anxiety level and age, prior surgery, social support, history of being teased, BDI, and BAI was found (Table 4).

4. Discussion

To the extent of our knowledge; this is the first study of obese female patients to identify the independent risk factors associated with social anxiety level.

Table 1. The analysis of psychiatric morbidity and sociodemographic features between groups (n (%)).

	Obesity	Healthy controls	P
Stressful life events	81 (72.3)	5 (4.6)	0.000
Prior operation	58 (51.8)	17 (15.6)	0.000
Continuous drug use	69 (61.6)	7 (6.4)	0.000
Social support	55 (49.1)	100 (91.7)	0.000
Diet	49 (43.8)	12 (11)	0.000
Dietitian application	54 (48.2)	4 (3.7)	0.000
Exercise	35 (31.3)	28 (25.7)	0.361
History of psychiatric treatment	45 (40.2)	2 (1.8)	0.000
History of being teased	42 (37.5)	6 (5.5)	0.000
Association of eating with mental status:			
Happy	21 (18.4)	50 (45.4)	
Sad	51 (44.7)	14 (12.7)	
Anxious	37 (32.4)	8 (7.2)	
Angry	28 (24.5)	6 (5.4)	

Table 2. The comparison of inventories between groups.

Inventories	Healthy controls Mean ± SD	Obesity Mean ± SD	P
BAI	5.6 ± 6.32	19.7 ± 12.2	0.000
BDI	5.2 ± 6.32	16.9 ± 9.94	0.000
LSAS fear/anxiety	36.97 ± 9.7	47.5 ± 15.1	0.000
LSAS avoidance	38.1 ± 9.44	46.4 ± 14.9	0.000
STAI-I	44.3 ± 5.87	42.1 ± 5.95	0.007
STAI-II	45.3 ± 4.84	50 ± 5.97	0.000

BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory, STAI I II: State and Trait Anxiety Inventory; LSAS: Liebowitz Social Anxiety Scale ; SD: standard deviation; P: Mann–Whitney U test.

Table 3. Simple correlation between LSAS and scales.

	LSAS anxiety	LSAS avoidance
EAS	0.215**	0.191**
BDI	0.452**	0.406**
BAI	0.358**	0.317**
STAI_I	-0.213**	-0.163*
STAI_II	0.296**	0.253**

BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory, STAI I II: State and Trait Anxiety Inventory; LSAS: Liebowitz Social Anxiety Scale.

*P < 0.05 (Spearman correlation coefficients = r); **P < 0.01 (Spearman correlation coefficients = r).

Table 4. The analysis of factors associated with social anxiety in obese patients.

Constant	Unstand coeff		Stand coeff beta	t	Sig	95% CI for B	
	B	Std error				Lower bound	Upper bound
Level of education	-1.372	1.119	-.082	-1.226	0.222	-3.579	0.836
Occupation	1.051	0.848	0.082	1.240	0.216	-0.621	2.723
Marital status	-0.735	1.330	-0.033	-0.553	0.581	-3.357	1.888
Place of living	2.447	3.423	0.044	0.715	0.476	-4.303	9.196
Prior surgery	-4.615	1.993	-.159	-2.315	0.022	-8.545	-0.684
Continuous drug use	0.810	2.160	0.028	0.375	0.708	-3.448	5.069
Social support	5.023	1.935	0.168	2.595	0.010	1.206	8.840
Exercise	3.154	1.901	0.102	1.664	0.098	-0.585	6.914
History of being teased	-8.277	2.164	-0.251	-3.825	0.000	-12.544	-4.010
BDI	0.353	0.107	0.262	3.310	0.001	0.143	0.563
BAI	210	0.097	0.181	2.156	0.032	0.018	0.402

Dependent variable: LSAS anxiety

BAI: Beck Anxiety Inventory, BDI: Beck Depression Inventory, CI: confidence interval

Common comorbid psychiatric conditions in obese patients are anxiety and mood disorders, especially depressive disorder (2,3). In research conducted with 9125 obese patients in the United States, Simon et al. showed that lifelong incidence of major depressive disorder, bipolar disorder, panic disorder, and agoraphobia were significantly higher (2). Similarly, in our study, depressive disorder was also high, and additionally generalized anxiety disorder and obsessive compulsive disorder were common in our group of patients.

Besides mental disorders, the association of eating with mental state in women is known (22). In particular, increase in appetite with negative emotions in atypical depression, premenstrual dysphoric syndrome, and eating disorders were found. Compatibly with the literature, our study showed that obese women tended to eat when they were sad, angry, or anxious.

We found significant association between stressful life events and obesity. Some studies have shown that there is a positive association between negative life events and obesity (23–25). However, a study conducted with African American women found no association between stressful life events and BMI, suggesting that cultural differences may play important roles (26).

In the literature a small number of studies have assessed mental disorders that can be associated with obesity. It was found that obesity was associated with anxiety and mood disorders and the severity of anxiety increased odds of obesity, which is similar to our study's findings (2,27). The association between depression and obesity is reciprocal and possible reasons include lack of physical activity in depression, effects of the drugs on hypothalamic regulations of appetite, and association of comorbid eating disorders. Weight gain may lead to depression with stigmatization and lack of physical and social activity. Additionally, in our study it was found that, besides depression, increase of social anxiety level is a predictor for the development of obesity. Barry et al. found a significant association between social anxiety and obesity and specified that this association occurred as obese people anticipate being negatively evaluated based on weight (27).

In its natural course, SAD is known to begin in 80% of cases under the age of 20; is seen more frequently in women displaying depression, anxiety disorders, and alcohol use; and worsens in patients with low social support, which is similar to our study (28–30). Contradictory results are presented by studies on the association between obesity and social anxiety (3,27,31,32). The frequency of social anxiety in obesity has been found to be 59% (9). This rate is quite higher than the social anxiety level of the general population. Similarly, in our study, the level of social anxiety has been found to be higher in obese participants than the control group.

Differently from other studies, in this study factors associated with social anxiety in obese women have been assessed. Some factors were found to be associated with obesity, as anticipated. Linear regression analysis showed that young age, prior history of surgery, low social support, history of being teased in childhood, and depression may be risk factors for the development of social anxiety in these patients.

Our study has displayed that a history of being teased in childhood may be a predictor for the development of SAD in adulthood in obese patients. The history of being teased in childhood is also high in patients with SAD (33). Our study is in line with those studies showing that traumatic events during childhood are associated with adult obesity (34). There are accumulating data on early life stress leading to chronic hyperactivity of the hypothalamic–pituitary–adrenal axis and causing fat deposition in visceral adipose tissue (35,36). Our results also imply that people with a history of being teased in childhood may develop SAD at young ages, which can be related to stigmatization-imposed introversion, lack of self-confidence, and behavioral changes regarding to eating.

Our study revealed that young age was associated with SAD in obese females. The rate of SAD onset before age 18 was found to be 79.6% in a prior study (37). The nature of SAD is closely related to neurobiological and genetic transitions and that may be the reason it arises in childhood or adolescence. Obesity at young ages may lead to social activity limitations and low self-esteem developing during the young adolescent period due to hyperandrogenism may cause SAD (38,39).

It is known that individuals with low social support are prone to develop SAD (40). Controversial results have been obtained in studies related to the effect of social support on BMI and weight loss (41–45). The presence of a correlation between high BMI and social support is highlighted and the support of family, close friends, and teachers is especially underlined (44,45). Social support promotes healthy behaviors; therefore, increasing social support from family and friends is warranted (44). Social support was found to be directly related with well-being, whereas BMI was not (41). People with SAD display high rates of reduced productivity and therefore may be dependent on the family, state, or society. Our study has found an inverse association between low social support and level of social anxiety.

Not surprisingly, a significant association between increasing levels of depression and development of SAD in obese females was found. Depression is a common psychopathology seen both in obese patients and in patients with SAD (28,29,46). Depression may increase the risk of obesity and obesity may trigger depression (46,47).

Possible reasons to explain the relationship between depression, SAD, and obesity are their common use of the hypothalamo-pituitary-adrenal axis and monoaminergic systems, effects of antidepressive treatments on weight, and finally lack of physical activity. The presence of depression worsens the severity of SAD, benefits of treatment, and quality of life (48,49).

Our study has found that obese women who had undergone any operations more often developed SAD. This has never been studied before. We believe the anxiety load during the pre- and postoperative period may lead to development of SAD.

The most important limitation of this study is that it was cross-sectional and conducted in a certain group of patients; thus, the results cannot be generalized. Some of the interview questions were closely related with patient memories, so some of the answers may be doubtful. Finally, the association between eating and emotional state was not identified with objective tests.

We conclude that the lack of social support for obese individuals may lead to SAD. Social support for any given individual is of paramount importance for individuals'

mental well-being. Families and communities as a whole must find ways to support every individual and this must especially include obese individuals who need social support to a greater extent. Our study also implies that families need to care about their children's nutrition habits starting from childhood to even beyond adolescence since every child in the present time may be assumed to be a possible victim of obesity and accompanying mental disorders.

This is the first study to assess the risk factors for SAD that accompany obesity. The prediction of these risk factors may help with these two conditions, which cause severe impairment in the social, occupational, and family life of an individual. We believe that population-based clinical studies in which more parameters are considered with greater subject count are needed.

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