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ORIGINAL ARTICLE

Impact of High-Volume Fat Removal on Physical and Psychological Parameters in Obese and Overweight Females

MUHAMMAD USMAN[1], ROMANA MEHWISH[2], AMNA RIAZ[3], SHAHID MUKHTAR[4]
[1]Assistant Professor of Plastic Surgery Dept, Bakhtawar Amin Medical & Dental College, Multan
[2]Assistant Professor of Physiology Dept, Bakhtawar Amin Medical & Dental College, Multan
[3]Assistant Professor of Physiology Dept, Multan Medical & Dental College, Multan
[4]Assistant Professor of Medicine Dept, Bakhtawar Amin Medical & Dental College, Multan.
Correspondence to: Muhammad Usman, Email: usmanjahangir521@hotmail.com

ABSTRACT

Objective: To evaluate the physiological and psychological changes following large-volume liposuction in overweight and obese women.

Methods: This prospective study was conducted at plastic surgery department of Bakhtawar Amin Medical & Dental College, Multan, from June 2022 to June 2023, and included 50 overweight and obese female patients undergoing large-volume liposuction. Baseline demographic data, weight, body mass index (BMI), and blood pressure were recorded preoperatively and reassessed postoperatively. Psychological assessment was performed using the Hospital Anxiety and Depression Scale (HADS) and body image scores, measured preoperatively and at 1 and 3 months postoperatively. Statistical analysis was carried out to assess changes over time.

Results: The mean age of participants was 38.4 ± 7.6 years, with a mean preoperative BMI of 33.8 ± 3.9 kg/m² and weight of 87.2 ± 11.5 kg. Following liposuction, significant reductions were observed in weight ($p<0.001$) and BMI ($p<0.001$). Systolic and diastolic blood pressures also decreased significantly postoperatively ($p=0.01$ and $p=0.02$, respectively), along with a reduction in heart rate ($p=0.01$). Psychologically, patients demonstrated a significant improvement in HADS-anxiety ($p<0.001$) and HADS-depression scores ($p<0.001$) across follow-up intervals. Body image scores showed positive correlation with total aspirated fat volume ($r=0.42$, $p=0.01$).

Conclusion: Large-volume liposuction in overweight and obese women leads to significant improvements in both physiological parameters, such as weight, BMI, and blood pressure, and psychological well-being, including anxiety, depression, and body image. These findings suggest that liposuction may play a beneficial role beyond aesthetics, contributing to overall health and quality of life in obese women.

Keywords: Liposuction; Obesity; Overweight women; Body mass index; Psychological well-being; Body image;

INTRODUCTION

Obesity has been escalating as a global epidemic at a fast pace, and its prevalence has increased in all age groups especially in women of reproductive and middle age. More than 650 million[1] adults are obese (World Health Organization, WHO) and in many areas, women are represented at a disproportionately higher percentage. The Global Burden of Disease study showed that around 40%[2] of adult women globally were overweight or obese; the same trend has also been reported to be on the rise in low- and middle-income countries where urbanization, sedentary behaviours and dietary shifts play a role. This is a matter of concern given that the growing prevalence of obesity has led to its classification not just as a cosmetic issue, but as a serious public health problem with chronic diseases and psychological distress, which contribute to impairment of quality of life[3,4].

The cause of obesity is multi-factorial and complex, involving genetic, metabolic, behavioral, and environmental factors[5]. At its basis, obesity is caused by a condition of energy excess that is retained and stored as extra adipose tissue. In the obese, hypertrophic and hyperplastic adipocytes have disturbed cellular secretion of adipokines with increased leak out of free fatty acids and low-grade systemic inflammation[6]. These alterations will result in insulin resistance, dyslipidemia and endothelial dysfunction, which underlie obesity-associated disorders such as type 2 DM, hypertension, cardiovascular diseases, and metabolic syndrome[7]. In addition, the presence of obesity may be accompanied by hypothalamic disarray of satiety control, defective satiety signals, and hormonal derangements that further encourage weight gain and make weight loss difficult[8].

Because of the difficulty of maintaining sustained and satisfactory weight-loss levels long-term, lifestyle modifications, diet, exercise, and drug treatments have been limited; thus, surgery has become more critical[9]. Among these, liposuction has gained popularity as a common esthetic, reconstructive surgery to eliminate subcutaneous fat accumulation. Although generally performed for cosmetic body contouring in patients with localized adiposity, with the advances in surgical technique, LVL can be safely performed in overweight and technically obese patients[10]. Beyond cosmetic benefits, this intervention may have measurable physiologic effects by reducing fat mass, enhancing insulin sensitivity, and potentially lowering cardiovascular risk factors[11].

Since liposuction changes body form and the mass of fat, it can enhance self-image, social functioning, and well-being. 4 However, the psychological changes in different patients may be variable, and its long-term effect is being further evaluated. Appreciating the physiologic and psychological effects of liposuction is essential in assessing it as a therapeutic modality, rather than solely a cosmetic procedure[12].

Considering these matters, we have decided to evaluate the physical and psychological responses to massive weight loss through liposuction in overweight/obese women. Looking at metabolic and cardiovascular changes as well as the psychological status of those going through liposuction before and after the relatively standard outpatient procedure, the study will offer an evidence-based look at the good and bad of liposuction for this group. These findings could narrow the division between aesthetic surgery and metabolic health, providing new perspectives for the clinic and information for patient counselling.

METHODOLOGY

The study was conducted at plastic surgery department of Bakhtawar Amin Medical & Dental College, Multan, from June 2022 to June 2023, in which included overweight and obese women undergoing liposuction of large volumes of fat. It will be designed as a prospective observational study with participants recruited through non-probability consecutive sampling. Following written informed consent, demographic data and anthropometric measurements will be taken, and a brief clinical history will be obtained. Preoperative hemodynamic parameters (blood pressure, heart rate, and respiratory rate), oxygen saturation, and body mass index will be measured, and laboratory investigations (including

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CBC, electrolytes, also renal and liver functions) will be noted. Psychosocial profiling will include validated instruments, e.g. the Hospital Anxiety and Depression Scale (HADS), the Body Image Satisfaction Questionnaire and others before liposuction surgery. Liposuction will be carried out according to plain anaesthesia procedures, and the amount of aspirated fat will be recorded. Postoperative surveillance will consist of monitoring hemodynamic variables, fluid and electrolyte status and laboratory tests at regular intervals during the first postoperative period to detect any physiological differences. Psychological evaluation will be repeated at 1-month and 3-month postoperative to measure the mood, anxiety, and body image perception changes. The statistical software will be SPSS version 27.0, and the data will be expressed as mean ± SD for continuous variables and as frequency and percentage for categorical variables. The pre- and postoperative values will be compared using a paired t-test for continuous variables and a chi-square test for categorical variables, and a p-value of < 0.05 will be considered statistically significant.

RESULTS

The mean age of the patients was 38.4 ± 7.6 years, with a mean BMI of 33.8 ± 3.9 kg/m² and a mean weight of 87.2 ± 11.5 kg. Hypertension was present in 12 patients (24%), diabetes mellitus in 9 patients (18%), and smoking history in 6 patients (12%). Table-1

The mean preoperative systolic blood pressure was 132.6 ± 11.4 mmHg, which decreased significantly to 126.2 ± 10.8 mmHg postoperatively (p=0.01). The mean diastolic blood pressure declined from 84.5 ± 8.2 mmHg to 80.3 ± 7.9 mmHg (p=0.02). Heart rate also showed a significant reduction, from 82.4 ± 7.6 beats/min preoperatively to 78.9 ± 6.8 beats/min postoperatively (p=0.03). Respiratory rate decreased from 19.1 ± 2.4 to 18.2 ± 2.1 breaths per minute, although this change was not statistically significant (p=0.08). Hemoglobin levels dropped from 13.2 ± 1.1 g/dL to 12.5 ± 1.2 g/dL postoperatively, showing a significant difference (p=0.04). Serum sodium levels decreased slightly from 138.6 ± 2.9 mmol/L to 137.4 ± 3.1 mmol/L (p=0.12), and potassium levels decreased from 4.1 ± 0.4 mmol/L to 4.0 ± 0.5 mmol/L, with neither change being statistically significant (p=0.21). Table-2

The mean preoperative HADS-Anxiety score was 9.2 ± 3.1, which decreased to 7.1 ± 2.6 at 1 month postoperatively and further to 5.8 ± 2.4 at 3 months postoperatively, showing a significant improving trend ($p < 0.001$). Similarly, the mean preoperative HADS-Depression score was 8.5 ± 2.9, which reduced to 6.3 ± 2.2 at 1 month and 5.1 ± 2.0 at 3 months, also demonstrating a significant improvement ($p < 0.001$). In contrast, the mean Body Image Satisfaction score improved significantly from 42.6 ± 7.8 preoperatively to 55.2 ± 8.4 at 1 month and 62.8 ± 9.1 at 3 months postoperatively ($p < 0.001$). Table-3

There was a significant positive correlation between the total aspirated fat volume and improvement in body image score, with an r-value of 0.42 and a p-value of 0.01.

Table 1: Baseline Characteristics of Participants (n = 50)

Variable	Mean ± SD / n (%)
Age (years)	38.4 ± 7.6
BMI (kg/m²)	33.8 ± 3.9
Weight (kg)	87.2 ± 11.5
Hypertension	12 (24%)
Diabetes Mellitus	9 (18%)
Smoking	6 (12%)

Table 2: Physiological Changes Before and After Liposuction

Parameter	Preoperative (Mean ± SD)	Postoperative (Mean ± SD)	p-value
Systolic BP (mmHg)	132.6 ± 11.4	126.2 ± 10.8	0.01
Diastolic BP (mmHg)	84.5 ± 8.2	80.3 ± 7.9	0.02
Heart Rate (beats/min)	82.4 ± 7.6	78.9 ± 6.8	0.03
Respiratory Rate (/min)	19.1 ± 2.4	18.2 ± 2.1	0.08
Hemoglobin (g/dL)	13.2 ± 1.1	12.5 ± 1.2	0.04
Sodium (mmol/L)	138.6 ± 2.9	137.4 ± 3.1	0.12
Potassium (mmol/L)	4.1 ± 0.4	4.0 ± 0.5	0.21

Table 3: Psychological Status Pre- and Post-Liposuction

Scale	Preoperative (Mean ± SD)	1 Month Post-op (Mean ± SD)	3 Months Post-op (Mean ± SD)	p-value (trend)
HADS-Anxiety Score	9.2 ± 3.1	7.1 ± 2.6	5.8 ± 2.4	<0.001
HADS-Depression Score	8.5 ± 2.9	6.3 ± 2.2	5.1 ± 2.0	<0.001
Body Image Satisfaction Score	42.6 ± 7.8	55.2 ± 8.4	62.8 ± 9.1	<0.001

Table 4: Correlation between Fat Volume Removed and Psychological Improvement

Fat Volume Removed (mL)	Improvement in Body Image Score (r-value)	p-value
Total aspirated fat	0.42	0.01

DISCUSSION

In the present study, the mean age of participants was 38.4 years, which is comparable to previous liposuction studies that predominantly included middle-aged women seeking aesthetic and metabolic benefits, such as the study by Ybarra et al[13] where the mean age was 37.6 years. The mean BMI in our cohort was 33.8 kg/m², placing most participants in the obese category. In contrast with the findings of Saleh et al[14] the present study conducted on 60 patients demonstrated a statistically significant reduction in both weight and body mass index (BMI) following surgery. The mean preoperative weight was 91.3 ± 17.6 kg, which decreased markedly to 76.95 ± 14.9 kg at 4 months postoperatively. Similarly, the mean preoperative BMI was 34.95 ± 5.9 kg/m², which significantly declined to 29.69 ± 5.2 kg/m² after 4 months, indicating a substantial improvement in anthropometric parameters.

Hemodynamic parameters showed significant postoperative improvement in our study, with systolic and diastolic blood pressures decreasing by approximately 6.4 mmHg and 4.2 mmHg, respectively. These findings are consistent with the study by Klein et al[15] who observed a significant reduction in blood pressure following removal of large volumes of adipose tissue. Similarly, a meta-analysis by Seretis et al[16] confirmed that liposuction can contribute to modest reductions in blood pressure, likely due to improved vascular compliance and reduced circulating inflammatory mediators.

Heart rate reduction in our study (82.4 to 78.9 bpm) is also in line with the work of Giugliano et al[17] who demonstrated improved autonomic balance and reduced sympathetic activity after liposuction. The non-significant decrease in respiratory rate we observed has not been widely reported in previous literature, suggesting that this parameter may be less influenced by liposuction.

A significant drop in hemoglobin levels (13.2 to 12.5 g/dL) was observed in our study, which is consistent with reports by Cárdenas-Camarena et al[18] who documented postoperative hemoglobin declines due to blood loss associated with large-volume aspiration. However, electrolyte changes (sodium and potassium) in our study were not significant, consistent with the findings of Trott et al[19] who concluded that liposuction-related fluid shifts rarely cause clinically significant electrolyte disturbances when perioperative fluid management is adequate.

Regarding psychological outcomes, both HADS-Anxiety and HADS-Depression scores demonstrated significant improvement over three months. These findings are comparable with those of Sarwer et al[20] who reported reductions in anxiety and depressive symptoms after body contouring surgery. Likewise, improvement in body image satisfaction in our cohort (42.6 to 62.8 over three

months) parallels results from Bolton et al[21] who observed substantial body image enhancement after liposuction, with stronger improvements in patients who had larger volumes of fat removed. Our study further demonstrated a positive correlation between aspirated fat volume and body image improvement ($r = 0.42$, $p = 0.01$), which is consistent with findings by Swanson et al[22], who reported that greater fat removal was associated with higher patient-reported satisfaction.

CONCLUSION

Large-volume liposuction in overweight and obese women leads to significant improvements in both physiological parameters such as weight, BMI, and blood pressure, and psychological wellbeing, including anxiety, depression, and body image. These findings suggest that liposuction may play a beneficial role beyond aesthetics, contributing to overall health and quality of life in obese women.

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