

## The Effect of Residence As a Predictor for Weight Loss in Laparoscopic Sleeve Gastrectomy

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### ABSTRACT

**Aim of the study:** To explore any differences in weight-loss outcomes between rural versus urban citizens in patients who underwent laparoscopic sleeve gastrectomy (LSG).

**Design:** A retrospective study.

**Patient and methods:** A sample of 270 patients (108 rural, 162 urban) who underwent (LSG) over a 1 year of follow-up.

Data collected included age, gender, pre-and postoperative body mass index (BMI) and percentage of total body weight loss (% TWL) at 3, 6 and 12 months.

**Results:** Patients from rural areas showed a greater (% TWL) at 3 months ( $p = 0.018$ ) but there were no significant differences between groups at 6 and 12 months ( $p > 0.05$ ).

**Conclusion:** Residence status is not a predictor of weight-loss outcomes at 12 months after (LSG).

**Keywords :** laparoscopic sleeve gastrectomy, Obesity, Residence.

### تأثير الإقامة كمؤشر لفقدان الوزن في تكميم المعدة بالمنظار

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#### الخلاصة

**الهدف من الدراسة:** استكشاف أى اختلافات فى نتائج فقدان الوزن بين المواطنين فى المناطق الريفية مقابل المواطنين الحضريين فى المرضى الذين خضعوا لعملية تكميم المعدة بالمنظار (LSG).

**التصميم:** دراسة بأثر رجعى.

**المرضى والطرق:** عينة من 270 مريضاً (108 ريفى، 162 حضرى) خضعوا لـ (LSG) على مدى سنة من المتابعة. تضمنت البيانات التى تم جمعها العمر والجنس ومؤشر كتلة الجسم قبل وبعد الجراحة (BMI) والنسبة المئوية من إجمالى فقدان وزن الجسم) % (TWL) فى 3 و 6 و 12 شهراً.

**النتائج:** أظهر المرضى من المناطق الريفية نسبة أعلى) % (TWL) فى 3 أشهر ( $p = 0.018$ ) ولكن لم تكن هناك فروق ذات دلالة إحصائية بين المجموعات فى 6 و 12 شهراً. ( $P > 0.05$ )

**الخلاصة:** حالة الإقامة ليست مؤشراً على نتائج فقدان الوزن بعد 12 شهراً (LSG).

**الكلمات المفتاحية:** عملية تكميم المعدة، السمنة، المسكن.

## INTRODUCTION

**B**ariatric surgery (BS) is the most effective management for patient with obesity who exceeds 35 BMI. It results in significant weight loss, improvement in life quality and reduction of obesity-associated diseases compared to non-surgical managements<sup>1,2</sup>. In 2018, over 252,000 (BS) procedures were performed in the United State of America, which is 10.8% increase from 2017 and 60% increase from 2011. Despite this growing popularity, only 1% of patients who qualify for (BS) ever receive it<sup>3</sup>. The prevalence of obesity is higher in rural than in urban citizens<sup>4,5</sup>. This may be attributed to differences in health, behaviour and community factors<sup>6,7</sup>. Rural areas have seen a shift towards higher income, more mechanized agriculture and better infrastructure, all of which bring more health benefits, but also lead to lower energy expenditure and more consumption of low quality processed food. All these factors contribute to faster increase in overweight/obesity in the rural areas<sup>8,9</sup>. Apart from that, patient is away from bariatric units and health facilities is associated with less medical assessment and follow-up<sup>10</sup>, they are less likely to have dietitians, nutritionists, well equipped sports centers, or weight management experts<sup>11</sup> as well as not taking medical advice in a timely manner, but rather late regarding their obesity

This study is to discuss any potential differences in post-operative (LSG) weight-loss outcomes between patients from rural versus urban citizens.

## PATIENTS AND METHODS

A retrospective review of adults with severe obesity who underwent (LSG) was performed to evaluate differences in weight-loss outcomes in patients from urban and rural citizens in Erbil Governorate, the capital of the Kurdistan Region/ Iraq. Erbil Governorate consists of nine districts according to administrative divisions, and it has 33 sub-districts. The study relied on considering the residents of the 9 districts to be the urbanites, and the residents of the 33 sub-districts to be the rural ones. Participants were 270 adult patients (ages 18+) who had (LSG) between 1 January 2018 and 1 January 2021 at a single bariatric center by one consultant surgeon using the same standardized operative and postoperative protocols for all. Follow-up were scheduled for all patients at three, six and twelve months' post-surgery. Patients data collected included age, gender, residence, initial preoperative weight and (BMI), postoperative weight, (BMI) and (% TWL) at 3, 6 and 12 months.

Weight Loss Percentage % = [ (Starting Weight - Current Weight) / Starting Weight] × 100.

Follow up was performed through personal attendance and or direct contact with the patient by the responsible medical center staff using a specialized social communication site (Telehealth services) to evaluate changes in their weight and document any other details.

Statistical analyses: The study's sample size of 270 patients yielded a statistical power of 0.90 to detect a 10% difference in (%TWL) between groups at 3, 6 and 12 months with a standard deviation of 10%. Chi-square tests and independent samples t-tests were used to investigate whether there were differences between rural and urban patients' weight at baseline and 3,6,12 months after surgery.

## RESULTS

The study included 270 patients, 108 (40%) resided in rural and 162 (60%) in urban districts. The age was an average (mean ± SD) of 33.7 ± 12.0 years old and had a preoperative (BMI) of 47.1 ± 8.1 kg/m<sup>2</sup>. Female were 148 (87.1%). Patient demographics and baseline characteristics by rural/urban status are displayed in Table 1. There were no statistically significant differences between patients from rural and urban districts in terms of age and sex. Patients from the rural districts had a higher baseline BMI.

The average (mean ± SE) (%TWL) was 15.8 at three months and 22.3 ± 0.5% at six months and 35 ± 0.6% after 12 months' post-surgery.

Both rural and urban patients showed significant reductions in (%TWL) at three months (Rural: -17.68 ± 0.6%, *t* (812.69) = -28.42, *p* < 0.001; Urban: -16.01 ± 0.4%, *t* (556.64) = -29.16, *p* < 0.001) and 6 months (Rural: -23.33 ± 1.24%, *t* (38.57) = -18.82, *p* < 0.001; Urban: -21.92 ± 0.7%, *t* (521.36) = -32.35, *p* < 0.001) and at 12 months (Rural: -37.68 ± 0.6%, *t* (802.69) = -34.52, *p* < 0.001; Urban: -35.86 ± 0.36%, *t* (556.64) = -33.16, *p* < 0.001) as shown in figure 1.

At three months, patients from rural areas demonstrated a significantly higher (%TWL) compared to patients from urban areas - 1.69 ± 0.72%, *t* (610.16) = -2.37, *p* = 0.019). However, these results were no longer statistically significant -1.68 ± 0.81%, *p* = 0.069) at 6 months and at 12 months (*p* = 0.481) as well (table 1).

Table 1. Participant baseline characteristics

Characteristic	Rural <i>n</i> = 108	Urban <i>n</i> = 162	<i>P</i>
Age in years, <i>M</i> ( <i>SD</i> )	35.4 (12.2)	32.9 (11.8)	0.218
Body mass index (kg/m <sup>2</sup> ), <i>M</i> ( <i>SD</i> )	47.9 (8.5)	45.2 (6.8)	0.045
Body weight (kg), <i>M</i> ( <i>SD</i> )	136.3 (29.9)	122.9 (22.5)	0.002
<b>Sex, <i>n</i> (%)</b>			
Female	89 (82.4%)	145 (89.5%)	0.261
Male	19 (17.6%)	17 (10.5%)	

## DISCUSSION

Adults from rural districts have higher (BMIs) than those who living in urban districts<sup>4,5</sup>. This fact was documented in our study.

Bergmann et al<sup>12</sup> and Mock et al<sup>13</sup> found that the food budget limitation was significantly associated with more weight loss at 3 months' post (LSG) in rural districts patients than urbans ones. However, this association was no longer significant at 12 months' post-surgery.

Age is considered as the most consistent predictor factor for weight loss after (LSG), with worse results in older patients<sup>14,15</sup>. Patients with higher pre-operative BMIs are less likely to reach normal weights as well as a BMI > 50 kg/m<sup>2</sup><sup>16-18</sup>. Gender has not influenced the results in many studies<sup>19,20</sup>. Regarding behavioral and psychosocial factors, Sheets et al<sup>21</sup> found that unusual eating habits like grazing and bingeing, apart from stress and depression and guilty feeling are most frequently associated with poor outcomes. On the other hand, adherence to the nutritional and exercise plans has been considered as a good prognostic factor for satisfactory weight loss. There were no racial differences in postoperative satisfaction rates<sup>22</sup>. There is limited research demonstrating the difference in (LSG) outcomes between rural versus urban districts patients. Kristie L Bergmann et al<sup>23</sup> concluded that rural patients seem to have decreased success at completing bariatric programs, which is likely confounded by insurance type. Yet, when they can realize the benefits of (BS), their outcomes are unchanged compared with urban patients. Viviana et al<sup>24</sup> suggested that patients from rural districts experience the same postoperative weight-loss outcomes comparable to those of their urban counterparts. Telehealth services have been well developed to assist the delivery of health care services, this facility was dramatically improved After the COVID-19 outbreak<sup>25</sup>. Our staff used telehealth services to communicate with patients who could not attend the follow-up and we found it very informative and

helpful. Although there are several calculation methods to assess the impact of (LSG) on weight loss, we preferred to use (%TWL) for follow-up, which is encouraged as a primary outcome measure in (BS) by many authors<sup>26</sup>. Our study did not capture differences between the two groups after 12 months, but a long-term period following surgery is needed. However, broader literature has demonstrated that early postoperative weight-loss outcomes serve as a significant predictor of long-term outcome<sup>27,28</sup>.

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