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ORIGINAL CONTRIBUTIONS

Ramadan Fasting Increases Socialization in Patients Who Underwent Sleeve Gastrectomy: An Observational Study

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Abstract

Purpose The prevalence of obesity is increasing along with the number of sleeve gastrectomies. Patients' mental health and social life, along with their physical health, should be considered. Their cultural and religious values are an important part of treatment. Fasting is an important act of worship in all religions. Ramadan fasting is one of the five pillars of Islam. In this study, we aimed to investigate the effect of Ramadan fasting on quality of life in patients who underwent sleeve gastrectomy.

Materials and Methods Data regarding the demographic characteristics, weight, the time elapsed after surgery, and the amount of liquid and solid food consumed during fasting were collected with two surveys, one of which was carried out at the beginning and the other at the end of Ramadan. In addition, the SF-36 health survey questionnaire was administered to evaluate the impact of Ramadan fasting on patients' quality of life.

Results Fifty-one people participated in the first survey, but the second survey included 19 of them. While the median weight of the patients was 86.52 ± 17.78 kg before fasting, the median weight after 25 days of fasting was 83.31 ± 17.06 kg. A significant decrease was observed in weight after 25 days of fasting ($p < 0.001$). A comparison of the SF-36 scores for quality of life revealed a significant increase in the social functioning ($p = 0.032$).

Conclusion Ramadan fasting caused significant weight loss in patients who underwent sleeve gastrectomy. Besides, it did not adversely affect the quality of life, but rather increased social functioning.

Keywords Sleeve gastrectomy · Obese · Obesity · Ramadan

Introduction

Obesity is a rapidly growing public health problem affecting increasing number of countries around the world due to its prevalence, costs, and health impacts. While there were an estimated 200 million obese adults worldwide in 1995, this number increased by 50% within 5 years, reaching 300 million [1]. Bariatric surgery is the most effective treatment for obesity. It is associated with the maintenance of successful long-term weight loss, a reduction in obesity-related morbidity, and improvement in the quality of life of patients [2]. Laparoscopic sleeve gastrectomy (LSG), originally designed as a limiting component of biliopancreatic diversion-duodenal switch (BPD-DS) surgery for high-risk patients, has gradually become the first-line treatment for morbid obesity. Studies on patients who underwent LSG revealed that this treatment has

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advantages such as excellent weight loss outcomes, success in the treatment of comorbid diseases, relative technical convenience, the lack of a need for external devices such as gastric bands, the lack of a need for adjustments, a shortened operation time, and immediate calorie intake restriction [3, 4]. Bariatric surgery causes a radical change in an individual's life, which consequently leads to a change in the types of food preferred, amount of food consumed, and frequency of eating. The restriction leads to a diet which contains more fluids, especially in the early postoperative period. It takes at least a year to achieve a stable and regular food intake and an adequate energy-intake balance [5]. The decrease in stomach volume after restrictive surgery causes a significant decrease in the amount of food consumed. Postoperative vomiting occurs in 30–60% of bariatric patients in the first months after surgery due to a decreased stomach volume. Most of these complaints occur within the first postoperative months and are associated with inappropriate eating behaviors such as eating large quantities of food and eating without chewing thoroughly. In addition, other gastrointestinal symptoms are observed after bariatric surgery such as early dumping syndrome, late dumping syndrome, diarrhea, bloating, constipation, dysphagia, food intolerance, and dehydration [6, 7].

Spirituality, religion and personal beliefs are important social determinants that affect patients' health behavior and compliance with treatment [8]. Patients who have higher levels of spirituality and attach more meaning to life are less affected by negative emotional situations and adapt better in the postoperative period. Patients with strong spiritual values have a better mental and physical quality of life [9]. The size of the Muslim population worldwide is expected to increase from 1.6 billion in 2010 to 2.2 billion in 2030 and to constitute 26.4% of the world's total predicted population, i.e., 8.3 billion people [10]. Although there are other types of fasting in Islam, Ramadan fasting is a compulsory type of worship for every Muslim who meet certain criteria. It is considered as one of the five pillars of Islam and an important form of worship in Muslim societies. Healthy individuals must fast during Ramadan, and it is believed that the sins of those who fast during Ramadan with sincere belief and hope to please Allah will be forgiven, and they will reach high levels in Paradise [11]. For this reason, many Muslims with severe medical problems insist on fasting despite their exemption from fasting during Ramadan and the advice of physicians not to fast [12, 13].

Due to the increase in the obese population and the effective treatment being surgery, an increasing number of people is expected to undergo bariatric surgery in the coming years. Fasting appears to be an important element in many religions. There are not enough studies on the Ramadan fasting by Muslims who underwent bariatric surgery. We aimed to investigate the fasting experiences of those who underwent sleeve gastrectomy, their adaptation to fasting, and effects of sleeve gastrectomy on their quality of life.

Materials and Methods

The present study was a prospective observational survey in patients who underwent sleeve gastrectomy due to morbid obesity in the General Surgery Clinic of the Faculty of Medicine at Tokat Gaziosmanpaşa University between January 2016 and January 2019. Ethics committee approval was obtained for this study (Approval no: 19-KAEK-132).

Participants who were between the ages of 18 and 65 years and who underwent sleeve gastrectomy in our clinic were reached via social media, and they were informed about the aim of the study. Patients who did not use social media were excluded from the study. After the patients were informed, a survey link was sent. Volunteer consent was requested from the participants when they started the survey. Fifty-one patients participated in the first survey, but the second survey included 19 of them. The evaluations in both surveys were performed based on pooled responses of the patients.

The survey was conducted by sending a survey link on social media in the month of Ramadan in the Hijri year of 1440 (May 7 to 31, 2019). The participants answered the survey's questions twice, one on the second and the other on the 26th day of Ramadan. No identifying information was requested for them so that they did not feel pressured as it is a religious issue. Thus, numerical multiple choice options were provided for the patients to choose from for their age, the time elapsed after surgery, and the amount of liquid and food they consumed before and during Ramadan. Data on height, weight on the day of the survey, chronic diseases, and whether the patient used medication were collected by the survey. Upper endoscopy was performed in all patients before surgery.

The short form-36 questionnaire was used to evaluate the quality of life of the participants. Both surveys included the same questions regarding whether there were any impairments in quality of life. In addition to the information mentioned above, the second survey also asked the participants whether they took a break from fasting.

Statistical Methods

Statistical analyses of the data were performed using SPSS (version 22.0, SPSS Inc., Chicago, IL, USA). The descriptive statistics were presented as mean ± standard deviation and median (min-max) depending on the distribution of the data for continuous variables. The descriptive statistics of the categorical data were reported as numbers and percentages. The Shapiro-Wilk test was used to assess whether the data were distributed normally. The quality of life subscores of the SF-36 scale were compared at two different time points by the Wilcoxon signed-rank test since the data were not distributed normally. The one-sample *t*-test was used to compare the quality of life scores measured by the SF-36 questionnaire

for the study population. Fisher's exact test was used to investigate the relationship between categorical variables and to compare proportions. The level of statistical significance was defined as $p < 0.05$.

Results

During the study period, a total of 254 patients underwent sleeve gastrectomy and 22 patients underwent gastric bypass operation in our clinic. In order to achieve homogeneity in the patient group, the patients who had gastric bypass operation were not included in the study. A survey link was sent via social media to a total of 60 patients who met the inclusion criteria. However, nine of them (15%) did not respond to the first survey, and the data from these 51 patients were used for the first survey. Thirty-six of the 51 patients who took the first survey (70.6%) were female, and 15 (29.4%) were male. Thirty-two (62.7%) of the 51 patients who participated in the first survey did not participate in the second survey, and the data from 19 patients were used for the second survey (Fig. 1). Eleven (57.9%) of the patients who completed the second survey were female, and eight (42.1%) were male. Four patients (21.1%) stated that they took vitamin supplements regularly, and 15 patients stated that they did not. Four patients (21.1%) mentioned that they had chronic diseases, including sleep apnea, hypertension, familial Mediterranean fever (FMF), and hypothyroidism while 15 patients reported that they did not have any chronic disease. Fourteen patients (73.7%) mentioned that they ate one to three plates of food a day, and five patients (26.3%) ate four to six plates a day on a normal day. All patients stated that they consumed one to three plates of food a day during Ramadan. The distribution of the patients participating in the first and second surveys according to their sociodemographic characteristics is presented in Table 1. Comparisons regarding the amount of fluid consumption of the patients before and during fasting are presented in Table 2, and no significant differences were found for fluid consumption ($p = 0.109$).

Statistical comparisons of the patients' weight changes before and after fasting are given in Fig. 2. A significant decrease was observed in their weight after 25 days of fasting ($p < 0.001$). The median weight was 86.52 ± 17.78 kg (range: 60–118) before fasting and 83.31 ± 17.06 kg (range: 58–116) after 25 days of fasting.

Due to the difficulty experienced during fasting, six participants had breaks for Ramadan fasting, which is normally performed on consecutive days. Average number of days they did not fast was 8.2 ± 4.12 days (range: 2–12).

Figure 3 shows the comparison of the patients' quality of life values measured by the SF-36 questionnaire at the beginning and end of Ramadan after 25 days of fasting. Among the SF-36 subscale scores, only the social functioning score changed significantly. The evaluation performed at the end of Ramadan revealed a significant increase in the social functioning scores ($p = 0.032$, Table 3). The effects of fasting on other subscale scores, including the physical functioning, physical role difficulty, emotional role difficulty, energy vitality, mental health, pain, and general health perception scores, were not significant ($p > 0.05$, Table 3).

Table 1 Sociodemographic descriptive statistics of patients

	Groups	First survey		Second survey	
		n	%	*n*	%
Gender	Female	36	70.6	11	57.9
	Male	15	29.4	8	42.1
How many months after surgery	1–6	6	11.8	1	5.3
	7–12	12	23.5	5	26.3
	13–18	7	13.7	4	21.1
	19–24	4	7.8	0	0
	24+	22	43.1	9	47.4
Smoking	No	33	64.7	13	68.4
	Yes	18	35.3	6	31.6
Age	18–30	14	27.5	4	21.1
	31–40	21	41.2	7	36.8
	41–50	12	23.5	6	31.6
	51–60	4	7.8	2	10.5
	Total	51	100%	19	100%

Discussion

Compared to nonsurgical treatments for morbid obesity, bariatric surgery is considered the most effective treatment, regardless of the type of surgical procedure used. The important outcomes achieved with bariatric surgery include long-term weight loss, improvement in or the remission of obesity-related comorbid conditions, changes in quality of life, and improved long-term survival. Bariatric surgery improves the quality of life of individuals with morbid obesity [14–16]. Sleeve gastrectomy is the most common surgical procedure performed today. The average age of the patients who undergo this procedure is between 35 and 45 years [15, 17]. However, the prevalence of childhood obesity is gradually increasing, and sleeve gastrectomy was shown to be an effective treatment in children as well [18–21]. Due to the increased prevalence of childhood obesity, many young individuals may undergo sleeve gastrectomy in the coming years. These individuals will face different difficulties after sleeve gastrectomy, and physicians will be required to provide sufficient information to their patients on these issues. Ramadan fasting appears to be an important form of worship in the Islamic society. However, there are insufficient number of studies regarding

Table 2 Comparison of fluid consumption amounts during fasting and on a normal day

		Fluid consumption on a fasting day				Total	*P* value*
		1–3	4–6	7–9	10+		
Fluid consumption per day	1–3	1	3	0	0	4	
	4–6	1	2	0	0	3	0.109
	7–9	0	2	6	1	9	
	10+	1	1	1	0	3	
Total		3	8	7	1	19	

*Significantly different based on Fisher's exact test.

the fasting experiences of patients who underwent sleeve gastrectomy during Ramadan.

In Ramadan, the ninth month of the Islamic calendar, healthy adolescent Muslims must fast from dawn to sunset. This period can vary between 10 and 18 h depending on the season and the geographical region. Fasting includes avoiding food and fluid intake, sexual activity, and smoking. Since the Islamic date is based on the lunar calendar, the month of Ramadan can coincide with different times of the year and different seasons. Muslims usually have two meals a day during Ramadan. One of them is a meal known as Iftar, which is consumed at sunset when the daytime fasting period is over, and the other is a light meal before dawn, known as Suhoor [8, 22, 23]. Weight loss is expected during Ramadan, which lasts for 29 or 30 days. Healthy individuals generally return to their previous weight within approximately one month after Ramadan through their normal diet [24, 25]. We observed a significant decrease in the weight of the patients in the present study. Although six female participants out of the 19 people who responded to the second survey stated that they could not fast for an average of 8.2 ± 4.12 days (range: 2–12) due to the difficulty fasting, there was significant weight loss. The food intake of the patients during Ramadan fasting after bariatric surgery should not differ from normal food intake in terms of quantity and quality. This balance should be achieved by making necessary changes in the timing of meals and selecting food according to the condition of each patient.

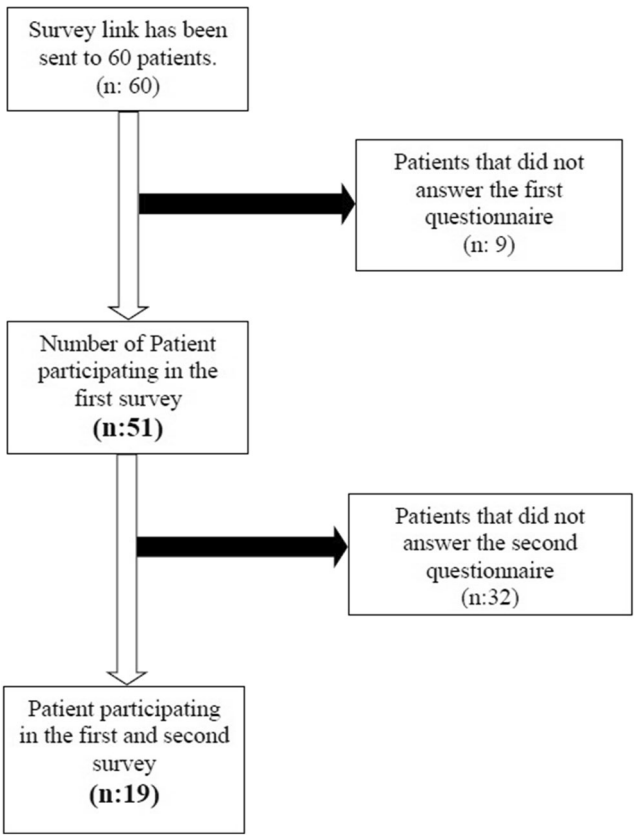


Fig. 1 Survey flowchart

We investigated the fasting experiences of patients who underwent sleeve gastrectomy and the effect of fasting on quality of life during Ramadan. For this purpose, we conducted two surveys on the second and 26th days of Ramadan. Although 51 people participated in the first survey, participation in the second survey was low. We do not know the reason why 32 people (62.7%) did not respond to the second survey. However, we think that the reason for this may be their inability to fast. In fact, in a survey conducted in diabetic patients in England, some participants who could not fast stated that they felt guilty and ate their meals in secrecy [26]. There was no significant difference in the amount of fluid consumed by patients between a normal day and a fasting day. In their study published in 2015, Al-Ozairi et al. found no difference in fluid consumption between fasting and non-fasting days. However, the authors reported a significant decrease in total energy and protein intake on fasting days [27]. Generally, after sleeve gastrectomy, patients are recommended to consume approximately 2 L of fluid. Fasting individuals need to consume enough fluid to avoid dehydration especially on days when Ramadan coincides with hot seasons [7, 8]. Thus, patients should be advised to consume sufficient fluids between Iftar and Suhoor.

The short form-36 (SF-36) is a scale developed to evaluate the quality of life. It is effective in evaluating quality of life because it is a self-assessment scale, can be filled in a short period by the patient, evaluates the positive aspects as well as the negative aspects of the patient's health status, and detects

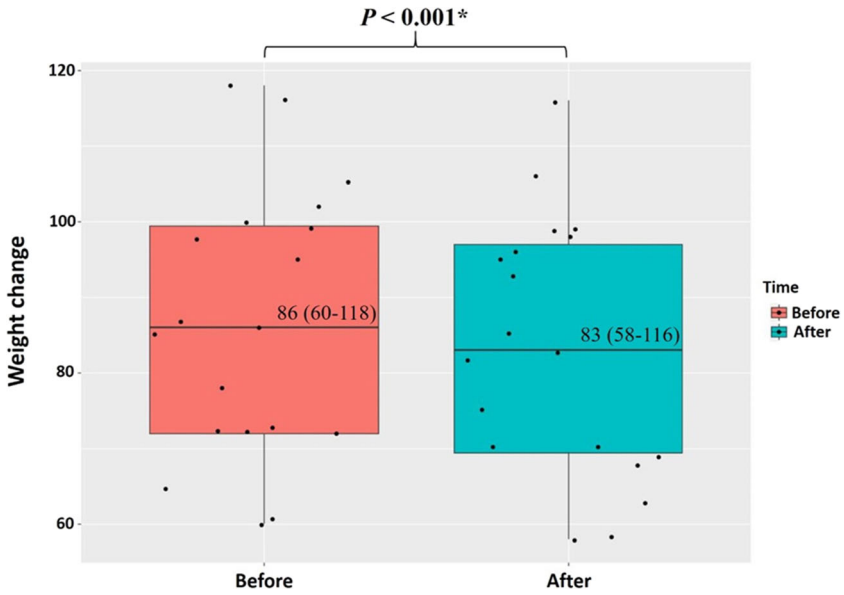


Fig. 2 Comparison of weight changes of patients before and after fasting

small changes. Studies on its validity and reliability have been conducted in Turkey [28, 29]. The comparison of the quality of life values measured by the SF-36 questionnaire at the beginning of fasting and at the end of Ramadan after fasting for 25 days demonstrated that the social functioning score increased at the end of Ramadan.

The World Health Organization defines health not only as the absence of disease and disability but also as a person's complete well-being in spiritual, physical, and social aspects [30]. Thus, physicians should consider patients' mental health and social life in addition to their physical health when determining the treatments to be used for them. Patients' cultural and religious values could considerably affect the treatment. Modern medicine advocates that patients' choices, values, and preferences are considered, their individual autonomy is preserved, and focused and collective decision-making is performed for patient-centered care [31]. It was shown that fasting has a positive effect on mental health and increases the psychological well-being of people who fast [26, 32, 33]. The effects of bariatric surgery on depression and anxiety are unclear. Several studies reported a decrease in depression and anxiety symptoms after surgery while some others showed an increase in major depression after surgery [34, 35]. The inability to fast may cause mental disorders in

Table 3 Comparison of quality of life values measured with the SF-36 before and after fasting

			N	Mean±SD	Median (min-max)	*P* values
PCS	PF	Before	19	84.73±15.31	90 (40–100)	0.804
	PR	After	19	86.31±16.40	90 (35–100)	
	BP	Before	19	73.68±41.22	100 (0–100)	0.439
	GHP	After	19	65.78±40.14	100 (0–100)	
	V	Before	19	80.65±18.68	80 (45–100)	0.699
	SF	After	19	78.68±20.05	77.5 (45–100)	
	ER	Before	19	67.63±20.84	70 (25–100)	0.568
		After	19	67.63±23.88	75 (25–100)	
MCS	PF	Before	19	59.21±24.39	60 (5–90)	0.444
	PR	After	19	62.89±20.83	65 (25–95)	
	BP	Before	19	76.31±19.93	75 (37.5–100)	0.032*
	GHP	After	19	86.84±12.82	87.5 (62.5–100)	
	V	Before	19	54.38±22.79	66.7 (0–100)	0.963
	SF	After	19	56.14±33.43	66.7 (0–100)	
	ER	Before	19	67.15±23.38	76 (12–92)	0.708
		After	19	69.68±15.73	72 (40–92)	

*Statistically significant based on Wilcoxon signed-rank test.

SD standard deviation, *PCS* physical component score, *PF* physical functioning, *PR* physical role, *BP* bodily pain, *GHP* general health perception, *MCS* mental component score, *MH* mental health, *V* vitality, *ER* emotional role, *SF* social functioning.

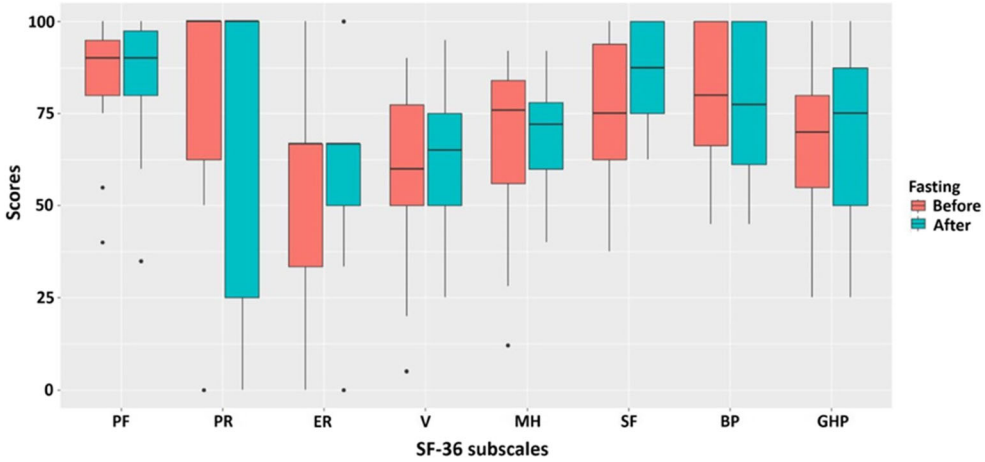


Fig. 3 Comparison of SF-36 subscale scores before and after fasting with box plot

patients who undergo bariatric surgery and attach importance to religious values. Therefore, more attention should be paid to the impact of fasting on people's mental health.

The present study has limitations such as small sample size, lack of quantitative data on calorie intake by the patients during fasting, lack of data about biochemical parameters of the patients during Ramadan, and use of subjective data obtained by surveys. However, our study is important because, to the best of our knowledge, there is only one study [27] in this area, and the results of the present study could provide guidance for future studies. The number of patients who undergo sleeve gastrectomy is increasing daily, and the average age of the patients is gradually decreasing. These patients may certainly encounter severe problems regarding fasting, an important act of worship in all religions. Fasting during Ramadan is an important ritual that has a very important social value in Islam. Surgeons performing bariatric surgery need to be prepared to answer patients' questions about fasting after surgery. In addition, Muslim individuals who practice fasting before surgery and cannot fast after bariatric surgery should be evaluated by Islamic scholars. We list the following suggestions based on our results:

1) Considering the comorbid conditions related to Ramadan fasting in patients who underwent bariatric surgery, there is a need for prospective large-scale studies.
2) Guidelines should be prepared for fasting during Ramadan for patients scheduled for bariatric surgery. Bariatric surgeons should be informed about the medical consequences and religious importance of this religious practice, and they should be made aware of the results. In doctor-patient communications, the importance of fasting for individuals should be understood correctly to develop an adequate treatment strategy based on a joint decision-making model taking into account the medical consequences. Surgeons' failure to adequately evaluate the importance of fasting for individuals may adversely affect patients' compliance and mental health.
3) Many morbidly obese Muslim patients fast during Ramadan. Patients who have difficulties with fasting during Ramadan after bariatric surgery may feel guilty and regret the surgery. To understand this issue, patients undergoing bariatric surgery, surgeons, and religious scholars should come together to make appropriate decisions. Then, patients and surgeons can take steps by evaluating the preoperative situations more clearly, thereby achieving the goal of a healthy well-being.

Conclusion

In the present study, we found that there were no negative changes in the quality of life of patients who fasted after sleeve gastrectomy. On the contrary, their social functioning was improved. We also found that patients experienced significant weight loss at the end of Ramadan. We think that more studies are needed on this subject.

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Data Availability The datasets generated during the current study are available from the corresponding author upon request.

Declarations

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest I confirm on behalf of all authors (E. D., H. D., F. D., I. O., and E. B.) that there is no conflict of interest to declare.

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