

# Comparison of Levels of Depression in Patients with Excessive Obesity Before and After Gastric Bypass Surgery

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## Abstract

**Introduction:** Eating disorders and morbid obesity have become common over the recent years. Laparoscopic gastric bypass surgery is known as one of the most effective methods for weight loss. Due to the rarity of studies regarding the association of depression and surgery, we aimed to compare the levels of depression in patients with excessive obesity before and after gastric bypass surgery.

**Materials and Methods:** This Quasi-experimental study performed on 40 obese patients who underwent gastric bypass surgery with BMI higher than 40 or between 35 to 40 (with FBS > 100 mg/dL) in Ghaem hospital, Mashhad University of Medical Sciences, Mashhad, Iran during September 2011 to September 2012. The Beck depression inventory (BDI) was performed one week before, and three and six months after operation and changes in BMI and BDI were evaluated using ANOVA with repeated measures.

**Results:** 40 obese patients with the mean age of  $34.20 \pm 11.32$  years old and mean BMI of  $45.31 \pm 2.56$  kg/m<sup>2</sup> were studied. Also, male to female ratio was 7:1. Average of BDI, before and three months after the operation was  $27 \pm 11.31$  and  $18.50 \pm 9.718$ , respectively ( $P < 0.001$ ). The value of  $17 \pm 7.071$  was also obtained six months after the surgery which significantly was decreased compared to patient's BDI ( $27 \pm 11.31$ ) before the operation ( $P < 0.0001$ ).

**Conclusions:** It can be concluded that depression level of the patients was decreased after the surgery and the recovery progressed gradually.

**Keywords:** Depression, Gastric Bypass Surgery, Obesity

## 1. Introduction

Obesity is considered as one of the most common diseases in this century (1). The prevalence of over weight or obesity in adults in America and Europe is 35% and over 20%, respectively (1, 2). In developed countries, the number of people who die annually from complications related to obesity is more than three times of the total morbidity rate due to colon and breast cancer (3, 4). Among the preventable diseases, deaths caused by obesity are ranked second after deaths caused by tobacco (5). Totally, lifespan of obese patients is averagely 10.5 years less compared with non-obese ones (1).

According to the definition, morbid obesity is defined as a body mass index (BMI) (the weight in kilograms divided to square of height) greater than or equal to 40. Also, if BMI is between 35 and 40, along with diseases related to obesity, it is called as morbid obesity too (1). Despite spontaneous or organized and scientific efforts of obese people with morbid obesity to lose weight and find a suitable weight, unfortunately statistics show that only about 3 per-

cent of them can keep their BMI lower than 35 using diet or medications (1).

Morbid obesity is a major issue in the world that is often resistant to treatment, diet, medication and psychotherapy while it responds well to bariatric surgery (6). Consequently, in most cases, a psychological examination before surgery seems necessary to find factors that affect the outcome (7-11). In a systemic review, the relationship between psychiatric impairment and weight loss was confirmed previously. This study showed that intervention in weight loss can be useful to improve mental disorders (2).

The review study by Herpertz et al. (12) showed that weight reducing surgery improves the mental state or social behavior of obese patients who do not have a proper mental state or social behavior.

There are overall differences in the prevalence of depression and anxiety in people with different levels of BMI (13). Obese people have certain mental characteristics which alters their levels of anxiety and depression. Given that eating disorders and morbid obesity are becoming

common in our country, hence laparoscopic gastric bypass surgery is suggested for its treatment in last two decades.

According to its association with diseases such as depression, eating disorders, and anxiety disorders among obese patients, it seems that the treatment of weight gain can be effective in improving concurrent psychiatric problems.

On the other hand, no previous studies are available in this regard (14). In this research, we decided to compare the levels of depression in patients with excessive obesity before and after gastric bypass surgery.

## 2. Materials and Methods

This Quasi-experimental study conducted on 41 obese patients according to the following inclusion criteria inclusive on obese patients referred to Ghaem hospital, Mashhad University of Medical Sciences, Mashhad, Iran during September 2011 to September 2012 and they were followed until 6 months after surgery. It should be mentioned that all of the participants were asked to sign a written consent after thorough explanation of the research process. This study protocol was approved by local Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran.

### 2.1. Participants

Based on the effect size of 0.35, desired study power of 95% and statistical significance of 1%, by using G\*power version 3.1.9.2 software and method of ANOVA repeated measures for within factors, the required sample size was at least 40.

We included morbid obese patients with BMI more than 40 or between 35 to 40 and patients having diabetes, joint pain, high lipid and sleep apnea who underwent gastric bypass surgery. Those who had heart disorders, severe vascular disease, sensory or physical disabilities, chronic mental disorders, and substance abuse were excluded.

An initial questionnaire containing demographic characteristics was completed. Then, Beck Depression Inventory was completed by the patients in a week before surgery, three months postoperatively, and six months after operation. Beck depression inventory questionnaire is a multiple-choice instrument with 21-questions as a self-report questionnaire to measure depression severity in adults aged 13 years old and above. The BDI-II-Persian had high internal consistency (Cronbach's alpha = 0.87) and acceptable test-retest reliability ( $r = 0.74$ ) (15).

Patients with scores 1 - 10, 1 - 16, 17 - 21, 21 - 30, 31 - 40, and more than 40 were classified as normal, slightly

depressed, needs to consult a psychiatrist, relatively depressed, severely depressed and excessively depressed, respectively. Based on the depression scores prior to surgery, the patients with more severe depression were excluded and were referred to a psychiatrist.

### 2.2. Statistical Analysis

Data were collected and analyzed with statistical package using the SPSS for Windows™, version 16 software (SPSS Inc., Chicago, Illinois, USA). Numerical data were expressed as mean  $\pm$  SD and categorical data as proportions of the sample size. Analysis of variance with repeated measures was used to compare BMI and BDI in follow-up times. All pairwise comparisons were done by Bonferroni post hoc. All P values less than 0.05 were considered significant.

## 3. Results

In this study, 5 patients (12.5%) were male and 35 (87.5%) were female. The patients ages ranged between 20 to 59 years old with a mean of  $34.20 \pm 11.32$  years old. The level of education in all patients was above high school degree. As the history of other treatments for weight loss, 10 (25%) patients had a history of weight-loss diet, 23 (57.5%) patients had a history of weight-loss surgery (bariatric surgery), and 5 (12.5%) individuals had experienced both methods, but, they were volunteers attending gastric bypass surgery due to the failure in weight loss [U+0648] and 2 (5%) patients had no history of weight-loss diets.

Average BMI of patients before surgery and three and six months after surgery was  $45.31 \pm 2.56$ ,  $37.37 \pm 3.32$  and  $34.32 \pm 2.62$ , respectively. The mean of Beck depression inventory scores (BDI) of patients before surgery was  $27 \pm 11.31$  that had been decreased to  $18.50 \pm 9.72$  3 months after surgery. This decreasing trend had been slowly continued to score  $17 \pm 7.08$ , 6 months after surgery. Using within subject effects in Repeated measures and after adjusting the degree of freedom with Huynh-Feldt, it was shown that there ones had a statistically significant decreases in both BMI and BDI after surgery ( $P < 0.0001$ ). Moreover pairwise comparisons between follow-up periods had been tested with Bonferroni adjustment and it was concluded that there was a statistically difference between all-time pairs of BMI and BDI ( $P < 0.0001$ ).

## 4. Discussion

In this study, the mean of BDI score significantly decreased after surgery and 6 months after operation, compared with before surgery.

**Table 1.** Basic Characteristics of Patients

Variable	Frequency
<b>Gender, No. (%)</b>	
Male	5 (12.5)
<b>Age, y, Mean <math>\pm</math> SD</b>	34.20 $\pm$ 11.32
<b>BMI before surgery, kg/m<sup>2</sup>, Mean <math>\pm</math> SD</b>	45.31 $\pm$ 2.56
<b>history of other treatments for weight loss, No. (%)</b>	
Weight-loss diet	10 (25)
Weight-loss surgery	23 (57.5)
Both methods	5 (12.5)

Valis's study findings state that surgery is usually related to improvement in mental function and life quality for most of the people (1). This finding is similar to our study result. As in both studies, mental function and individual's depression score decrease were improved and case's depression score was decreased over the time.

In a systemic review study by Petry et al. (6), the relationship between reducing weight and mental state was confirmed. This study, like our study, showed that intervention in reducing weight could be useful for improving the mental disorders by reducing BDI score 3 and 6 months after the surgery (6). Ornic's findings concentrated on the link of obesity to depression (16). Results of one previous study (17) on 478 cases showed that weight loss was along with a significant and continuous decrement in BDI score (decrease from  $7.8 \pm 6.5$  at the first year to  $9.6 \pm 7.7$  at 4 years postoperatively). Also in our study, in the first three months after the surgery and six month post operation, BDI score reduced by 8.5 and 10 points respectively in accordance to Dixon's results (17). Therefore, both studies showed that there is a positive association between depression before surgery and success in losing weight one year after the surgery. Depression before surgery by Beck's test and success in losing weight was confirmed by Averbukh et al. too (18). Depressed people have low motivation but considering losing weight after the surgery, which cannot be avoided, they had greater motivation leading to an overall improvement and treatment adherence. Mental conditions and progressive weight loss of our study improved gradually after the operation. In a review by Greenberg et al. (19), high prevalence of depression, self-body abhorrence, eating disorders, and extremely low quality of life were seen in obese people. Anxiety and depression among obese subjects were three to four times higher compared to non-obese ones (19). Additionally, reducing levels of depression, anxiety and eating disorder due to the changes in BMI associated to improvements in psychological out-

comes after two years of surgery, were measured before (20). Among all previous studies, only our study examined the rate of depression in obese patient up to 6 months. However due to a lack of follow-up for our study participants, the long-term study was not possible. The authors recommend that the evaluation of this study is done based on the greater sample size and longer follow up.

#### 4.1. Conclusion

It can be concluded that depression level of the patients was decreased after the gastric bypass operation in depressed morbid obese patients and the recovery progressed upon the time.

#### 4.2. Limitations

One of the limitations of our study was the length of questionnaires which might have disappointed the responder. Also, the researchers were assigned for only one session for data collection due to the possible sample disadvantage and lack of access to patients. Also, it is better to re-evaluate the patients after more than 6 months in the future study.

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**Table 2.** Distribution and Comparison of BMI and BDI Before and After Surgery

Variable	Before Surgery	3 Months After Surgery	6 Months After Surgery	P Value
BMI	45.31 ± 2.56	37.37 ± 3.32 <sup>a</sup>	34.32 ± 2.62 <sup>b</sup>	< 0.0001 <sup>c</sup>
BDI	27 ± 11.31	18.50 ± 9.72 <sup>a</sup>	17 ± 7.08 6 <sup>b</sup>	< 0.0001 <sup>c</sup>

<sup>a</sup>significantly different than before surgery at level 0.01 by post hoc tests.

<sup>b</sup>significantly different than 3 months after surgery at level 0.01 by post hoc tests.

<sup>c</sup>Significantly different at level 0.01

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