Changes in Quality of Alimentation, Anthropometric Measurements, Emotional and Appetite Status of Bariatric Surgery Patients: A Retrospective Cohort Study

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Abstract: *Introduction:* Laparoscopic adjustable gastric band (LAGB) operation is one of the bariatric surgery methods used to treat extreme obesity.

Objective: This study aimed to evaluate the changes in food tolerance, quality of alimentation, anthropometric measurements, and emotional and appetite status following LAGB.

Materials and methods: A retrospective cohort study was conducted with 98 patients, 1 year had passed since LAGB. In this study, no sample selection method was used; all patients who met the inclusion criteria and volunteered participated. The questionnaire form included questions to determine the patients' demographic information, anthropometric measurements, changing food consumption, pre- and post-operative meal consumption, appetite and emotional status. Quality of Alimentation (QA) reflects patients' post-operative dietary satisfaction and tolerance. The QA Form was used to evaluate post-operative food tolerance.

Results: The average age was 38.61±9.82 years, and the mean QA score was 15.59±4.81. The patients lost an average of 30.80±17.76 kg of body weight from pre-operative to post-operative 1st year, and the percentage of patients' excessive body weight loss was found to be 54.37±26.42. It was determined that the foods that were most difficult to consume after the operation were red meat, white meat, bread, rice, pasta, and salad, respectively.

Conclusions: This study uniquely evaluates food tolerance using the QA Form, offering insights into post-operative dietary challenges. LAGB effectively reduces appetite, promotes weight loss, and has a positive impact on patients' emotional health.

Keywords: Appetite, Bariatric Surgery, Emotion, Food Intolerance, Obesity, Weight Loss.

INTRODUCTION

Laparoscopic adjustable gastric band (LAGB) operation is one of the bariatric surgery methods used to treat extreme obesity. LAGB offers lower perioperative risks compared to other bariatric procedures but presents unique post-operative (post-op) challenges such as band slippage and erosion [1]. However, as with other bariatric surgery methods, post-op complications can be controlled with appropriate interventions [2-4]. Studies in the literature indicate that the LAGB operation continues to be a safe, effective and durable option for body weight loss, with advantages such as preserving the integrity of the gastrointestinal tract, relatively easy reversibility, and read justability compared to other methods [5].

After bariatric surgery, patients often experience decreased quality of alimentation, food intolerance, and sometimes frequent vomiting. This can also negatively affect patients' quality of life [6]. In the LAGB operation, the quality of the diet consumed by patients may change due to gastrointestinal symptoms and food intolerance that may occur in relation to these symptoms. However, nutritional difficulties decrease as time passes after bariatric operation. Thus, patients' tolerance to food also increases. In a study in which 93 patients were followed for 3 years after LAGB operation, it was observed that food intolerance was high, especially to red meat, bread, salad, and rice-pasta in the first 6 weeks, but in long-term follow-up, the quality of alimentation of the patients increased and their tolerance to food improved [7]. Compared to other methods, similar improvements were found in all bariatric surgery methods as the duration increased [8,9]. The literature on the change in the quality of

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alimentation of patients after LAGB operation is limited [6]. This study was conducted to evaluate the changes in food tolerance, quality of alimentation, anthropometric measurements, emotional and appetite status after laparoscopic adjustable gastric band operation.

MATERIAL AND METHODS

Study Design and Sample

In this retrospective cohort study, we attempted to reach all patients between the ages of 19-64 who underwent LAGB operation in 2011 at Ankara Numune Training and Research Hospital and 1 year had passed since LAGB, and were followed by the bariatric surgery team and dietician. The study was completed with 98 patients with a mean age of 38.61±9.82 years. In this study, no sample selection method was used, the study was conducted with all patients who met the inclusion criteria and volunteered during the study. Inclusion criteria included being between 19-64 years of age, having a preoperative (pre-op) BMI over 40 kg/m^2, or having a pre-op BMI between 35-40 kg/m^2 and at least 2 comorbidities. The study was approved by the the Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee and written informed consent was obtained from all participants in accordance with the provisions of the Declaration of Helsinki [10].

Data Collection

The questionnaire form includes questions to determine the patients' demographic information (age, gender, education status, pre- and post-op disease status), anthropometric measurements (height and pre- and post-op body weight), changing food consumption, pre- and post-op meal consumption, appetite and emotional status. In addition, the Quality of Alimentation Form was used [6].

Quality of Alimentation Form

Patients' food tolerance after bariatric surgery was recorded using the Quality of Alimentation (QA) form. This form included an overall assessment of patient satisfaction with the quality of their diet, questions about the timing of meals, food intake between meals, and tolerance to various foods, and frequency of vomiting/ regurgitation. The form was developed by Suter *et al*. [6], and the validity and reliability study of the QA form in Turkish was conducted by Erdem and Avşar [7]. The Cronbach's alpha value was found to be 0.72 in patients who underwent LAGB operation [7]. The patient's satisfaction with nutritional intake is scored with numbers ranging from 1 (very bad) to 5 (excellent). Food tolerance is assessed for each specific food type (red meat, white meat, salad, vegetables, bread, rice, pasta, and fish), with 2 points if the patient can eat it without any difficulty, 1 point if the patient can eat it with some difficulties/restrictions, and 0 points if the patient cannot eat it at all and the total score varies between 0 and 16. Vomiting/ regurgitation is evaluated based on a total score ranging from 0 to 6 points; daily vomiting or regurgitation is evaluated as 0 points, vomiting or regurgitation three or more times a week is evaluated as 2 points, vomiting twice a week is evaluated as 4 points, and no vomiting is evaluated as 6 points. The form is scored between 1 and 27, with 27 being the maximum value for excellent food tolerance [6].

Anthropometric Measurements

The pre-op body weight and one year post-op body weight measurement results of the patients were used. Body weight (kg) was measured with a calibrated Tanita brand digital scale, without shoes and wearing light clothing, in accordance with the method [11]. Height (cm) was measured using a non-stretchable tape measure, with feet together, heels, back and shoulders touching the wall, and after providing the Frankfurt plane [11]. Body mass index (BMI) values were calculated by dividing the body weight of the individuals by the square meter of their height (kg/m^2) and were evaluated according to the classification made by the World Health Organization (WHO) [12]. When calculating percentage of excessive body weight loss rate (EWL%), the formula "lost weight / (pre-op weight – ideal body weight) x 100" was used [13].

Data Analysis

SPSS 26.0 (SPSS Inc., Chicago, IL, USA, a free trial version) was used for statistical analysis of the data [14]. The methods used in statistical analyses were selected considering the retrospective cohort design of the study and the characteristics of the data set. Means ± standard deviations ($\bar{x}$ ±SD) were calculated and frequencies were expressed as numbers (n) and percentages (%). These analyses were used to describe the sample characteristics and understand the general structure of the data set. The Kolmogorov-Smirnov test was used to determine whether the distribution of continuous variables was normal. The Wilcoxon matched pairs test was used to

test whether there was a difference between the medians of the dependent samples. Quality of alimentation score (QAS) was converted into a categorical variable (as more or less) by determining the cut-off point (15.5918) from the sample mean and used in the Chi-square test for statistical dependencies. Chi-square cross-tab analysis was used to assess independence between categorical QAS variables and qualitative variables. The McNemar test was used to investigate whether there were significant differences in participants' morning and afternoon eating behavior before and after the operation. Relationships between quantitative variables were tested using Spearman correlation tests. For all statistical tests, the minimum significance level was set at 0.05.

RESULTS

The general characteristics of the patients participating in the study are given in Table **1**. The QAS was transformed into a categorical variable (more or less) by selecting the sample mean as the cut-off point. The independence of the qualitative variables and the "categorical QAS" variable was investigated with Chi-square cross-table analysis and the found p-value is given. QAS mean did not differ significantly according to patient general characteristics. The majority of the patients participating in the study were female [female:81 (82.65%), and male:17 (17.35%)], and almost all of the patients had attempted to lose weight other than diet and bariatric surgery before the LAGB operation (94.90%). The mean QAS of the patients is 15.59±4.81 kg/m^2 and 52.04% comply with the post-op diet. More than half of the patients describe their appetite as normal or above in the post-op period. Similarly, 85.71% of the patients feel full after the operation. When the post-op emotional status is examined, it is determined that very few of the patients feel bad or very bad (bad:3.06%, very bad:4.08%).

Differences between pre- and post-op anthropometric measurements and the number of meals were examined using the Wilcoxon matched pair test. The average BMI of the patients decreased from 45.98±6.91 kg/m² preoperatively to 34.81±6.52 kg/m² one year postoperatively. While 82.65% of the patients were in the obesity class III category according to WHO's BMI classification before the operation, it was observed that 5.10% of them were normal weight and 18.37% were pre-obesity after the operation. The patients lost an average of 30.80±17.76 kg of body weight from pre-op to post-op 1st year, and the percentage of patients' excessive body weight loss was found to be 54.37±26.42.

Changes in the consumption of certain foods in the post-op 1st year are summarized in Table **3**. It was determined that the consumption of red meat, white meat, bread, salad, fruit, rice, pasta, legumes, fat and fatty foods decreased after the operation in most patients. When the food consumption before and after the operation was evaluated based on QAS, the QAS averages of the individuals whose consumption of white meat, salad, and vegetables (cooked) decreased were found to be statistically significantly lower than the QAS averages of the individuals whose consumption of these foods did not change or increased ($p<0.05$). Higher QA scores were observed in patients maintaining consistent red meat, soup, and milk consumption ($p<0.05$).

In the study, the relationships between QAS and anthropometric measurements and nutritional habits were evaluated with Spearman Correlation Analysis. This method is suitable for examining the linear relationship between continuous variables such as QAS and other continuous variables that do not show normal distribution. This analysis contributed to the determination of factors that may affect the quality of alimentation. No correlation was found between the patients' QAS, anthropometric measurement results, and the number of main meals and snacks ($p>0.05$).

As shown in Figure **1**, when the patients' tolerance status to different foods was examined in the post-op 1st year, it was determined that the foods that were most difficult to consume after the operation were red meat, white meat, bread, rice, pasta, and salad, respectively. It was found that the patients had higher food tolerance to vegetables and fish compared to other foods.

DISCUSSION

Laparoscopic adjustable gastric banding is a restrictive procedure that involves placing an adjustable band inside the stomach to create an artificial pouch. This pouch helps reduce body weight by creating a feeling of fullness [15,16]. This method is associated with a significant reduction in obesity-related comorbidities and significant improvements in health and quality of life. It also provides safe and effective control of extreme obesity [17,18]. However, deterioration in the quality of alimentation and food intolerance are common after bariatric surgery [19,20]. Patients who have undergone a band operation often have difficulty consuming certain specific foods in the post-op period. However, this situation decreases as

Table 1: General Characteristics of the Patients and their Quality of Alimentation Scores

	Frequency (n)	Percentage (%)	QAS $\bar{X}$ ±SD	p-value
Quality of alimentation score (QAS)	98	100.00	15.59±4.81	
Satisfaction of eating ability			3.85±1.08	
Food tolerance			9.55±3.17	
Frequency of vomiting			2.18±1.86	
Gender				
Female	81	82.65	15.53±5.16	0.719
Male	17	17.35	15.88±2.71	
Education				
Illiterate	2	2.05	19.50±7.78	
Primary school graduate	33	33.67	15.15±4.82	
Secondary school graduate	12	12.24	16.08±4.42	
High school graduate	23	23.47	15.74±4.30	0.915
University graduate	25	25.51	15.40±5.61	
Master's/PhD graduate	3	3.06	16.33±3.51	
Weight loss attempts other than pre-op diet and bariatric surgery				
Yes	93	94.90	15.61±4.89	0.680
No	5	5.10	15.20±3.27	
Weight loss methods other than pre-op diet and bariatric surgery*				
Self-induced vomiting	9	9.68	14.44±3.47	0.700
Weight loss drug use	74	79.57	15.96±4.86	0.472
Laxatives use	11	11.83	15.36±5.37	0.777
Diuretics use	13	13.98	13.92±3.09	0.146
Excessive exercise	14	15.05	15.00±3.66	0.592
Alternative medicine practices (other than acupuncture)	63	67.74	15.83±4.99	0.415
Acupuncture	53	56.99	14.89±5.14	0.178
Surgical applications (liposuction etc.)	6	6.45	14.83±5.46	0.384
Non-surgical applications (CO_2 application, cavitation, etc.)	8	8.60	15.75±4.95	0.975
Compliance with the recommended diet after surgery				
Yes	51	52.04	16.18±4.80	0.680
No	47	47.96	14.96±4.80	
Feeling of fullness after surgery				
Feeling full	84	85.71	15.82±4.72	0.419
Not feeling full	14	14.29	14.21±5.29	
Appetite status after the operation				
Very bad	3	3.06	11.33±2.08	
Bad	16	16.33	14.44±5.30	0.541
Normal	55	56.12	16.25±4.72	
Good	18	18.37	16.33±4.83	
Very good	6	6.12	12.50±3.21	
Emotional status after the operation				
Perfect	45	45.92	16.71±4.33	
Good	30	30.61	15.47±4.70	
Not bad	16	16.33	13.31±5.35	0.842
Bad	3	3.06	16.33±3.21	
Very bad	4	4.08	12.50±7.14	

*More than one option is marked. QAS: Quality of Alimentation Score. Data were analyzed using the Chi-square test.

Table 2: Anthropometric Measurements, Meal Consumption, Appetite and Emotional Status of the Patients Pre-op and Post-op 1st Year

	Pre-op		Post-op 1st year		p-value
	n	%	n	%	
Body weight (kg) ($\bar{X}$ ±SD)	126.08±24.29		95.27±20.45		<0.01*
BMI (kg/m^2) ($\bar{X}$ ±SD)	45.98±6.91		34.81±6.52		<0.01*
BMI classification					
Normal weight	-	-	5	5.10	<0.01*
Pre-obesity	-	-	18	18.37	
Obesity class I	-	-	30	30.61	
Obesity class II	17	17.35	24	24.49	
Obesity class III	81	82.65	21	21.43	
Body weight loss (kg) ($\bar{X}$ ±SD)	30.80±17.76				
EWL (%) ($\bar{X}$ ±SD)	54.37±26.42				
Number of main meals ($\bar{X}$ ±SD)	3.64±1.57		2.77±0.44		<0.01*
Number of snacks ($\bar{X}$ ±SD)	2.20±1.83		2.07±1.34		0.631*
Main meals*					
Breakfast	84	85.71	89	90.82	<0.01**
Lunch	84	85.71	84	85.71	<0.01**
Dinner	96	97.96	98	100.00	-
Appetite status					
Very bad	-	-	3	3.06	-
Bad	-	-	16	16.33	
Normal	1	1.02	55	56.13	
Good	13	13.27	18	18.37	
Very good	84	85.71	6	6.2	
Emotional status					
Perfect	3	3.06	45	45.92	-
Good	12	12.24	30	30.61	
Not bad	10	10.21	16	16.33	
Bad	32	32.65	3	3.06	
Very bad	41	41.84	4	4.08	

*More than one option is marked. Pre-op: Pre-operative, Post-op: Post-operative, BMI: Body Mass Index, EWL%: Percentage of excess weight loss. *Data were analyzed using the Wilcoxon matched pair test.** Data were analyzed using the McNemar test. -: McNemar test could not be performed because the number of categories of the variables was more than two.

Table 3: Changes in the Consumption of Certain Foods Post-op 1st Year

	n	%	QAS ($\bar{X}$ ±SD)	p-value
Red meat				
Increased	3	3.06	14.33±2.52	0.014
Decreased	76	77.55	14.95±4.80	
Not Changed	19	19.39	18.37±4.23	
White meat				
Increased	9	9.18	16.33±4.42	0.016
Decreased	66	67.35	14.82±4.64	
Not Changed	23	23.47	17.52±5.06	
Fish				
Increased	16	16.33	15.44±2.85	0.962
Decreased	34	34.69	15.35±4.97	
Not Changed	48	48.98	15.81±5.27	

(Table 3). Continued.

	n	%	QAS ($\bar{X}$ ±SD)	p-value
Egg				
Increased	8	8.16	17.25±4.98	0.920
Decreased	49	50.00	15.18±4.75	
Not Changed	41	41.84	15.76±4.90	
Cheese				
Increased	12	12.24	15.67±6.73	0.793
Decreased	38	38.78	15.32±4.24	
Not Changed	48	48.98	15.79±4.79	
Milk				
Increased	32	32.65	14.38±4.27	0.047
Decreased	21	21.43	14.57±3.88	
Not Changed	45	45.92	16.93±5.29	
Yogurt				
Increased	26	26.53	16.00±5.34	0.463
Decreased	30	30.61	14.77±4.38	
Not Changed	42	42.86	15.93±4.82	
Vegetables (cooked)				
Increased	28	28.57	16.32±4.86	0.010
Decreased	50	51.02	14.36±4.43	
Not Changed	20	20.41	17.65±4.98	
Salad				
Increased	18	18.37	18.17±3.24	0.001
Decreased	61	62.24	14.48±4.93	
Not Changed	19	19.39	16.74±4.64	
Fruit				
Increased	17	17.35	16.71±3.04	0.335
Decreased	65	66.33	14.91±4.80	
Not Changed	16	16.32	17.19±5.97	
Bread				
Increased	3	3.06	15.33±2.89	0.715
Decreased	92	93.88	15.59±4.78	
Not Changed	3	3.06	16.00±8.72	
Pasta				
Increased	2	2.04	20.50±6.36	0.116
Decreased	86	87.76	15.35±4.89	
Not Changed	10	10.20	16.70±3.50	
Rice				
Increased	2	2.04	20.50±6.36	0.069
Decreased	90	91.84	15.40±4.81	
Not Changed	6	6.12	16.83±4.22	
Soup				
Increased	30	30.61	14.27±4.83	0.040
Decreased	51	52.04	15.78±4.87	
Not Changed	17	17.35	17.35±4.17	
Legumes				
Increased	7	7.14	15.43±3.36	0.109
Decreased	65	66.33	14.83±4.87	
Not Changed	26	26.53	17.54±4.58	
Fat and fatty foods				
Increased	2	2.04	14.00±4.24	0.998
Decreased	88	89.80	15.67±4.70	
Not Changed	8	8.16	15.13±6.51	
Sugar and desserts				
Increased	18	18.37	12.61±4.65	0.630
Decreased	52	53.06	16.56±4.51	
Not Changed	28	28.57	15.71±4.84	

Data were analyzed using the Chi-square test.

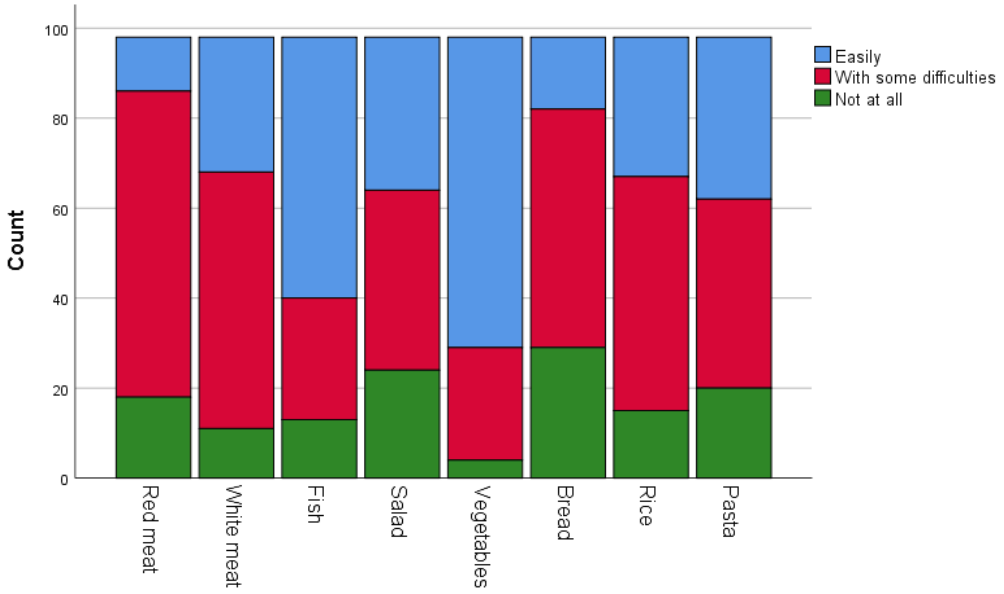

Figure 1: Quality of Alimentation: Tolerance to Different Foods Post-op 1st Year.

time passes after the operation and the patient's quality of alimentation improves [7,9]. In this study, the mean QAS of the patients 1 year after the LAGB operation was found to be 15.59±4.81. When the quality of alimentation of the patients was evaluated by taking into account the time elapsed after the operation in different studies in the literature, QAS means similar to the results of this study were found [9]. For example, in a cross-sectional clinical study, the quality of alimentation was evaluated in three different periods after LAGB operation: short (3-6 months), medium (6-12 months), and long-term (>12 months) follow-up. The mean QAS of the patients was found to be 14.47±5.92 in the medium term and 15.5±3.75 in the long term [9]. In this study, it was determined that the foods that patients had the most difficulty consuming after the operation were red meat, white meat, bread, rice, pasta, and salad, respectively (in Figure **1**). In addition, most patients reported that their consumption of red meat, white meat, bread, salad, fruit, rice, pasta, legumes, fat and fatty foods decreased after the operation. As shown in Figure **1**, patients have a higher food tolerance to vegetables and fish than to other foods. It is thought that this is due to the fact that vegetables are consumed cooked and fish is a food that can be easily broken into small pieces by chewing when cooked. Cooked vegetables and fish are easily digestible foods [21,22]. In another study, similar to the results of this study, it was observed that food intolerance, especially to red meat, bread, salad and rice-pasta, was high in the first 6 weeks after LAGB operation, but over time, the quality of alimentation of the patients increased and their tolerance to foods improved [7]. In a different study, it was observed that patients had difficulty consuming bread, rice, and fish after LAGB operation (n:49) [9]. It was also found that there was a significant decrease in the consumption of pasta, white bread and fresh fruit compared to before the operation ($p<0.05$) [23]. It is likely that patients' difficulty in consuming nutrient-rich foods such as fruit and red meat will negatively affect their diet quality [23,24]. Dietary challenges, particularly intolerance to red meat and bread, underscore the importance of individualized nutritional counseling post-LAGB. The quality of alimentation in LAGB patients may decrease due to food intolerance and gastrointestinal symptoms. However, nutritional difficulties decrease as time passes after bariatric surgery. Thus, patients' tolerance to food and the quality of alimentation improve [7].

In this study, it was determined that while the majority of individuals were in the obesity class III category (82.65%) before the operation, 5.10% of them reached normal weight after the operation, 18.37% were pre-obesity, and 30.61% were in the obesity class I category. In addition, the mean BMI of the patients was 45.98±6.91 kg/m^2 in the pre-op period, while it was 34.81±6.52 kg/m^2 in the post-op first year. In a similar study, patients showed comparable post-operational BMI reductions, with the mean BMI decreasing from 42.7 kg/m² to 31.0 kg/m² one year after operation [25]. In this study, patients lost an average of 30.80±17.76 kg body weight from pre-op to one year after the operation, and EWL% was found to be 54.37±26.4%. Loss of 50% of EWL% after operation is shown as success [26]. Accordingly, our results were successful. Similar to the results of this study, in

Table 4: Relationship between QAS and Anthropometric Measurements and Meal Consumptions

	r	p
Post-op body weight (kg)	-0.028	0.787
Post-op BMI (kg/m^2)	0.022	0.830
Body weight loss (kg)	-0.163	0.108
EWL%	-0.097	0.342
Number of main meals post-op 1st year	0.138	0.176
Number of snacks post-op 1st year	0.086	0.398

Data were evaluated with Spearman correlation analysis. Post-op: Post-operative, BMI: Body Mass Index, EWL%: Percentage of excess weight loss. Correlation was considered significant if p<0.05 (2-tailed).

another study, the average body weight loss of patients one year after the operation was found to be 35.4±13.8 kg, and EWL% (27.6±8.4%) was reported lower than that found in this study [7]. In another study where long-term follow-up results after LAGB operation were reviewed, it was found that the mean pre-op BMI of patients who did not need reoperation decreased from 42.23 kg/m^2 to 37.50 kg/m^2 and their EWL% was 39.22%. These results indicate that LAGB is an effective and durable option for providing body weight loss in the treatment of extreme obesity [5]. As shown in Table **4**, no correlation was found between the patients' QAS and anthropometric measurements and the number of meals (p>0.05). In a study conducted with patients who underwent LAGB operation, no relationship was found between the QAS and weight loss, EWL%, and BMI in the post-op 1st year, similar to the results of this study [7]. It is possible that the relatively short follow-up period affected these results. Indeed, the relationship between anthropometric measurements and QAS was found to be statistically significant in the post-op 3rd year (for EWL% r:+0.0251, p:0.031; for BMI r:-0.395, p:0.001) [7].

In a study investigating food tolerance and gastrointestinal quality of life in LAGB patients approximately 2 to 4 years after the operation, it was shown that low food tolerance after the operation was associated with decreased Gastrointestinal Quality of Life Index in this patient group [27]. Study results supporting decreased food tolerance in LAGB patients [27-29] indicate that long-term nutritional problems that may be encountered should be taken into consideration before the operation. According to the results of this study, 52.04% of the patients comply with their post-op diet and 85.71% feel full despite the decrease in the average number of main and snack meals after the operation. It is possible that the LAGB procedure and the nutritional counseling, education and diet monitoring provided by the dietitian to the patients participating in this study were effective on these results [7]. The ability of patients to change their eating habits and body weight loss after LAGB operation are interrelated. Therefore, compliance with dietary recommendations and continuous diet monitoring are shown to be important factors in determining post-op body weight loss and health outcomes [24]. In this study, more than half of the patients described their appetite as normal or above in the post-op period. Similarly, it was determined that very few patients felt bad or very bad after the operation. When all these results are evaluated together, it is thought that the health and quality of life of the patients and their post-op adaptations are high after the LAGB operation.

This study is a retrospective cohort study, the study could have been supported by follow- up data of patients participating in the study for more than one year to verify the data obtained from the study. There are a limited number of studies in the literature on the evaluation of the quality of alimentation in patients undergoing LAGB operation. Therefore, although we think that the contribution of this study to the literature is quite important, longitudinal studies with follow-up studies are needed. Future studies should incorporate longitudinal designs and larger sample sizes to validate findings and assess long-term changes.

CONCLUSION

The results obtained from this study show that LAGB is an effective method for appetite control and loss of excess body weight, as well as having health benefits on the emotional state of the patients. This study uniquely evaluates food tolerance using the QA Form, offering insights into post-op dietary challenges. It is thought that the relatively low food tolerance after the operation is due to the control of the patients with nutritional counseling, nutritional education, and dietary interventions, and these are essential in this patient

group. Food tolerance and vomiting/regurgitation have the potential to affect the quality of alimentation, quality of life, and post-op complications. Therefore, it is anticipated that evaluation of this issue in future studies involving longitudinal designs and larger sample sizes will contribute to the development of a more comprehensive evidence base in the nutritional perspective of LAGB.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

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REFERENCES

[1] Beitner M, Kurian MS. Laparoscopic adjustable gastric banding. Abdom Imaging 2012; 37(5): 687-9. https://doi.org/10.1007/s00261-012-9864-8

[2] Mognol P, Chosidow D, Marmuse J-P. Laparoscopic gastric bypass versus laparoscopic adjustable gastric banding in the super-obese: a comparative study of 290 patients. Obes Surg 2005; 15(1): 76-81. https://doi.org/10.1381/0960892052993486

[3] Poulose BK, Griffin MR, Zhu Y, Smalley W, Richards WO, Wright JK, *et al*. National analysis of adverse patient safety events in bariatric surgery. Am Surg 2005; 71(5): 406-13. https://doi.org/10.1177/000313480507100508

[4] Allen JW. Laparoscopic gastric band complications. Med Clin North Am 2007; 91(3): 485-97, xii. https://doi.org/10.1016/j.mcna.2007.01.009

[5] Nasri B-N, Trainor L, Jones DB. Laparoscopic adjustable gastric band remains a safe, effective, and durable option for surgical weight loss. Surg Endosc 2022; 36(10): 7781-8. https://doi.org/10.1007/s00464-022-09278-8

[6] Suter M, Calmes J-M, Paroz A, Giusti V. A new questionnaire for quick assessment of food tolerance after bariatric surgery. Obes Surg 2007; 17(1): 2-8. https://doi.org/10.1007/s11695-007-9016-3

[7] Erdem NZ, Avşar FM. Effects of patients quality of alimentation on long-term clinical outcomes after laparoscopic adjustable gastric band: Prospective-cohort clinical study. Turkiye Klin J Med Sci 2023; 43: 269-80. https://doi.org/10.5336/medsci.2022-94459

[8] Kaner G, Ayer Ç, Yalçın T. Evaluation of eating quality after laparoscopic sleeve gastrectomy. Karya J Heal Sci 2023; 4(3): 220-226. https://doi.org/10.52831/kjhs.1342510

[9] Schweiger C, Weiss R, Keidar A. Effect of different bariatric operations on food tolerance and quality of eating. Obes Surg 2010 ; 20(10): 1393-9. https://doi.org/10.1007/s11695-010-0233-9

[10] World Medical Association. WMA Declaration of Helsinki-Ethical principles for medical research involving human participants. Cited: 19 November 2024. Available from: https://www.wma.net/policies-post/wma-declaration-of-helsinki/.

[11] Pekcan G. Beslenme Durumunun Saptanması. Elektronik. Ankara: T.C Sağlık Bakanlığı; 2008.

[12] World Health Organization. A healthy lifestyle - WHO recommendations. Cited: 20 November 2024. Available from: https://www.who.int/europe/news-room/fact-sheets/item/a-healthy-lifestyle-who-recommendations.

[13] Khalifa IG, Tobar WL, Hegazy TO, Balamoun HA, Mikhail S, Salman MA, *et al*. Food tolerance after laparoscopic sleeve gastrectomy with total antral resection. Obes Surg 2019; 29(7): 2263-9. https://doi.org/10.1007/s11695-019-03840-5

[14] IBMCORP IBM S. Statistics For Windows, Version 26.0. Armonk, NY: IBM Corp. 2024.

[15] Kuzmak LI, Yap IS, McGuire L, Dixon JS, Young MP. Surgery for morbid obesity: using an inflatable gastric band. AORN J 1990; 51(5): 1307-24. https://doi.org/10.1016/S0001-2092(07)70154-0

[16] Burton PR, Brown WA. The mechanism of weight loss with laparoscopic adjustable gastric banding: induction of satiety not restriction. Int J Obes 2011; 35(3): S26-S30. https://doi.org/10.1038/ijo.2011.144

[17] O'brien PE, Dixon JB, Brown W, Schachter LM, Chapman L, Burn AJ, *et al*. The laparoscopic adjustable gastric band (Lap-Band®): a prospective study of medium-term effects on weight, health and quality of life. Obes Surg 2002; 12(5): 652-60. https://doi.org/10.1381/096089202321019639

[18] Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K, *et al*. Bariatric surgery: a systematic review and meta-analysis. JAMA 2004; 292(14): 1724-37. https://doi.org/10.1001/jama.292.14.1724

[19] Stumpf MAM, Rodrigues MR da S, Kluthcovsky ACGC, Travalini F, Milléo FQ. Analysis of food tolerance in patients submitted to bariatric surgery using the questionnaire quality of alimentation. Arq Bras Cir Dig 2015; 28 Suppl 1(Suppl 1): 79-83. https://doi.org/10.1590/S0102-6720201500S100021

[20] Salavatizadeh M, Amini MR, Abbaslou F, Amirbeigi A. Comparison of food tolerance among bariatric surgery procedures: a systematic review. Surg Obes Relat Dis Off J Am Soc Bariatr Surg. 2024; https://doi.org/10.1016/j.soard.2024.10.009

[21] Bhat ZF, Morton JD, Bekhit AE-DA, Kumar S, Bhat HF. Thermal processing implications on the digestibility of meat, fish and seafood proteins. Compr Rev food Sci food Saf 2021; 20(5): 4511-48. https://doi.org/10.1111/1541-4337.12802

[22] Iborra-Bernad C, García-Segovia P, Martínez-Monzó J. Physico-chemical and structural characteristics of vegetables cooked under sous-vide, cook-vide, and conventional boiling. J Food Sci 2015; 80(8): E1725-34. https://doi.org/10.1111/1750-3841.12950

[23] Ernst B, Thurnheer M, Wilms B, Schultes B. Differential changes in dietary habits after gastric bypass versus gastric banding operations. Obes Surg 2009; 19: 274-80. https://doi.org/10.1007/s11695-008-9769-3

[24] Dodsworth A, Warren-Forward H, Baines S. A systematic review of dietary intake after laparoscopic adjustable gastric banding. J Hum Nutr Diet Off J Br Diet Assoc 2011; 24(4): 327-41. https://doi.org/10.1111/j.1365-277X.2011.01155.x

[25] Nicolai A, Ippoliti C, Petrelli MD. Laparoscopic adjustable gastric banding: essential role of psychological support. Obes Surg 2002; 12(6): 857-63. https://doi.org/10.1381/096089202320995709

[26] Freire RH, Borges MC, Alvarez-Leite JI, Correia MITD. Food quality, physical activity, and nutritional follow-up as determinant of weight regain after Roux-en-Y gastric bypass. Nutrition 2012; 28(1): 53-8. https://doi.org/10.1016/j.nut.2011.01.011

[27] Overs SE, Freeman RA, Zarshenas N, Walton KL, Jorgensen JO. Food tolerance and gastrointestinal quality of life following three bariatric procedures: Adjustable gastric banding, Roux-en-Y gastric bypass, and sleeve gastrectomy. Obes Surg 2012; 22(4): 536-43. https://doi.org/10.1007/s11695-011-0573-0

[28] Freeman RA, Overs SE, Zarshenas N, Walton KL, Jorgensen JO. Food tolerance and diet quality following adjustable gastric banding, sleeve gastrectomy and Roux-en-Y gastric bypass. Obesity Research & Clinical Practice 2014; 8(2): e183-e191. https://doi.org/10.1016/j.orcp.2013.02.002

[29] Salavatizadeh M, Amini MR, Abbaslou F, Amirbeigi A. Comparison of food tolerance among bariatric surgery procedures: A systematic review. Surgery for Obesity and Related Diseases 2024 Oct; [cited 2024 December 12]. https://doi.org/10.1016/j.soard.2024.10.009

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