

Frequency of Major Depressive Disorders Among Obese Adults Patients Attending to Academic Port-Fouad Family Practice Center Faculty of Medicine, Suez Canal University

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Abstract

Background: Obesity has become a major contributor to the global burden of chronic disease and disability. Studies have consistently found a modest association between depression and obesity. Meta-analysis of 17 community-based studies found that obese people were 1.18 times more likely to have depressive symptoms than those who were not obese. This relationship has been suggested to be dose dependent, with a higher body mass index (BMI) being linked to a greater likelihood of clinical depression. **Aim:** to estimate the frequency of major depressive disorders among obese adults patients. **Patients and Methods:** The present study was designed as descriptive analytical cross-sectional study that included 129 adult obese patients attending to Academic Port-Fouad Family Practice Center, Faculty of Medicine, Suez Canal University. **Results:** Mean age of the patients in different groups was comparable ($p=0.52$), 53.5% of obese patients in our sample had no depression, whereas 41.9% had mild depressive symptoms and 4.7% are severely depressed. Frequency of eating dairy products was significantly different between depressed and non-depressed patients ($p=0.027$). Depressed patients significantly had a greater number of snakes (2.25 ± 1.83 times) than those with no depression ($p=0.011$). Depressed patients were significantly less satisfied with their body shape ($p=0.008$). **Conclusion:** Depression often accompanies obesity. Therefore, it is recommended that health professionals should always explore the presence of depression and suicidality in obese patients.

Keywords: Major depression disorder, Obesity, and Prevalence.

Introduction

Obesity is a chronic disease of individual and public health which affects many people all over the world. Obesity has become a major contributor to the global burden of chronic disease and disability. It is a complex condition with serious social and psychological dimensions, affecting virtually all ages and socioeconomic groups⁽¹⁾. The

most used definitions of obesity are based on BMI, which is defined as weight in kilograms divided by height in meters squared. In adults, obesity is generally defined as a BMI of 30.0 or greater⁽²⁾. Recent epidemiological studies show that a high percentage of people have some kind of pathology associated with obesity, reaching figures exceeding 300 million all over the world⁽³⁾. As prevalence rate of obesity in adults 32 % in

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Egypt (WHO 2016), in the Eastern Mediterranean Region, some research studies confirmed that overweight has reached an alarming level. During adulthood, women showed a higher prevalence of obesity (35–75%) compared with men (30–60%)⁽⁴⁾. In an Egyptian study, the prevalence of obesity among adults was 24.1 and 28.7% based on the waist circumference and waist-to-hip ratio indicators, respectively⁽⁵⁾. Depression and obesity are common, with an estimated 350 million and 500 million people globally with these respective conditions⁽⁶⁾. Studies have consistently found a modest association between depression and obesity. Meta-analysis of 17 community-based studies found that obese people were 1.18 times more likely to have depressive symptoms than those who were not obese, with this association more clearly present among women than men. Evidence of a relationship between depression and obesity was found in a meta-analysis of longitudinal studies⁽⁷⁾. Obesity increased the odds of subsequent depression by 1.27 and 1.55 respectively, while depression increased the odds of obesity at follow-up by 1.58. This relationship has been suggested to be dose dependent, with a higher body mass index (BMI) being linked to a greater likelihood of clinical depression⁽⁸⁾. Another study administered at Ain Shams University, which followed 50 obese adults for one year, found that females with depression were 54 percent more likely to be affected by obesity at the end of the study than those who were not obese; no such association was found in males⁽⁹⁾. In many countries, including Australia, the UK, and Canada, clinical practice guidelines recommend that family physicians play a role in the management of both obesity and depression⁽¹⁰⁾. Recent data from Australia's Bettering the Evaluation and Care of Health (BEACH) study of family physicians

found that depression was the fifth most frequently managed problem, and weight and nutrition counseling was the most common preventative treatment administered. The frequency with which these conditions are encountered in primary care suggests that family physicians may need to be equipped to provide comprehensive care to patients with depression and obesity⁽¹¹⁾. The National Health and Nutrition Examination Survey data showed that among the most obese adults, in the 95th to 100th percentile, the prevalence of major depression increased to highly significant levels, 20% for men and 30% for women⁽¹²⁾. An analysis of previous studies looking at depression and obesity (BMI more than 30) published in the Archives of General Psychiatry in 2010 re-confirmed the link between the two and showed that being affected by obesity at the start of the studies significantly increased the chance of having depression later among people more than 20 years old, but not for teens or children. And, having depression at the start significantly increased the chances of developing obesity later⁽¹³⁾. There is not enough data base for the association between obesity and depression in Egypt and also the prevalence of depression in obese adults which needs further studies. So this research will be carried out to estimate the prevalence of depression among adults with obesity in Port Fouad city. This study was conducted to improve the quality of life of obese patients attending to Academic Port-Fouad Family Practice Center, Faculty of Medicine, Suez Canal University.

Subjects and Methods

This work is a descriptive cross-sectional analytical study carried out in Academic Port-Fouad Family Practice Center, Faculty of Medicine, Suez Canal University. Adults who were diagnosed with obesity

to evaluate the prevalence of major depressive disorders in these patients through a simple concise and informative questionnaire. Our study included 129 adult obese patients attending academic Port-Fouad family health center.

Study population

A simple randomly selected sample of adults above 18 years' old with obesity attending to academic Port-Fouad family health center, Faculty of medicine at Suez Canal University were included. Patients with any of the following conditions were excluded from the study; 1. Other chronic diseases (e.g., hypertension, chronic liver diseases, bronchial asthma, cancer, diabetes, hypothyroidism) 2. Complications of obesity as infertility. 3. Nearby bad social life event in the last 6 months as (operation, drug abuse, death of family member, breakup of beloved one, divorce). 4. Drug users (atypical antipsychotics, diabetes therapies, steroids hormone, anti-convulsions).

Sample size

It was planned to take a sample sufficient enough to demonstrate 20, 6%⁽¹⁴⁾ prevalence of major depressive disorder among the obese adults with 95% confidence interval. The sample size was calculated using a standard formula⁽¹⁵⁾

Methods:

Data were obtained from participants attending Port-Fouad family practice center from 9 a.m. to 2 p.m. from June to December 2018. All participants were subjected to the following

1- *Structured questionnaire*⁽¹⁶⁾ that contained 3 groups of questions:

A. Socio-demographic data

Age in years, residence, marital status, educational status, occupation and the loss of a close person during the past months.

B. Economic data

Monthly income and how sufficient (according to his/her perception).

C. Medical history

History of depression, hypertension, ischemic heart disease, diabetes mellitus, cerebrovascular stroke, urinary incontinence, tumor, other medical conditions (based on person's previous diagnosis and drugs) and his/her medication history and its duration. History of obesity: (duration, regimens, complications, drugs). (NB: Obesity is diagnosed when BMI is higher than 30)

2-patient health questionnaire 9⁽¹⁷⁾

PHQ-9 is a widely used depression screening instrument in non-psychiatric settings. It can be scored using different methods including an algorithm based on diagnostic and statistical manual of mental disorders, fifth edition criteria and cut off based on summed item scores. This questionnaire is well validated. *Scoring of depression: total score Depression severity was as follows: 0-4=None, 5-9=Mild, 10-14=Moderate, 15-19=Moderately severe, 20-27=Severe*⁽¹⁸⁾.

3-Nutritional history⁽¹⁹⁾

- Frequency of eating fruits, vegetables, meat, fish, legumes, dairy products, and fast foods
- Frequency of eating breakfast
- Eating in front of Tv
- Number of main meals, number of snacks
- Size of meal
- When to stop feeding
- Frequency of drinking juices, tea and coffee

Statistical analysis

Data was analyzed by SPSS version 22, and EPI-Info statistical packages. The chi-square or Fisher exact tests as appropriate were used to compare categorical data

and the student t-test and Analysis of Variance (ANOVA) was used to compare quantitative data. To estimate the independent

association of each risk factor with depression, bivalent regression analysis was performed. $p < 0.05$ are considered significant.

| Variables | none (n=35) | mild (n=34) | Moderate (n=38) | Mod/Severe (n=18) | Severe (n=4) | test value | p-value |
|---|----------------|----------------|-----------------|-------------------|-----------------|------------|-------------------|
| Age, mean \pm SD | 34.7 \pm 8.4 | 34.9 \pm 9.5 | 32.2 \pm 8.1 | 32.1 \pm 8.2 | 38.1 \pm 10.8 | 3.22 | 0.52 ^a |
| Gender | | | | | | | |
| Male | 20 (57.1) | 16 (47.1) | 15 (39.5) | 10 (55.6) | 0 (0) | 6.08 | 0.18 ^b |
| Female | 15 (42.9) | 18 (52.9) | 23 (60.5) | 8 (44.4) | 4 (100) | | |
| Marital status | | | | | | | |
| Single | 6 (17.1) | 6 (17.6) | 14 (36.8) | 6 (33.3) | 1 (25) | 12.9 | 0.06 ^b |
| Married | 28 (80) | 27 (79.4) | 24 (63.2) | 9 (50) | 3 (75) | | |
| Divorced | 1 (2.9) | 1 (2.9) | 0 (0) | 3 (16.7) | 0 (0) | | |
| Educational level | | | | | | | |
| Primary | 0 (0) | 0 (0) | 0 (0) | 1 (5.6) | 0 (0) | 16.1 | 0.11 ^b |
| Intermediate | 1 (2.9) | 2 (5.9) | 2 (5.3) | 5 (27.8) | 0 (0) | | |
| High | 33 (94.3) | 31 (91.2) | 34 (89.5) | 12 (66.7) | 4 (100) | | |
| University | 1 (2.9) | 1 (2.9) | 2 (5.3) | 0 (0) | 0 (0) | | |
| Living conditions | | | | | | | |
| Partner/siblings | 23 (65.7) | 24 (70.6) | 20 (33.3) | 6 (33.3) | 3 (75) | 20.1 | 0.17 ^b |
| Partner | 5 (14.3) | 4 (11.8) | 5 (13.2) | 3 (16.7) | 0 (0) | | |
| Siblings | 0 (0) | 0 (0) | 0 (0) | 1 (5.6) | 0 (0) | | |
| Relatives | 7 (20) | 6 (17.6) | 13 (34.2) | 6 (33.3) | 1 (25) | | |
| Alone | 0 (0) | 0 (0) | 0 (0) | 2 (11.1) | 0 (0) | | |
| Changes in social life last year | | | | | | | |
| No | 34 (97.1) | 33 (97.1) | 37 (97.4) | 8 (100) | 4 (100) | 1.74 | 0.99 ^b |
| Yes | 1 (2.9) | 1 (2.9) | 1 (2.6) | 0 (0) | 0 (0) | | |
| Relative/ friend death in the last year | | | | | | | |
| Yes | 0 (0) | 3 (8.8) | 3 (7.9) | 1 (5.6) | 0 (0) | 3.79 | 0.39 ^b |
| No | 35 (100) | 31 (91.2) | 35 (92.1) | 17 (94.4) | 4 (100) | | |
| Income | | | | | | | |
| Sufficient | 2 (5.7) | 3 (8.8) | 4 (10.5) | 2 (11.1) | 0 (0) | 1.10 | 0.91 ^b |
| Not sufficient | 33 (94.3) | 31 (91.2) | 34 (89.5) | 16 (88.9) | 4 (100) | | |

^a= Kruskal Wallis test. ^b=Fisher's Exact test. Statistical significance at $p < 0.05$

Results

The sociodemographic data of studied population are shown in table 1. The mean age of the patients in the different groups was comparable ($p=0.52$). All the patients in severe depression were females. Moreover, half of the patients with moderately severe depression were married while 75% of the patients who were severely de-

pressed were married. Most of the patients in moderately severe and severe groups were highly educated. Moreover, almost all patients with moderately severe and severe groups had insufficient income. Regarding clinical characteristics of the studied sample, only diastolic blood pressure was found to be significantly different based on different level of depression ($p=0.002$).

| Variables | none (n=35) | mild (n=34) | Moderate (n=38) | Mod. severe (n=18) | Severe (n=4) | test value | p ⁻ |
|-------------------|----------------|----------------|--------------------|-----------------------|-----------------|---------------|-------------------|
| Body mass index | 36.5 ± 10.6 | 35.4 ± 4.3 | 34.7 ± 12.1 | 35.2 ± 4.4 | 38.6 ± 7.1 | 5.34 | 0.25 ^a |
| BMI groups | | | | | | 9.53 | 0.64 ^b |
| Overweight | 0 (0) | 1 (2.9) | 2 (5.3) | 0 (0) | 0 (0) | | |
| Obesity grade I | 23 (65.7) | 18 (52.9) | 24 (63.2) | 12 (66.7) | 2 (50) | | |
| Obesity grade II | 7 (20) | 11 (32.4) | 9 (23.7) | 4 (22.2) | 0 (0) | | |
| Obesity grade III | 5 (14.3) | 4 (11.8) | 3 (7.9) | 2 (11.1) | 2 (50) | | |

^a p-values are based on Kruskal Wallis test. Statistical significance at p < 0.05

On pairwise comparison, we found that patients with moderately severe depression had statistically significant higher diastolic blood pressure (78.3 ± 12.4) than that of patients with moderate depression (69.7 ± 8.5) ($p=0.006$). Most of the studied sample had grade I obesity (61%). Moreover, one quarter of the patients was grade II obese and 13% of them were grade III obese. About 27% of the obese patients in our sample had no depression, whereas 14% had moderately severe depression and 3.1% were severely depressed. No statistically significant relationship between grades of obesity and depression categories ($p=0.64$) were shown (Table 2). About 53% of the studied patients reported symptoms

of loss of interest or pleasure (anhedonia) as well as having depressed mood only at some days (Table 3). Meanwhile, about 50% suffers insomnia or hypersomnia while 42% feel Fatigue or loss of energy at some of their days. Regarding the feeling of worthlessness or guilt, 34.1% had never experience that feeling, while 37.2% suffered that feeling only at some of their days. Meanwhile, 46.5% reported lack of the ability to think or concentrate and the same percentage had psychomotor agitation or retardation. 31.8% experienced significant weight loss, when not dieting/ weight gain/decrease or increase in appetite at some days, with equal percentage suffered these disturbances in weight/ appetite.

| Variables | Never n (%) | Somedays n (%) | Most days n (%) | Every day n (%) |
|---|----------------|-------------------|--------------------|--------------------|
| Loss of interest or pleasure | 38 (29.5) | 68 (52.7) | 17 (13.2) | 6 (4.7) |
| Depressed mood | 25 (19.4) | 70 (54.3) | 30 (23.3) | 4 (3.1) |
| Insomnia or hypersomnia | 28 (21.7) | 64 (49.6) | 30 (23.3) | 7 (5.4) |
| Fatigue or loss of energy | 38 (29.5) | 55 (42.6) | 28 (21.7) | 8 (6.2) |
| Feeling of worthlessness or inappropriate guilt | 44 (34.1) | 48 (37.2) | 27 (20.9) | 10 (7.8) |
| Diminished ability to think or concentrate | 37 (28.7) | 60 (46.5) | 28 (21.7) | 4 (3.1) |
| Psychomotor agitation or retardation | 35 (27.1) | 59 (45.7) | 32 (24.8) | 3 (2.3) |
| Significant weight loss when not dieting or weight gain or decrease or increase in appetite | 34 (26.4) | 41 (31.8) | 41 (31.8) | 13 (10.1) |
| Recurrent thought of death | 71 (55) | 42 (32.6) | 10 (7.8) | 6 (4.7) |

Finally, more than half of the patients (55%) never think about death. Table (4) shows eating frequency of different types of food of the studied sample. It was found that patients who consumed dairy products daily or at some days were associated with

less depression than those who never ate dairy product ($p=0.031$). Otherwise, there was no significant association between different grades of depression and other food patterns. There was no statistically significant difference between patients

with different depression scores in the number of main meals ($p=0.47$) and number of snacks ($p=0.07$). Moreover, half of the patients in moderately severe and severe depression eat large sized meals Table (5). By comparison between different depression groups showed that body dissatisfaction was significantly more associated with higher depression grade ($p=0.034$). Otherwise, there was significant association between depression and any other medical variables Table (6). Multivariate linear regression analysis was used to assess predictors of depression among obese patients. $R^2 = 0.751$, where 75.1 % of the variability of depression score among obese patients can be explained by this linear model. It was found that patients who were satisfied with their body had significantly 3.7 points lower in depression score than those who were not satisfied ($p=0.001$) Table (7).

Discussion

Several lines of the literature suggested the association between obesity and the risk of depression. In their study to find out if obesity can cause Depression, Ha and colleagues used the Behavioral Risk Factor Surveillance System (BRFSS), which is an annual cross-sectional survey of the adult population (18 yrs or over). The BRFSS is a nationally representative sample based on a phone survey using both landlines and cell phones, and was established in 1984, covering 15 states. They found that BMI was found to have a positive effect on depression days and the percentage of depressed individuals in the population. Every 1-unit increase in the BMI increased depression by 0.159 days per month⁽¹⁴⁾. A community-based prospective study, in which participants were drawn from a statewide, community-based, Minnesota sample and were assessed *via* structured

interview (depression) and study-measured height and weight, found that obesity that developed during late adolescence predicted the onset of depression (OR=5.89, CI=2.31–15.01) during early adulthood among females⁽¹⁵⁾. A university psychiatry department and student health center collaborated to develop the College Student Computer User Survey (CSCUS) to assess mental and physical health in a large sample of college students. A total of 2108 students completed the survey and they were classified by weight as normal, overweight or obese based on body mass index. Overweight and obesity were associated with significantly lower overall academic achievement, more depressive symptoms, and using diet pills for weight loss. Obese males had significantly higher rates of lifetime trichotillomania while overweight and obese females reported higher rates of panic disorder⁽²⁰⁾. In current study 41.9% of obese participants were found to have mild depressive symptoms and 4.7% were severely depressed. These findings further support the results of previous studies. Lester et al.⁽²⁵⁾ conducted a study on 70 consecutive obese outpatients seeking surgery to treat their obesity who were referred for a psychiatric evaluation prior to surgery. The results showed that 23% of this sample of obese patients had some suicidal risk and 32% had serious enough depression to require a psychiatric evaluation⁽²¹⁾. A previous study that involved 173 obese subjects was conducted to assess the prevalence of depression in subjects before starting a weight-reduction programme. Severe depression was diagnosed in 84 (48.5%) subjects; mild depression was diagnosed in 65 (37.5%) subjects, and 24 subjects did not have depression. They observed differences in BMI between subjects without depression and severe depression ($p < 0.05$) and between mild and severe depression^(22,23).

| Table 4: Eating frequency of different types of food of the obese patients (n=129) | | | | | | | |
|--|-------------|-------------|-----------------|--------------------|--------------|------------|--------------------------|
| Variables | none (n=35) | mild (n=34) | Moderate (n=38) | Mod. severe (n=18) | Severe (n=4) | test value | p-value |
| Fruits and vegetables | | | | | | | |
| Daily | 16 (45.7) | 14 (41.2) | 13 (34.2) | 7 (38.9) | 3 (75) | 7.16 | 0.50 ^c |
| Some days | 14 (40) | 17 (50) | 22 (57.9) | 9 (50) | 0 (0) | | |
| Never | 5 (14.3) | 3 (8.8) | 3 (7.9) | 2 (11.1) | 1 (25) | | |
| Dairy products | | | | | | | |
| Daily | 18 (51.4) | 19 (55.9) | 8 (21.1) | 8 (44.4) | 2 (50) | 15.11 | 0.031^c |
| Some days | 13 (37.1) | 14 (41.2) | 26 (68.4) | 8 (44.4) | 1 (25) | | |
| Never | 4 (11.4) | 1 (2.9) | 4 (10.5) | 2 (11.1) | 1 (25) | | |
| Juices | | | | | | | |
| Daily | 15 (42.9) | 12 (35.3) | 15 (39.5) | 8 (44.4) | 3 (75) | 4.35 | 0.83 ^c |
| Some days | 13 (37.1) | 15 (44.1) | 19 (50) | 8 (44.4) | 1 (25) | | |
| Never | 7 (20) | 7 (20.6) | 4 (10.5) | 2 (11.1) | 0 (0) | | |
| Tea and coffee | | | | | | | |
| Daily | 29 (82.9) | 27 (79.4) | 29 (76.3) | 13 (72.2) | 2 (50) | 7.59 | 0.42 ^c |
| Some days | 4 (11.4) | 7 (20.6) | 7 (18.4) | 3 (16.7) | 2 (50) | | |
| Never | 2 (5.7) | 0 (0) | 2 (5.3) | 2 (5.3) | 0 (0) | | |
| Meat and fish | | | | | | | |
| Daily | 20 (57.1) | 20 (58.8) | 16 (42.1) | 12 (66.7) | 2 (50) | 7.86 | 0.56 ^c |
| Some days | 15 (42.9) | 14 (41.2) | 21 (55.3) | 6 (33.3) | 2 (50) | | |
| Never | 0 (0) | 0 (0) | 1 (2.6) | 0 (0) | 0 (0) | | |
| Legumes | | | | | | | |
| Daily | 11 (31.4) | 12 (35.3) | 7 (18.4) | 7 (38.9) | 1 (25) | 10.46 | 0.18 ^c |
| Some days | 20 (57.1) | 21 (61.8) | 30 (78.9) | 9 (50) | 2 (75) | | |
| Never | 4 (11.4) | 1 (2.9) | 1 (2.6) | 2 (11.1) | 1 (25) | | |
| Breakfast | | | | | | | |
| Daily | 28 (80) | 20 (58.8) | 30 (78.9) | 12 (66.7) | 3 (75) | 8.2 | 0.35 ^c |
| Some days | 6 (17.1) | 13 (38.2) | 6 (15.8) | 6 (33.3) | 1 (25) | | |
| Never | 1 (2.9) | 1 (2.9) | 2 (5.3) | 0 (0) | 0 (0) | | |
| Fast foods | | | | | | | |
| Daily | 7 (20) | 7 (20.6) | 8 (21.1) | 7 (38.9) | 0 (0) | 9.6 | 0.25 ^c |
| Some days | 18 (51.4) | 22 (64.7) | 26 (68.4) | 7 (38.9) | 4 (100) | | |
| Never | 10 (28.6) | 5 (14.7) | 4 (10.5) | 4 (22.2) | 0 (0) | | |
| Eating in front of TV | | | | | | | |
| Daily | 21 (60) | 17 (50) | 26 (68.4) | 5 (27.8) | 2 (50) | 11.21 | 0.16 ^c |
| Some days | 8 (22.9) | 12 (35.3) | 7 (18.4) | 7 (38.9) | 2 (50) | | |
| Never | 6 (17.1) | 5 (14.7) | 5 (13.2) | 6 (33.3) | 0 (0) | | |

^b=Fisher's Exact test. Statistical significance at $p < .05$

In their study to assess the impact of weight loss on depression status in obese individuals, Deliopoulou et al., from Greece, included 100 consecutive females fulfilling criteria for balloon treatment. They were assessed for depression and divided into two groups (65 depressed, 35 non-depressed). During the treatment period, the depression status of the mildly,

moderately, and severely depressed patients improved from 40, 32.3, and 27.7 % to 20, 7.7, and 1.5 %, respectively, with 70.8 % finally exhibiting no depression at all⁽²⁴⁾. A cross-sectional survey was conducted among primary care patients in 12 practices in Australia. Data were obtained from 3361 participants. The prevalence of depression was 24% (95% confidence interval [CI]=

11.86 to 39.28) among underweight participants, 11% (95% CI = 8.5 to 14.0) among normal weight participants, 12% (95% CI = 0.9 to

15.2) among overweight participants, and 23% (95% CI = 17.8 to 29.0) among obese participants⁽²⁵⁾.

Table 5: Dietary habits characteristics of obese patients (n=129)

| Variables | none (n=35) | mild (n=34) | Moderate (n=38) | Mod. severe (n=18) | Severe (n=4) | test value | p-value |
|---------------------------------|---------------|----------------|-----------------|--------------------|----------------|------------|-------------------|
| No. of main meals mean \pm SD | 2.9 \pm 0.8 | 3.1 \pm 0.37 | 3.1 \pm 0.28 | 2.8 \pm 0.51 | 3.1 \pm 0.8 | 3.5 | 0.47 ^a |
| Size of meal | | | | | | | |
| Small | 3 (8.6) | 3 (8.8) | 1 (2.6) | 0 (0) | 0 (0) | 8.36 | 0.34 ^b |
| Medium | 23 (65.7) | 25 (73.5) | 26 (68.4) | 9 (50) | 2 (50) | | |
| Large | 9 (25.7) | 6 (18.2) | 11 (28.9) | 9 (50) | 2 (50) | | |
| No. of snakes, mean \pm SD | 1.6 \pm 1.5 | 1.3 \pm 1.4 | 2.05 \pm 1.8 | 2.5 \pm 1.88 | 2.7 \pm 1.26 | 8.7 | 0.07 ^a |
| When to stop feeding | | | | | | | |
| At the middle of meal | 1 (2.9) | 1 (2.9) | 1 (2.6) | 1 (5.6) | 0 (0) | 9.82 | 0.19 ^b |
| At feeling full stomach | 28 (80) | 30 (88.2) | 32 (84.2) | 11 (61.1) | 2 (50) | | |
| After feeling full stomach | 6 (17.6) | 3 (8.8) | 5 (13.2) | 6 (33.3) | 2 (50) | | |

^a= Kruskal Wallis test. ^b=Fisher's Exact test. Statistical significance at $p < 0.05$

The inconsistencies of percentages of depressed patients among obese subjects could be explained by the variability in the method of assessment of depression in each study. In the current study Diagnosis of major depressive episode according to

Phq 9. The aforementioned studies assessed depression depending on depression (D-score) of MMPI-2 11 (Lester et al., 2011), Beck's Depression Inventory (BDI)^(22,24), and The Patient Health Questionnaire (PHQ-9)⁽²⁵⁾ respectively.

Table 6: Medical history of the obese patients (n=129)

| Variables | none (n=35) | mild (n=34) | Moderate (n=38) | Mod. severe (n=18) | Severe (n=4) | test value | p-value |
|---|----------------|-----------------|-----------------|--------------------|---------------|------------|--------------------|
| Duration of obesity, mean \pm SD | 8.5 \pm 5.3 | 7.3 \pm 4.7 | 6.3 \pm 4.5 | 9.4 \pm 6.2 | 9.0 \pm 8.2 | 4.8 | 0.31 ^a |
| Trials for diet control | | | | | | | |
| No | 14 (41.2) | 13 (38.2) | 13 (34.2) | 4 (22.2) | 2 (50) | 2.5 | 0.67 ^b |
| Yes | 21 (58.9) | 21 (61.8) | 25 (65.8) | 14 (77.8) | 2 (50) | | |
| No. of trials for diet control, mean \pm SD | 2.0 \pm 2.68 | 1.85 \pm 2.06 | 1.6 \pm 1.7 | 2.6 \pm 2.5 | 3.7 \pm 5.2 | 2.3 | 0.67 ^a |
| Body satisfaction | | | | | | | |
| No | 21 (60) | 25 (73.5) | 31 (81.6) | 17 (94.4) | 4 (100) | 9.8 | 0.034 ^b |
| Yes | 15 (41.3) | 9 (26.5) | 7 (18.4) | 1 (5.6) | 0 (0) | | |
| History of depression | | | | | | | |
| No | 32 (94.1) | 34 (100) | 35 (92.1) | 15 (83.3) | 4 (100) | 5.7 | 0.16 ^b |
| Yes | 3 (5.9) | 0 (0) | 3 (7.9) | 3 (16.7) | 0 (0) | | |
| Chronic disease | | | | | | | |
| Absent | 35 (97.1) | 34 (100) | 38 (100) | 17 (94.4) | 4 (100) | 4.4 | 0.37 ^b |
| Present | 1 (2.9) | 0 (0) | 0 (0) | 1 (5.6) | 0 (0) | | |

^a= Kruskal Wallis test. ^b=Fisher's Exact test. Statistical significance at $p < 0.05$

In the current study, by comparison between the depressed and non-depressed participants, depressed patients were significantly less satisfied with their body shape ($p=0.008$). Furthermore, by logistic regression analysis to assess predictors of depression among obese patients, the best-fitting predictor of depression was body satisfaction. This was in accordance with the findings of an observational study which assessed body attitude, body satisfaction and body awareness in a clinical group of depressed patients and the influence of treatment. The study was performed at the Department of Mood and Anxiety Disorders, University Center for Psychiatry (UCP), University Medical Center Groningen (UMCG), and a tertiary academic centre. During a period of 18 months all patients starting the three months' inpatient treatment or day treatment, patients scored significantly lower than a healthy comparison sample on body attitude and body satisfaction. After treatment, depression scores decreased, scores for body attitude and body satisfaction in

creased. Medium pre-treatment and strong post-treatment associations were found between depression severity and body attitude and between depression severity and body satisfaction⁽²⁶⁾. A number of longitudinal studies have found that body dissatisfaction in adolescence is associated with a heightened risk for subsequent depressive symptoms^(27,28). Salafia and Gondoli have recently conducted a study in which the data were collected as part of a larger project investigating parenting and child outcomes during the transition to adolescence⁽²⁹⁾. Initial contact letters were distributed by primary schools in a medium-sized, Midwestern city or by direct mailings to parents of children in fourth grade. They documented from data of 85 mother-girl dyads that body dissatisfaction in early adolescence may predispose girls to later depressive symptoms as well as bulimic symptoms and dieting behaviors. Others stated that body dissatisfaction prospectively predicted the risk of suicidal ideation in early-adolescent girls and mid-adolescent boys⁽³⁰⁾.

| Predictors | Unstandardized Coefficients | | Standardized Coefficients Beta | (95% CI) | P value |
|--------------------------|-----------------------------|------------|--------------------------------|--------------------|---------------|
| | B | Std. Error | | | |
| (Constant) | 8.433 | 4.135 | | | 0.044* |
| <i>Dairy product</i> | | | | | |
| Never | Reference | | | | |
| Somedays | -0.455 | 1.715 | -0.041 | (-3.85 – 2.939) | 0.791 |
| Daily | -1.734 | 1.722 | -0.153 | (-0.5.141 – 1.674) | 0.316 |
| <i>Diastolic BP</i> | 0.034 | 0.050 | 0.059 | (-0.065 – 0.132) | 0.500 |
| <i>Body satisfaction</i> | | | | | |
| Not satisfied | Reference | | | | |
| Satisfied | -3.688 | 1.118 | -0.283 | (-5.902 – -1.474) | 0.001* |

ANOVA= 0.009, $R^2= 0.75$, * Statistical significance at $p < 0.05$

Data were obtained from Korea Youth Panel Survey data sets for early adolescents (1380 boys and 1209 girls, Time 1 mean age 10 years) and mid-adolescents

(1429 boys and 1437 girls, Time 1 mean age 15 years) and from follow-up surveys of the same individuals after 2 years. Santos et al. conducted a study on Two hundred and

forty one high school students (115 males and 126 females) from a southwestern high school and found that body dissatisfaction and low self-esteem and low social support were all found to be significantly related to depressive symptoms ($p < 0.01$)⁽³¹⁾. In current study, there was not any statistically significant difference between depressed and non-depressed participants regarding age according to WHO, age was from 25 to 45 as youth. Also there was not statically significant difference in gender as 52.5% of our sample was males and 47.5% were females. There was not statically significant difference in marital status, educational level, living conditions, or changes in social life last year. In contrast, almost all community epidemiological studies of the previous literature find that gender, age, and marital status are associated with depression. Women typically have a two-fold increased risk of major depression compared to men, individuals who are separated or divorced have significantly higher rates of major depression than the currently married, and prevalence of major depression generally goes down with age⁽³²⁻³⁴⁾. This evidence, however, comes primarily from studies conducted in Western countries. The sparse data available from low-middle income countries suggest that the age pattern might either be non-monotonic or reversed compared to other countries, with depression increasing with age⁽³⁵⁾. In five low-middle income countries, there was no significant association between age and depression⁽³³⁾. Other socioeconomic factors have less consistent relationships with major depression in different countries⁽³²⁾. Gender difference regarding depression was however, frequently mentioned in the literature as an important factor. Several studies reported that females have an increased risk regarding depression^(36,37). Body dissatisfaction may play as a contrib-

utor to the gender differences in depression. Body dissatisfaction not only poses a risk to adolescent wellbeing but is also a gendered preoccupation, given that body image concerns appear to be both more frequent and motivationally significant in females than in male. As a result, body dissatisfaction can be expected to be involved in the gender imbalance in depressive symptoms⁽³⁷⁾. The percentage of depression was higher in females in our sample; however, it was insignificant. Our small sample size could have caused this hidden significance. In current study, comparison of dietary habits variables between the two groups showed that depressed patients had significantly a greater number of snakes (2.25 ± 1.83 times) than those with no depression ($p = 0.011$). That was consistent with the previous literature as in several prospective partly large studies an unhealthy western dietary pattern was associated with an increased prevalence of depression. Moreover, the consumption of sweetened beverage, refined food, fried food, processed meat, refined grain, and high fat intake, biscuit snacking and pastries have been shown to be associated with an increased risk of depression in longitudinal studies^(38,39). In current study, frequency of eating dairy products was significantly different between depressed and non-depressed patients ($p = 0.027$) with a protective effect of the daily intake of dairy products. Similarly, a healthy whole food pattern was associated with a 26% lower risk of elevated depressive symptoms in middle-aged British subjects.⁴⁰ A cross-sectional study among Iranian adults showed that a lacto-vegetarian dietary pattern that contained high intakes of fruits, vegetables and low-fat dairy products was protectively associated with anxiety⁽⁴¹⁾. In current study, no significant difference between depressed and non-depressed participants

regarding number or size of meals. However, A multivariable logistic regression analysis of dietary habits in a recent study in south Korea showed that depression correlated inversely with eating out (≥ 1 time/day Vs < 1 time/month) among men [odds ratio (OR) = 0.23, 95% confidence interval (CI): 0.10–0.55] and women (OR = 0.14, 95% CI: 0.05–0.35) and positively with a lower number of daily meals (< 3 Vs ≥ 3) among women (OR = 1.45, 95% CI: 1.01–2.11)⁽⁴²⁾. Different cultural background of this setting (South Korea) may be a possible explanation of this rather inconsistency.

Conclusion

Depression often accompanies obesity. The level of depression is increased in morbidly obese persons in comparison to moderately obese patients. Dietary patterns have a great effect on the psychological status and the depressive symptoms. Therefore, it is recommended that health professionals should always explore the presence of depression and suicidality in obese patients to correct their obesity. In obese persons the important issue in a weight-reduction management seems to be psychotherapy and, in some cases, pharmacological treatment of depression. It also seems that psychotherapy may be an important factor of preventing obesity and depression, especially in people prone to stressful situations. Thus, obese people should be seen as potential psychiatric patients and evaluated before obesity treatment.

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