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The Short-Term Effect of Sleeve Gastrectomy on Blood Lipid Parameters and Emotional Appetite in Morbidly Obese Individuals

Morbid Obez Bireylerde Tüp Mide Ameliyatının Kan Lipid Parametreleri ve Duygusal İştah Üzerine Kısa Dönem Etkisi

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ÖZ

Obezite tüm dünyada etkisi giderek artan ve sağlığı birçok yönden etkileyen bir halk sağlığı sorunudur. Beden kütle indeksinin'nın (BKİ) 40 kg/m^2'yi aştığı durumlarda veya BKİ 35 kg/m^2 olan ve eşlik eden hastalıkları olan kişilerde kilo kaybı sağlanamadığında obezite ameliyatlarına başvurulmaktadır. Bu çalışmanın amacı morbid obez bireylerde tüp mide ameliyatı öncesi ve sonrası lipit profilindeki değişiklikleri, bariatrik cerrahinin tüp mide ameliyatı sonrası erken postoperatif dönemde kan lipit düzeylerinin, duygusal iştah durumunun iyileşmesine katkı sağlayıp sağlamadığını ve tüp mide ameliyatı sonrası erken dönemdeki duygusal iştah durumunu ile lipit profili arasındaki ilişkiyi incelemektir.Bu çalışmada tüp mide ameliyatı geçiren bireylerin (n=47) ameliyat öncesi ve ameliyat sonrası erken dönemlerinde kan lipit parametreleri ile emosyonel iştah durumu arasındaki ilişki araştırılmıştır. Bağımlı grup karşılaştırmalarında Wilcoxon testi, sürekli veriler arasındaki ilişkileri değerlendirmek için Spearman korelasyon analizi kullanıldı. Tüm analizler %95 güven aralığında ($p<0,05$) değerlendirildi ve sonuçlar yorumlandı. Çalışma sonucunda bireylerin ameliyat sonrası erken dönemde total kolesterol, trigliserit, yüksek yoğunluklu lipoprotein (HDL) kolesterol ve düşük yoğunluklu lipoprotein (LDL) kolesterol değerleri istatistiksel olarak anlamlı düzeyde azaldı ($p<0,001$). Bireylerin ameliyat sonrası erken dönem toplam kolesterol ve LDL kolesterol değerleri ile pozitif duygu ve durum toplam puanları ile negatif duygu ve durum toplam puanları arasında pozitif yönde zayıf bir korelasyon olduğu belirlendi ($p<0,05$). Sonuç olarak tüp mide ameliyatının erkeklerde ameliyat sonrası dönemde bile kan lipit parametreleri ve bireylerin emosyonel iştah durumu üzerine olumlu etkileri olduğu görülmektedir. Ancak ameliyat tercih edilmeden önce vücut ağırlık kaybına yönelik yaşam tarzı değişiklikleri denenmeli ve bu süreçte diyetisyenler daha aktif rol almalıdır.

Anahtar Kelimeler: Bariatrik Cerrahi, Sleeve Gastrektomi, Duygusal İştah, Kan Lipitleri

ABSTRACT

Obesity is a public health problem that has an increasing effect all over the world and affects health in many ways. In cases where the BMI exceeds 40 kg/m2 or in individuals with a BMI of 35 kg/m2 and accompanying diseases, weight loss cannot be achieved, thus bariatric surgeries are applied. The aim of this study is to determine the changes in lipid profile in morbidly obese individuals before and after sleeve gastrectomy surgery, whether bariatric surgery contributes to the improvement of blood lipid levels and emotional appetite in the early postoperative period after sleeve gastrectomy surgery, and the relationship between emotional appetite status and lipid profile in the early postoperative period after sleeve gastrectomy surgery to examine the relationship.In this study, the relationship between blood lipid parameters and emotional appetite status in the pre-operative and early post-operative periods of individuals who underwent sleeve gastrectomy (n = 47) was investigated. the Wilcoxon test was used for dependent group comparisons, and Spearman correlation analysis was used to evaluate the relationships between continuous data. All analyses were evaluated within the 95% confidence interval ($p<0,05$), and the results were interpreted.As a result of the study, total cholesterol, triglyceride, high density lipoprotein (HDL) cholesterol, and low density lipoprotein (LDL) cholesterol values of individuals in the early post-operative period were statistically significantly decreased ($p< 0,001$). It was found that there was a weak positive correlation between individuals' early post-operative total cholesterol and LDL cholesterol values, positive mood and state total scores, and negative emotion and state total scores ($p<0,05$).As a result, it is seen that sleeve gastrectomy has positive effects on blood lipid parameters and the emotional appetite status of individuals, even in the male post-operative period. However, lifestyle changes should be tried for weight loss before surgery is preferred, and dietitians should be given a greater role in this process.

Keywords: Bariatric Surgery, Sleeve Gastrectomy, Emotional Appetite, Blood Lipids

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INTRODUCTION

Obesity has become a major problem affecting many aspects of health in the 21st century and is now the most common chronic metabolic disease worldwide. Obesity generally is defined as a body mass index (BMI) greater than 30 kg/m^2 (1). The condition where the body mass index exceeds 40 kg/m^2 is called morbid obesity (2). It is known that there is a close relationship between obesity and type 2 diabetes, hypertension, dyslipidemia, obstructive sleep apnea, coronary heart disease, metabolic syndrome, and insulin resistance (3). The risk of disease increases as BMI increases. Therefore, weight loss is important to reduce the risk of disease. Bariatric surgery is reported to be effective in providing and maintaining weight loss and reducing obesity-related comorbidities. Due to its efficiency and low complication rate, sleeve gastrectomy, which is among the most frequently performed surgical operations today, is seen as a definitive treatment, especially for individuals with morbid obesity (4).

Dyslipidemia is defined as elevated levels of any or all lipids and/or lipoproteins in the blood (5). Since dyslipidemia has been found to be one of the major comorbidities in obesity, lipid profiles are an important parameter with the potential to reduce disease risk. In addition, it is known that 60–70% of obese people are dyslipidemic, and there is a positive correlation between obesity severity and dyslipidemia (6). Bariatric surgeries cause changes in eating behavior as well as reduced energy intake and weight loss. It is thought that obese people may exhibit eating behaviors to cope with anxiety, depression, anger, and other negative emotions (7). He calls this phenomenon of eating, which is carried out in order to cope with negative emotions, "emotional eating" (8). According to studies, an eating behavior that occurs in order to cope with negative emotions may result in obesity (9-10). Therefore, the aim of this study is to examine the changes in lipid profile before and after sleeve gastrectomy in morbidly obese individuals, whether bariatric surgery contributes to the improvement of blood lipid levels, emotional appetite status in the early post-operative period after sleeve gastrectomy, and the relationship between emotional appetite status and lipid profile.

MATERIAL AND METHODS

The population of this cross-sectional study consisted of 47 individuals who applied to the general surgery polyclinic of the city hospital in Balıkesir and had sleeve gastrectomy surgery. When the studies in the literature are examined, it is seen that there are changes in the range of 0.3-3.5 when the mean and standard deviation values measured for pre-op and post-op blood parameters and the effect size are calculated. Therefore, for the comparison of two dependent sample means, the average of the first group is 39±8. and 2. When the average of Group 2 was taken as 36±7, the effect was found to be d=0.39. At d=0.39 effect, α=0.05 (within 95% confidence interval) with a power of 0.80, the minimum number of samples to be reached was calculated as 41 people. Individuals with a BMI greater than 40 kg/m^2 and without any chronic disease were included in this cross-sectional and descriptive study. Ethics committee permission was received from Ondokuz Mayıs University Clinical Research Ethics committee (Ethics Committee No: B.30.2.ODM.0.20.08/1299-1338). Informed consent forms were obtained from people who participated in the study.

Basal lipid profiles were obtained the blood tests routinely given by the individuals included in the study at the pre-operative and post-operative first controls (average one month) from the central laboratory of the hospital as a part of the research. By examining the biochemical parameters of the individuals, the values of total cholesterol, triglycerides, HDL, and LDL cholesterol, among the parameters related to blood lipids, were examined. Analyses of blood lipids in the hospital were performed using a Cobas® 8000 (Roche, Germany) modular autoanalyzer device. The enzymatic colorimetric method was used for total cholesterol and triglycerides, and the homogeneous colorimetric enzyme test was used for HDL and LDL cholesterol. While

evaluating blood lipids, reference values from the hospital were used: total cholesterol (0–200 mg/dL, triglycerides (0–150 mg/dL), HDL cholesterol (30–75 mg/dL), and LDL cholesterol (0–130 mg/dL).

An informed consent form was taken from the individuals before starting the study, and the "Emotional Appetite Questionnaire" was applied. By Nolan et al. The emotional appetite questionnaire developed aims to assess emotional eating (11). The validity and reliability study of the Turkish version of the Emotional Appetite Questionnaire (EMAQ) by Demirel et al. (8) The questionnaire consists of 22 questions created with 9-point Likert-type scoring. Participants answered each question with (1-4) less, (5) the same, and (6–9) more. Emotional eating is evaluated as consisting of 14 and 8 items, respectively, in negative and positive emotions and situations. Positive emotions and situations make up the positive total score, and negative emotions and situations make up the negative total score. The scale, which does not have any cut-off points for emotional eating, evaluates the emotions and situations in which emotional eating may be present.

The statistical analysis of the data on the individuals included in the study was made using the SPSS 23 package program. Descriptive statistics of variables with summary tables are presented with mean, standard deviation (SD), min, max, and percentage values. Normality, kurtosis and skewness coefficients of the variables were calculated and normality distributions were examined accordingly. Since the data does not have a normal distribution; the Wilcoxon test was used for dependent group comparisons, and Spearman correlation analysis was used to evaluate the relationships between continuous data. All analyses were evaluated within the 95% confidence interval ($p<0.05$), and the results were interpreted.

RESULTS AND DISCUSSION

Obesity, which is a global health problem due to its increasing prevalence and accompanying comorbidities; hypertension, type 2 diabetes, dyslipidemia etc. It is a risk factor for many diseases (12). Bariatric surgery is the most effective treatment for increasing the quality of life, decreasing comorbidities, and achieving long-term weight loss, especially in morbid obesity (13). Due to its satisfactory results and low complication rate, even in the early period, sleeve gastrectomy has become one of the most preferred bariatric surgery methods in recent years (14). Lipid abnormalities are seen in 80% of obese individuals. Therefore, when we look at the studies on bariatric surgery, it is seen that surgical treatment for obesity has positive effects on blood lipids and cardiovascular disease risk in individuals (15).

Emotional eating, which is predominantly seen in energy imbalances such as obesity, involves eating changes that occur in positive or negative emotions and situations (16). It has been shown that individuals who are overweight eat more food in negative emotions and situations compared to those who eat normally, while individuals with low weight eat less (11). Besides weight gain, emotional eating is associated with high blood lipids (17). However, due to the limited number of studies on this subject, there is no clear information yet. In this study, the changes in total cholesterol, triglyceride, HDL cholesterol, and LDL cholesterol values, which are blood lipids, in the pre-operative and early post-operative periods and the emotional appetite status of the individuals in the early post-operative period were evaluated.

Of the 47 individuals participating in the study, 74,5% were women, 25,5% were men, and 61,7% were married. The mean BMI of individuals is 46,0±21,93 kg/m^2. 21,3% of the individuals are primary school graduates and below, 38,3% are high school graduates, and 40,4% are undergraduate graduates and above. It was determined that 52,2% of the individuals participating in the study never smoked, 46,8% quit smoking, and none of them used alcohol.

The total cholesterol, triglyceride, HDL cholesterol, and LDL cholesterol values of the individuals were statistically significantly decreased in the post-operative period when compared to the pre-operative period (p<,001) (Table 1).

Table 1. Comparison of preoperative and postoperative blood lipids of the patients

Blood Values	Preop	Postop	Z	p
Total Cholesterol **(**mg/dl)	194,61	165,76	-4,254*	<,001
Triglyceride (mg/dl)	167,02	130,87	-3,794*	<,001
HDL Cholesterol (mg/dl)	46,08	41,10	-3,530*	<,001
LDL Cholesterol (mg/dl)	117,91	100,12	-3,753*	<,001

***** *Wilcoxon*

As expected in the study, it was observed that the total cholesterol values of the individuals in the post-operative period decreased significantly compared to the pre-operative period (p<,001). Similarly, Singhal et al., observed in their study that the total cholesterol level decreased significantly in the first postoperative month when compared with the pre-operative period (1). In another study, it was observed that total cholesterol levels decreased significantly at 6 months postoperatively (12). Contrary to this study, Strain et al., concluded in a study they conducted with 82 people who had a sleeve gastrectomy that the total cholesterol levels of individuals increased in the first 3 years (18). This increase may be due to individuals' genetic factors, malabsorption, dietary components, and loss of adipose tissue (19) (Table 1).

Similar to total cholesterol, it was observed that triglyceride levels of individuals decreased significantly in the post-operative period when compared with the pre-operative period (p<0,001). In the study by Zhang et al., it was observed that the blood triglyceride levels of individuals decreased (20). Another study concluded that blood triglyceride levels decreased significantly at 6 months postoperatively (21). In a cohort study by Capoccia et al., in 195 people who had undergone sleeve gastrectomy, blood triglyceride levels were found to be significantly decreased in both diabetic and nondiabetic groups (Table 1).

Blood HDL cholesterol levels were significantly decreased in the post-operative period compared to the pre-operative period (p<0,001). Contrary to this study, in a study conducted with a total of 102 people who underwent 51 sleeve gastrectomy and 51 Roux-en-Y gastric bypass, it was found that HDL cholesterol levels of individuals increased significantly in both groups at the post-operative 12th month, but the increase was higher in individuals who had undergone sleeve gastrectomy (19). In a study by Azevedo et al., it was observed that HDL cholesterol levels of individuals who underwent sleeve gastrectomy increased significantly in the post-operative 3rd month (22). In another study similar to this one, HDL cholesterol levels were found to decrease (23). It is thought that these differences may be due to the physical activity status, nutrition program given to individuals in the postoperative period, and the collection of data in the early postoperative period (Table 1).

LDL cholesterol levels decreased significantly in the post-operative period compared to the pre-operative period (p<,001). Contrary to this study, Capoccia et al., did not find a significant decrease in LDL cholesterol levels in individuals after sleeve gastrectomy in their study (24). In another study, in parallel with our results, LDL cholesterol levels were found to decrease significantly in the post-operative period (12). In a study by Singhal et al., a significant decrease in blood LDL cholesterol levels was observed in the first month of the post-operative period after sleeve gastrectomy (1). These differences are thought to be due to malabsorption that may occur after surgery (19) (Table 1).

It was observed that triglyceride levels of 40 individuals who had undergone sleeve gastrectomy decreased significantly from the postoperative 3rd month, HDL cholesterol levels increased significantly at the postoperative 12th month, and total cholesterol and LDL cholesterol levels were also decreased, but not statistically significant (25). In a study group consisting of 100

people, consisting of 50 sleeve gastrectomy and 50 control groups, it was determined that weight loss after sleeve gastrectomy decreased blood triglyceride, total cholesterol, and LDL cholesterol levels while increasing HDL cholesterol levels (26). It is thought that these improvements observed in blood lipids after sleeve gastrectomy may be due to the reduction of abdominal fat or free fatty acids in the liver (24). This study, like other studies, shows that sleeve gastrectomy is a suitable option for improving blood lipids in the treatment of morbid obesity (Table 1).

EMAQ positive emotion score averages of the individuals participating in the study were 22,4±97,73; the negative emotion mean score was 29,57±11,23; the positive situation mean score was 12,9±44,7; and the negative state mean score was 15,28±6,56. The mean of the individuals' total scores of positive emotions and states is 35,43±12,27, and the mean of total scores of negative emotions and states is 44,85±17,53 (Table 2).

Table 2. Patients emotional appetite survey point mean

Emotional Appetite	Min	Max	$\bar{X}$ ± SD
Positive Emotion Scores (5-45)	5	37	22,49±7,73
Negative Emotion Scores (9-81)	9	45	29,57±11,23
Positive Status Points (3-27)	3	22	12,94±4,73
Negative Status Points (5-45)	5	25	15,28±6,56
Positive Emotion and State Total Score	8	55	35,43±12,27
Negative Emotion and Situation Total Score	14	70	44,85±17,53

Min: Minimum; Max: Maximum; $\bar{X}$: Average; SD: Standard Deviation

There was no significant relationship between the pre-operative total cholesterol, triglyceride, HDL cholesterol, and LDL cholesterol values and the total scores of positive and negative emotions and states (p>0,05). In the study, it was determined that there was a weak positive correlation between the post-operative total cholesterol values of the individuals and the total scores of positive and negative emotions and states (p<0,05, positive mood r =0,397; negative mood r =0,310). There was no significant correlation between the post-operative triglyceride and HDL cholesterol values of the participants and the total scores of positive and negative emotions and states (p>0,05). It was observed that there was a weak positive correlation between the post-operative LDL cholesterol values of the individuals and the total scores of positive and negative emotions and states (p<0,05, positive emotion and state r =0,387; negative emotion and state r =0,315) (Table 3).

Table 3. Comparison of patients' blood lipids and emotional appetite

Blood Lipids	Positive Feeling and Status Total points		Negative Feeling and Status Total points	
	r	**p**	**r**	**p**
Preop Total Cholesterol	0,130	>,05	-0,018	>,05
Preop Triglyceride	0,160	>,05	-0,140	>,05
Preop HDL Cholesterol	-0,023	>,05	0,117	>,05
Preop LDL Cholesterol	0,200	>,05	0,046	>,05
Postop Total Cholesterol	**0,397**	**<,05**	**0,310**	**<,05**
Postop Triglyceride	0,094	>,05	0,031	>,05
Postop HDL Cholesterol	-0,179	>,05	-0,176	>,05
Postop LDL Cholesterol	**0,387**	**<,05**	**0,315**	**<,05**

* *Spearman Correlation*

When the blood lipids and emotional appetite status of individuals are compared, it is found that there is a weak positive correlation between post-operative total cholesterol values and positive emotion and state total scores (p =0,06, r =0,397). In addition, it was observed that there was a weak positive correlation between the post-operative total cholesterol values of the

individuals and the total scores of negative emotions and states (p =0,034, r =0,310). Similar to the results of their study, Mensorio et al. concluded in their study that there was a significant relationship between negative emotions and states and total cholesterol (Table 3).

It was observed that there was a weak positive correlation between the post-operative LDL cholesterol values of the individuals and the total scores of positive emotions and states (p =0,007, r =0,387). It was determined that there was a weak positive correlation between the post-operative LDL cholesterol values of the individuals and the total scores of negative emotions and states (p=0,031, r =0,315). Moschonis et al., concluded in their study that there is a relationship between LDL cholesterol and emotional eating (28). Similarly, another study found a significant relationship between negative emotions and states and LDL cholesterol (Table 3).

CONCLUSION AND SUGGESTIONS

Weight loss in morbid obesity is very important for the recovery of accompanying diseases. Through the media, society should be encouraged to have adequate and balanced nutrition and physical activity. Nutrition therapy should always be included in the first step of treatment. If the individual has a BMI of 40 kg/m^2 or a BMI of 35 kg/m^2 and has another chronic disease, surgical treatment should be sought if there is no response to nutrition, behavior change, or physical activity treatment. In this process, individuals should be followed and supported by a team consisting of physicians, dietitians, physiotherapists, psychiatrists, and nurses. Individuals should be called for control at regular intervals. The team formed for obesity surgery should help the individual apply appropriate nutritional therapy before and after surgery and prevent complications that may occur after surgery.

In order to increase the efficiency of the results of the surgery, individuals should be informed about the nutrition plan they will apply in the pre-operative and post-operative periods. In this process, dietitians should determine the nutritional status of individuals in the pre-operative and post-operative periods and ensure that they adhere to nutritional changes. While doing this, individuals should be counselled on how they should be fed. Through dietitian-client communication, individuals should be given the necessary training on body weight control, be helped to lose weight, and choose appropriate foods in their diets. Individuals should be educated on how to eat in certain portions, away from high-fat and sugary foods, and meet the energy needs that need to be met daily from all food groups. In addition, the necessary analyses of the individuals should be examined, and they should be assisted in supplementing the missing nutrient. After adequate weight loss is achieved, individuals should be placed on an appropriate weight maintenance program. In order to ensure the permanence of the treatment, individuals who have undergone surgery should be trained, and they should be called for control at least two years after the surgery and followed up with a dietitian. In addition to all these, individuals should be directed to seek psychological support when necessary.

The limitations of the study are that the participants were not questioned about their chronic diseases, medication use, and nutritional habits that may affect blood lipids, the study was conducted in a single hospital during a certain period of time, and the sample size was small.

Similar to the studies conducted in this study, when compared to the pre-operative period after sleeve gastrectomy, it was observed that the blood lipid parameters of total cholesterol, triglyceride, HDL cholesterol, and LDL cholesterol values decreased in the post-operative period, and the eating behaviors of the individuals improved positively. In addition, the pre-operative and post-operative nutritional status of individuals should be questioned and their behaviors monitored in order to increase productivity after sleeve gastrectomy. Individuals should be supported by the team formed with health personnel in the problems they encounter. In addition, individuals should be followed for at least two years.

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