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Impact of Educational Status and Number of Children on Weight Loss Outcomes After Laparoscopic Sleeve Gastrectomy

Emre TEKE[1], Bilal TURAN[2], Burcu GÜMÜŞTEKİN[1], Ercan KORKUT[1], Emrah CENGİZ[3], Hüseyin Cahit YALÇIN[1], Sadettin ÖZTÜRK[4]

[1] General Surgery Department, University of Health Sciences, Gaziantep City Hospital, Gaziantep, Türkiye
[2] General Surgery Department, Süleyman Demirel University, Faculty of Medicine, Isparta, Türkiye
[3] Gastroenterological Surgery Department, University of Health Sciences, Gaziantep City Hospital, Gaziantep, Türkiye
[4] Endocrinology and Metabolic Diseases Department, University of Health Sciences, Gaziantep City Hospital, Gaziantep, Türkiye

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Abstract

Objective
Laparoscopic sleeve gastrectomy (LSG) is a successful method to achieve sustained weight loss and reduce morbidity and mortality. However, outcomes vary widely based on several factors, including preoperative childbirth history and educational status. The purpose of this research is to evaluate the influence of the number of children and educational level before surgery on the weight reduction results in female patients who had LSG.

Material and Method
We analyzed data from 70 female patients who underwent LSG between January 2017 and January 2022. Patients were stratified into groups based on the number of children (0 vs. ≥1) and educational status (primary or secondary school vs. high school or university). The primary outcome measures were the percentage of excess weight loss (%EWL) and percentage of total weight loss (%TWL) at 1-year post-surgery.

Results
At 1 year, the mean %EWL was 79.3, and the mean %TWL was 36.2. No differences were observed in %EWL and %TWL between patients with and without children. However, patients with high school or university education had significantly better %EWL and %TWL outcomes compared to those with less education.

Conclusion
Education level positively influences weight loss outcomes following LSG, while the number of children does not appear to significantly impact postoperative weight loss. These findings suggest that LSG can be equally effective in women regardless of their childbirth history, but higher education levels may contribute to better surgical outcomes.

Keywords: educational status, sleeve gastrectomy, number of children, weight loss

Correspondence: E.T. / dr.emreteke@gmail.com
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ORCID IDs of the Authors: E.T: 0000-0001-7597-6401; B.T: 0000-0003-1665-3607; B.G: 0000-0003-3097-3519; E.K: 0000-0001-8543-7778; E.C: 0000-0003-2879-4976; H.C.Y: 0000-0001-8123-5474; S.Ö: 0000-0002-2992-1511

Introduction

Among bariatric surgical procedures, laparoscopic sleeve gastrectomy (LSG) is a successful method to achieve sustained weight loss (WL) and reduce morbidity and mortality (1,2). WL following LSG varies depending on many factors, ranging from the number of children a patient has to socioeconomic status, education level, and health literacy (3-5).

Considering the relationship between pregnancy and weight gain, it can be anticipated that women with more children enter surgery with a higher preoperative body mass index (BMI) (3). Each additional pregnancy-related weight gain can lead to a higher BMI and poorer bariatric surgery (BS) outcomes. Therefore, knowing the full history of pregnancies is crucial (6). Education level is another factor that influences WL. As patients' education levels and thus their awareness of BS increase, improvements in WL outcomes are observed (5).

Limited studies are showing the impact of preoperative educational status and number of children on postoperative outcomes in BS. Therefore, our primary aim is to compare the influence of the preoperative number of children and educational status on WL outcomes in female patients after BS.

Materıal and Method

Patients who underwent LSG between January 2017 and January 2022 and were followed up in our hospital's obesity center were included in the study. The study evaluated the outcomes of 70 female patients with available preoperative data and 1-year postoperative follow-up data. The ethics committee of the hospital gave its approval (Approval number: 2024/24, 26/06/2024). The study was conducted by the principles outlined in the Declaration of Helsinki. Data were retrospectively collected using the hospital information system and the national health database (e-nabız). The number of preoperative children, adherence to dietary recommendations, and education level parameters were obtained from patient histories. Patient height, weight, BMI, age, percentage of excess weight loss (%EWL) and percentage of total weight loss (%TWL), comorbidities, surgery date, and surgical reports were evaluated through the system. Patients were subjected to subgroup analyses based on educational status (primary or secondary school vs. high school or university) and the number of children.

Patients with incomplete 1-year data, those who did not adhere to dietary recommendations, patients whose surgical reports were not accessible through the database, patients who had adopted children, and male patients were excluded from the study. Patients who were lost to postoperative follow-up or had physical activity restrictions were excluded from the study. Additionally, patients who did not regularly attend dietitian follow-ups were not included.

Surgical Procedure

LSG was performed using the classic 5-port technique. Patients with a bougie size of 36–38 French were included in the study. Only those whose transection was initiated 4–6 cm from the antrum were eligible for inclusion.

Statistical Analysis

An analysis of the normal distribution of continuous data was conducted using the Shapiro-Wilk test. An analysis was conducted on categorical variables using the Pearson’s chi-square test to investigate differences between groups, and on continuous covariates using the Mann-Whitney U test. A statistical significance level was defined as a p-value below 0.05. Analyses were performed using SPSS software developed by IBM in Armonk, NY, USA.

Results

Seventy female patients participated in the study. The average age of the patients was 41.8 years. The mean weight was 124.2 kg, and the mean BMI was 47.5. Only 20 of the patients had no children. At the end of the first year, the mean %EWL was 79.3, while %TWL was 36.2. Table 1 presents the demographic indicators, comorbidities, and weight-related outcomes of the patients. None of the patients with diabetes were using insulin. All patients were on metformin therapy.

The comparison of parameters between groups based on childbearing status is shown in Table 2. Patients without children were younger. Patients with children had higher preoperative BMI values. Hypertension was more common in patients without children. One-year %EWL and %TWL values in the two groups contained similar results.

The comparison of parameters between groups based on education level is presented in Table 3. Patients with high school or university education were younger and had fewer children. Additionally, in this group, preoperative weight and BMI were lower. Diabetes mellitus was less common in the group with high school or university education. Most importantly, patients with high school or university education had

Table 1 Demographic Data, Comorbidities, and Weight-Related Data

Age, mean (SD), year	41.8 ± 10.4
Educational Status (Primary or middle school/High School or University)	37/33
Number of children, n	
0	20
1	12
2	19
3	10
4	5
5+	4
Comorbidities	
Hypertension	19
Diabetes	29
Weight (preoperative) (kg)	124.2 ± 16.3
BMI (preoperative) (kg/m²)	47.5 ± 5.4
Weight (one year after LSG)(kg)	79.5 ± 14.2
BMI (one year after LSG)(kg)	30.3 ± 4.4
EWL (one year after LSG) (%)	79.3 ± 15.8
TWL (one year after LSG) (%)	36.2 ± 6.1

BMI:Body mass index, EWL:Excess weight loss, TWL:Total weight loss

Table 2 Comparative Analysis of Groups Based on Whether Patients Have Children

	No children (n=20)	≥ 1 Child (n=50)	P value
Age, median, year	35 (19-53)	43 (27-61)	0.03
Weight (preoperative) (kg)	127.5 (93-158)	120 (94-154)	0.621
BMI (preoperative) (kg/m2)	46.1 (37.2-57.4)	47.0 (38.0-60.1)	0.308
EWL (one year after LSG) (%)	81.0 (35.9-107.9)	78.2 (43.9-106)	0.474
TWL (one year after LSG) (%)	36.4 (20.2-45.0)	37.0 (20.8-50.8)	0.938
Educational Status (Primary or middle school/High School or University)	6/14	31/19	0.019
Comorbidities			
Hypertension (Present/Absent)	0/20	19/31	0.001
Diabetes (Present/Absent)	5/15	24/26	0.108

BMI:Body mass index, EWL:Excess weight loss, TWL:Total weight loss

Table 3 Comparative Analysis of Groups Based on Educational Status

	Primary or Middle School (n=37)	High School or University (n=33)	P value
Age, median, year	46 (19-61)	40 (25-58)	0.009
Weight (preoperative) (kg)	126 (98-158)	120 (93-139)	0.003
BMI (preoperative) (kg/m2)	48.0 (38.0-60.1)	43.8 (37.2-55.0)	0.012
EWL (one year after LSG) (%)	78.1 (35.9-104.6)	86.8 (66.0-107.9)	<0.001
TWL (one year after LSG) (%)	35.0 (20.2-47.7)	37.0 (29.1-50.8)	0.015
Children (≥ 1 child/no children)	31/6	19/14	0.019
Comorbidities Hypertension (Present/Absent) Diabetes (Present/Absent)	 13/24 23/14	 6/27 6/27	 0.178 <0.001

BMI:Body mass index, EWL:Excess weight loss, TWL:Total weight loss

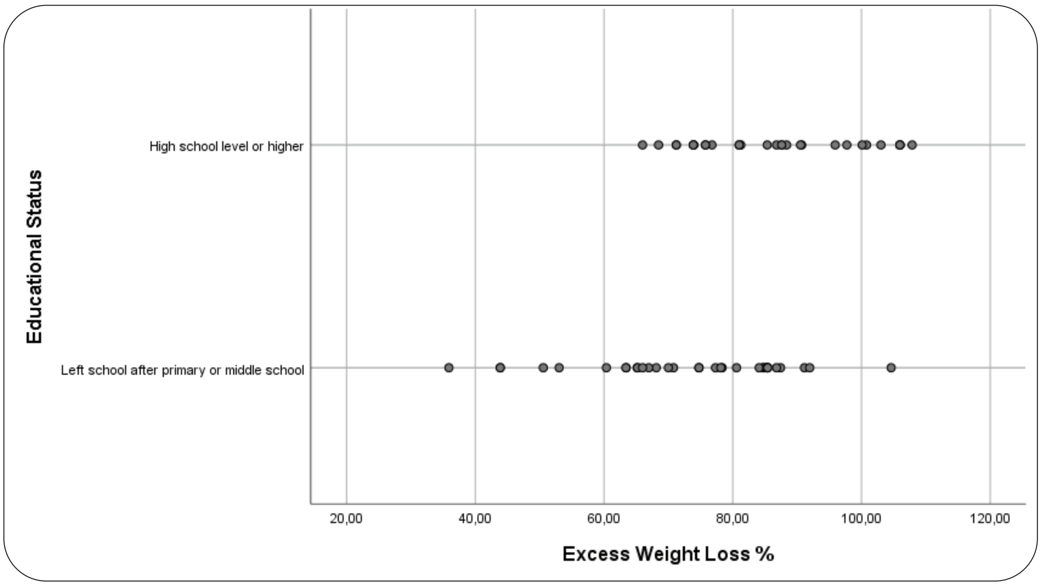

Figure 1
The relationship between education status and 1-year %EWL outcomes

better %EWL and %TWL outcomes at the end of one year.

The 1-year %EWL results were superior in patients with a high school or university education. The relationship between education status and 1-year %EWL outcomes is illustrated in Figure 1.

Discussion

Many factors influence WL after BS. The objective of this research was to examine the influence of the number of children during surgery and the degree of education on WL after BS. This research is significant since it is among the first investigations on the impact of educational status and the number of children before surgery on the effectiveness of WL after LSG. In the current literature, successful WL after LSG is defined as a loss of more than 50% EWL in the medium term. Studies have shown that most patients achieve %EWL levels of over 50% by the sixth month following LSG (5,7). In our study, when evaluating 1-year outcomes, all patients reached successful %EWL results.

The impact of preoperative pregnancies on preoperative BMI and %EWL remains unclear. Pregnancy induces various metabolic changes, such as weight gain, insulin response, and insulin sensitivity. However, these changes often return to pre-pregnancy levels within a few years after childbirth (8). Therefore, the time elapsed since childbirth may affect WL after BS. It is well known that many women have their first child in their 20s (8). The mean age of the patients included in the research was 41.8 years, suggesting that more than a year had passed since childbirth, minimizing the metabolic effects of pregnancy. Women who had children before undergoing bariatric surgery had a lower average weight and BMI compared to those without children. This result is consistent with the study by Hill et al (9). Additionally, we found no statistically significant difference in %EWL between patients with and without children. This finding is inconsistent with the study by Hecht et al (3). The discrepancy could be due to the time interval between pregnancy and surgery, or could be attributed to racial differences.

Another factor we examined in our study was education level. Patients with high school education or higher had lower preoperative weight and BMI, similar to findings in other studies (5,10). Moreover, %EWL and %TWL outcomes were higher in the group with high school education or higher, consistent with the study by Dilektaşlı et al (5). These results may be because patients with higher education levels better understand and adhere to long-term follow-up and dietary recommendations. Additionally, individuals with lower education levels are reported to have a higher incidence of mental health disorders (11). Considering the positive correlation between eating disorders, mood disorders, and obesity, lower education levels could lead to poorer WL outcomes (12). Recent studies have shown that psychiatric disorders contribute to poor WL outcomes and an increased need for revisional BS (13,14).

Although higher education levels do not always correlate with higher health literacy, they often do (15). As health literacy increases, lower preoperative BMI and higher %EWL levels are observed (4,15). Patients are given lifestyle modification and dietary recommendations both before and after surgery. The understanding and implementation of these lifelong changes are more feasible for patients with higher education levels, which likely leads to better long-term WL outcomes in this group. In contrast to Mahoney et al.'s study, which found a positive correlation between preoperative hypertension and diabetes mellitus, and education level, our study had the opposite results (4). Barcelo et al. also found a negative correlation between diabetes mellitus and education level (16). This discrepancy might be due to a lower level of knowledge about healthy eating.

One of the limitations of our study is that it has a relatively small sample size. Another limitation is that historical data (such as the number of children) were obtained directly from the patients. No health literacy questionnaires were administered to the patients. Finally, the uneven distribution of diabetes prevalence and age between groups may also introduce bias.

Conclusion

In conclusion, this study showed that patients with higher education levels had lower preoperative BMI and higher %EWL-%TWL values. The number of children before surgery did not affect weight loss. These findings suggest that BS can be equally effective in women regardless of their childbirth history, but higher education levels may contribute to better surgical outcomes. Although it is not possible to change the level of education before surgery, educating patients on health literacy may be beneficial in achieving better bariatric surgery outcomes.

Conflict of Interest Statement
The authors declare no conflicts of interest.

Ethical Approval
Ethics approval was obtained from the Non-Invasive Clinical Research Ethics Committee of the Gaziantep City Hospital (Date: 26.06.2024, No 2024/24). The study was conducted by the principles outlined in the Declaration of Helsinki.

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Availability of Data and Materials
Data available on request from the authors.

Artificial Intelligence Statement
The authors declare that they have not used any type of generative artificial intelligence for the writing of this

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Authors Contributions

ET: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing- original draft.

BT: Conceptualization; Formal analysis; Funding acquisition;

BG: Investigation; Methodology; Project administration;

EK: Resources; Supervision; Validation; Writing-review & editing.

EC: Investigation; Validation; Writing- original draft.
HCY: Formal analysis; Investigation; Visualization; Writing- original draft.

SÖ: Funding acquisition; Resources; Supervision; Writing-review & editing.

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