

# Satisfaction and Quality of Life in Patients Who Underwent Post Massive Weight Loss Body Contouring Procedures: A Tertiary Center Experience in Bahrain

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## ABSTRACT

**Background:** Incidence of body contouring surgeries (BCS) rose significantly to overcome problems resulted from post-Bariatric Surgery (BS). We aimed to evaluate satisfaction level and quality of life (QOL) in patients' post-BCS.

**Methods:** In this retrospective prospective study, patients who underwent BCS in Plastic Surgery Department, Salmaniya Medical Complex, Bahrain, in 2017-2018, were enrolled. Demographic and anthropometric data were collected. BS-group's QOL and satisfaction level were assessed using a questionnaire.

**Results:** Of 929 plastic surgery admissions, 316 (34%) were for BCS (249 patients). Fifty-eight (28%) patients underwent 82 BS were recruited, mostly females (n=42, 72.4%). The mean age was 37.4±9.6 years. Excess abdominal skin was the most area of concern (n=50, 86.2%). Median pre-BCS body mass index was 26.9 (interquartile range: 25.6-29.8) kg/m<sup>2</sup>. Most patients were overweight (n=26, 44.8%). Abdominoplasty was the commonest BCS (n=172, 50.6%). This was also the case in 82 BCS in post-BS group (n=38, 46.3%). In post-BS group, post-operative complications were noted in 25/82 (30.5%) patients with wound problems being the most frequent (n=14, 17.1%). Most patients rated their experience as better in all questionnaire domains and most (n=45, 54.9%) rated their satisfaction level as excellent. Older age gave better overall satisfaction ( $P<0.001$ ) while employed patients had better overall QOL ( $P=0.012$ ) and self-confidence ( $P=0.048$ ). Females had better satisfaction with body appearance ( $P<0.001$ ) while those underwent abdominoplasty or breast surgeries had lower physical activity ( $P=0.042$ ).

**Conclusion:** This study showed improvement in patient's QOL post-BCS with excellent overall satisfaction, findings that could be affected by age, sex, and occupation.

## KEYWORDS

Plastic Surgery; Body Contouring; Bariatric surgery; Bahrain

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## INTRODUCTION

Since 1975, obesity has nearly tripled worldwide<sup>1</sup>. Moreover, over the past few years, the number of obese people dramatically increased<sup>1</sup>. Obesity increases the risk of developing many serious chronic diseases like type 2 diabetes mellitus, hypertension, stroke, cardiovascular disease, dyslipidemia, osteoarthritis, and some cancers<sup>3,4</sup>.

According to the World Health Organization (WHO) data published in 2007, the kingdom of Bahrain had one of the highest rates of overweight and obesity among adults from the Eastern Mediterranean Region, after Kuwait and Saudi Arabia<sup>2</sup>. Thirty-three percent of adults in Bahrain are overweight, of whom 36% are obese<sup>2</sup>. This might be due to many factors mainly diet and sedentary lifestyle<sup>1</sup>.

Over the last few years, bariatric surgery (BS) gained popularity due to its success in decreasing body weight<sup>5,6</sup>. It contributed to the reduction and resolution of the afore-mentioned diseases associated with obesity<sup>5,6</sup>. Moreover, studies have revealed positive impact of BS on the quality of life (QOL), depending on the percentage of weight loss<sup>7,8</sup>. Due to this success, the number of BS has increased globally<sup>9</sup>. However, the negative effects of massive weight loss were observed<sup>10,11</sup>. Excess skin and tissue redundancy may result in subsequent limitations of physical activities, hygienic problems, intertriginous dermatitis and severe psychosocial effects<sup>10,11</sup>. To overcome these negative impacts, modern plastic surgery techniques undergoing a major growth in the field of body contouring surgeries (BCS) allowing the correction of post BS sequels.

Due to the increase in frequency of BS over the last few years, a parallel and dramatic increase in the number of BCS was observed<sup>14</sup>. For instance, more than 45,000 BCS after weight loss were performed in the United State of America in 2012, according to the American society of plastic surgeons<sup>14</sup>.

Many publications reported the experience of plastic surgery centers about the overall indications, patient characteristics or QOL of patients underwent BCS from neighboring countries and worldwide<sup>10,11,13-17</sup>. Up to date, no studies have been published that tackles the QOL of patients post BCS in Bahrain. Accordingly, we aimed to evaluate the level of satisfaction and QOL in patients post BS that attempted BCS in the plastic surgery department at

the main tertiary hospital in Bahrain.

## MATERIALS AND METHODS

### *Study setting and design*

This is a retrospective and prospective cohort study conducted in the Plastic Surgery Department, Salmaniya Medical Complex (SMC), Bahrain, between January 2017 and December 2018.

### *Study populations*

All patients who underwent BCS were included in the study and their clinical characteristics were reviewed. Patients were divided into two groups based on the method of weight reduction performed, BS and non-BS. The BS group was used to assess the patient satisfaction and QOL. Any patient who refused to participate or did not reply to the phone call was excluded.

### *Data collection*

Demographic data such as identity document, sex, age, nationality, weight, height, comorbidities, and the type of BS and BCS were collected for all patients. For the BS group, occupation and body mass index (BMI) were also gathered. Overweight was defined as BMI greater than or equal to 25, and obesity as BMI greater than or equal to 30 according to the WHO growth references<sup>1</sup>. Moreover, medical history including the presence of comorbidities, use of medications, smoking, type and sequence of BS and BCS (abdominoplasty, belt lipectomy, mastopexy, chest lift, brachioplasty, back lift, thigh lift, and face lift) performed, most distressing region of skin redundancy, and complications of the included BCS patients were evaluated.

### *Patient satisfaction and quality of life assessments*

To assess the patient satisfaction and QOL, a questionnaire was administered and formulated based on previous similar studies that evaluated pre and post BCS patient satisfaction and QOL<sup>10,16,17</sup>. This questionnaire was made to assess the overall QOL, self-confidence, appearance, clothing satisfaction, physical and sexual activity, and degree of satisfaction. It was filled by two of the researchers

over the phone. Patients were contacted for verbal consent followed by answering the questionnaires inquires.

### Ethical consideration

This study was ethically approved by the secondary healthcare research subcommittee (SHCRC) in SMC. The study was conducted in accordance with the principles of Helsinki declaration. Informed verbal consent was obtained from each candidate who participated in the BS group and patient's confidentiality was assured.

### Statistical analysis

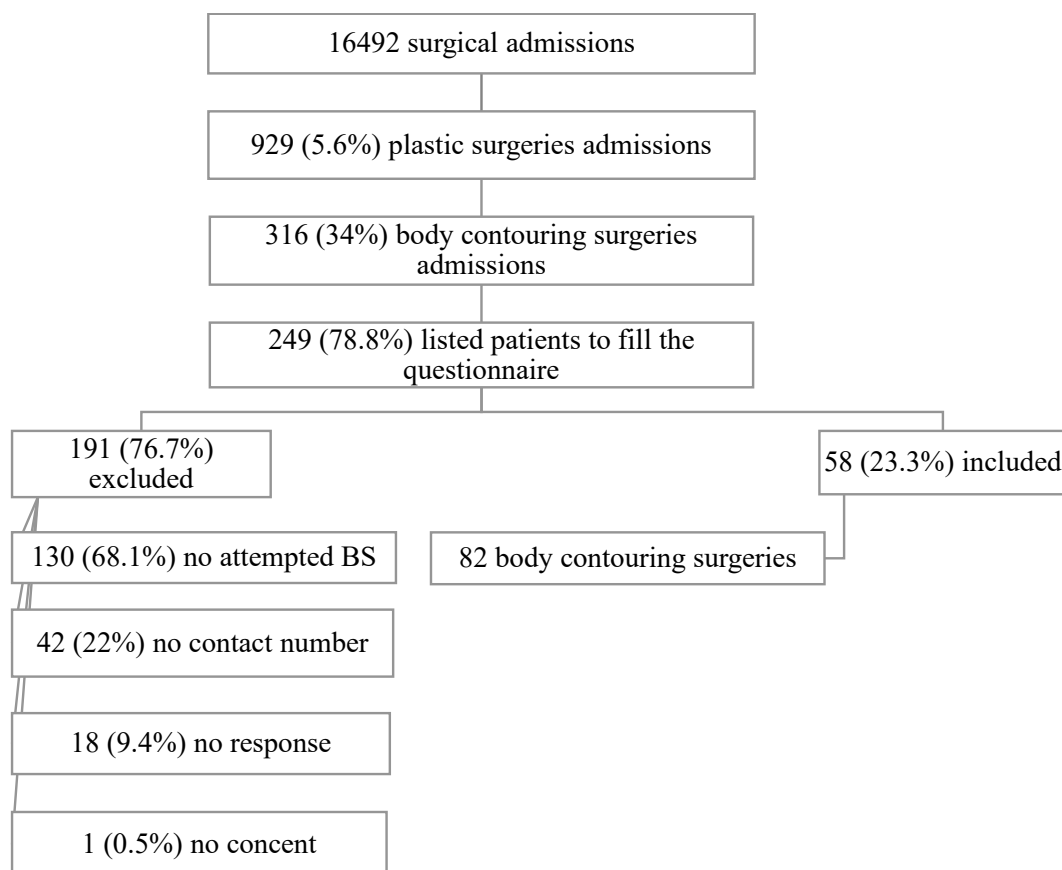
Data was collected and entered into Microsoft excel sheet version 15.24, then transferred into IBM SPSS program version 21 (IBM Corp., Armonk, NY, USA) for statistical analysis. Categorical data frequency and percentage were calculated. Continuous data were presented as mean and standard deviation or median and interquartile range (IQR) according to

distribution normality. The BS group were analyzed in terms of sex, age, nationality, weight, height, BMI, comorbidities, and types of BS and BCS. Fisher's exact test was used to compare categorical variables while Mann-Whitney U test was used to compare continuous variables. Pearson's chi-square test was used to compare categorical variables of the different QOL domains. One way ANOVA was used to compare age with the QOL domains while Kruskal-Wallis's test was used to compare BMI with the QOL domains. *P*-value < 0.05 was considered statistically significant.

### RESULTS

Out of 16,492 surgical admissions, 929 (5.6%) admissions were for plastic surgeries. Of the latter, 316 (34%) admissions were for BCS which were conducted for 249 patients. Out of the 249 patients, 58 (28%) patients underwent a total of 82 BS procedures and agreed to participate in the questionnaire as shown in **Figure 1**.

Demographic data of the included patients are



**Figure 1:** Flow charts of patients underwent plastic surgery, Salmaniya Medical Complex, Bahrain. BS: bariatric surgery.

shown in **Table 1**. Forty-two (72.4%) patients were females. The mean age at the time of study was  $37.4 \pm 9.6$  years. The age group of 30-39 years old was the most frequent age group and was found in 21 (36.2%) patients. All participants were Bahraini. Gastric sleeve procedure was noted to be the most common BS performed which was seen in 35 (60.3%) patients. The most common area of concern due to excess skin post BS was the abdomen which was found in 50 (86.2%) patients. The median duration between the BS and the first BCS performed was 36 (IQR: 24-48) months. Nineteen (32.7%) patients had their first BCS within 13 to 24 months after the BS. The median pre-BCS BMI was 26.9 (IQR: 25.6-29.8) kilogram per meter squared. Most of the patients were overweight ( $n=26$ , 44.8%).

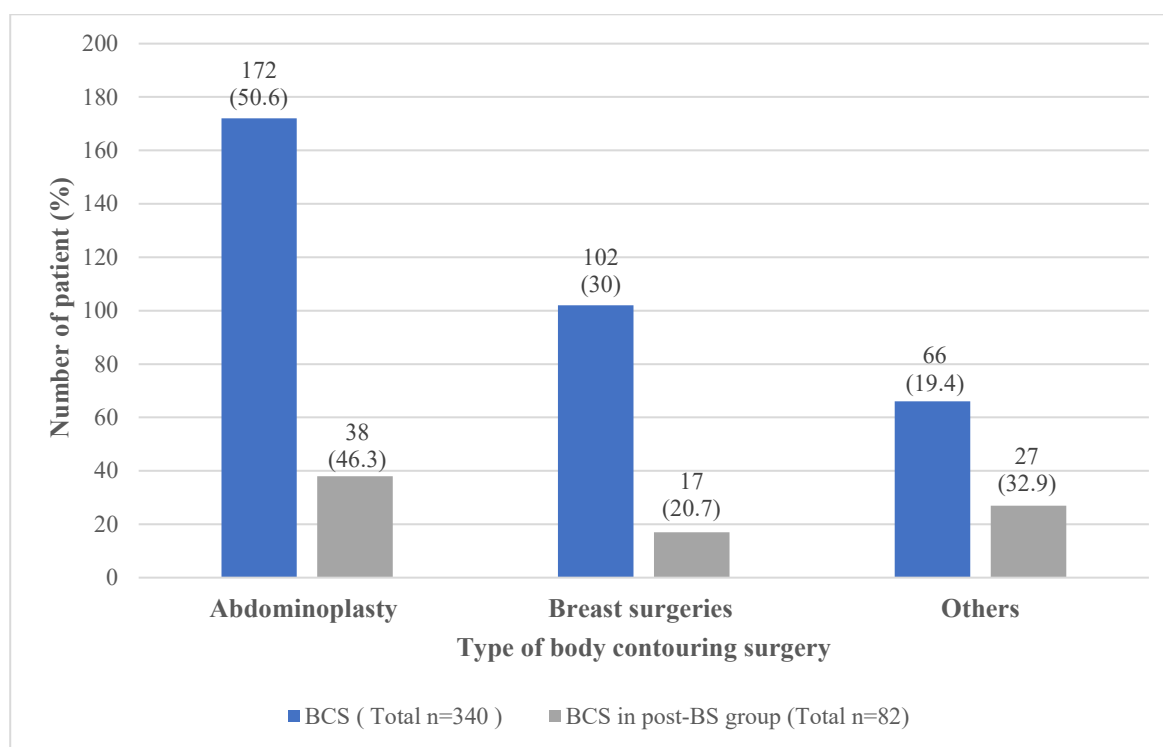
Out of the 340 procedures, the most frequent BCS was abdominoplasty ( $n=172$ , 50.6%) followed by breast surgeries ( $n=102$ , 30%) (**Figure 2**). This finding was also observed in the 82 BCS in the post-BS group where abdominoplasty was the commonest ( $n=38$ , 46.3%). Types of different BCS in the post-BS group are shown in **Figure 3**.

Twenty-five (30.5%) of the 82 BCS performed were associated with post-operative complications in

the post-BS group. The most frequently reported complications were related to wound problems and seen in 14 (17.1%) procedures (wound dehiscence in eight, infection in five, and necrosis in one procedure). Other complications such as scarring, asymmetry, hematoma, and seroma were seen in eight (9.8%), seven (8.5%), three (3.7%) and three (3.7%) procedures, respectively. There were no procedures complicated by psychiatric difficulties nor thromboembolic events.

Out of the 82 procedures evaluated, most of the patients rated their overall QOL ( $n=60$ , 73.2%), self-confidence ( $n=47$ , 57.3%), body appearance ( $n=57$ , 69.5%), clothing satisfaction ( $n=58$ , 70.7%), physical activity ( $n=52$ , 63.4%), and sexual activities ( $n=35$ , 42.7%) as better after undergoing the BCS. Moreover, most of them ( $n=45$ , 54.9%) rated their level of satisfaction as excellent as shown in **Figure 4**.

On analyzing the possible predictors of QOL, self-confidence, and overall satisfaction (**Table 2**), older age gave better overall satisfaction ( $P<0.001$ ) while employed patients had better overall QOL ( $P=0.012$ ) and self-confidence ( $P=0.048$ ) than those unemployed. Patient's sex, BMI, and type of



**Figure 2:** Comparison between the most frequent type of body contouring surgery out of the 340 procedure and out of the 82 procedures in patients underwent bariatric surgery at Salmaniya Medical Complex, Bahrain.

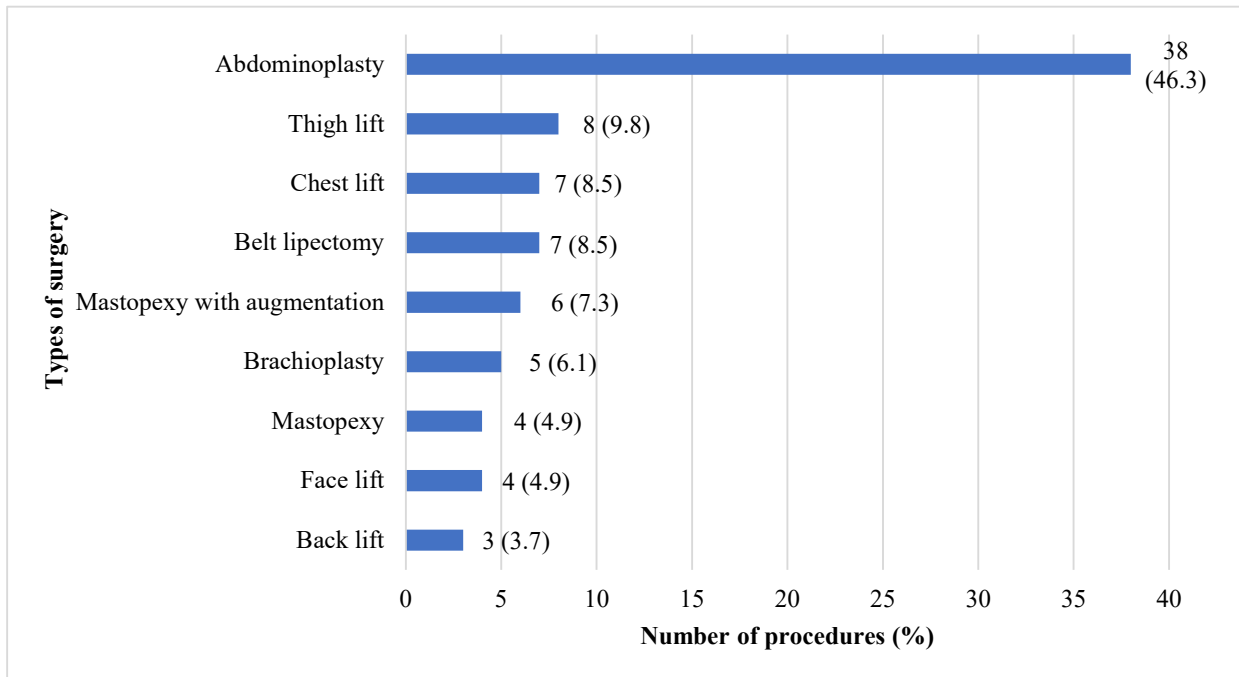


Figure 3: Types of body contouring surgeries in 58 patients (82 procedures).

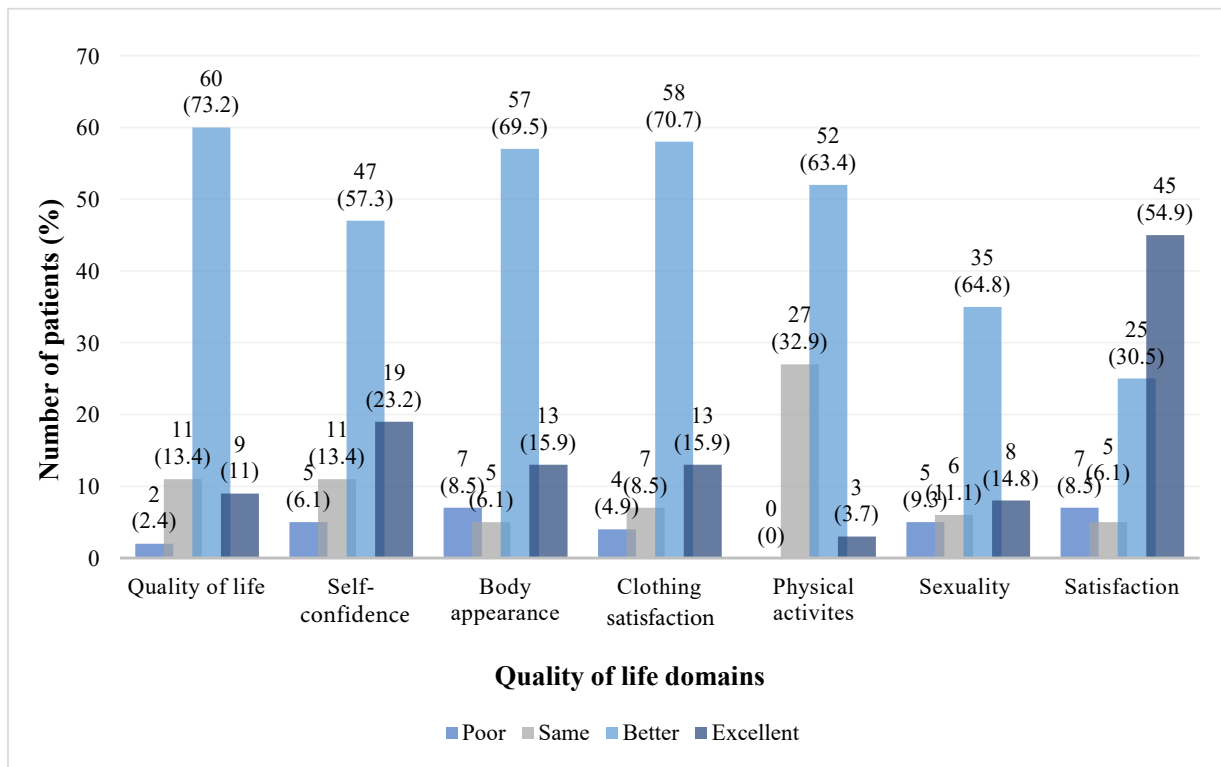


Figure 4: Quality of life and satisfaction after body contouring surgeries, Salmaniya Medical Complex, Bahrain.

**Table 1:** Demographic data of the included patients.

Data	Variable	N (%), 58 (100)
Sex	Male	16 (27.6)
	Female	42 (72.4)
Age(yr)	≤20	1 (1.7)
	20-29	13 (22.4)
	30-39	21 (36.2)
	40-49	15 (25.8)
	50-59	7 (12)
	≥60	1 (1.7)
Occupation	Unemployed	12 (21.1)
	Office job	31 (54.4)
	Labor	9 (15.8)
	Others	5 (8.8)
Type of BS	Sleeve gastrectomy	35 (60.3)
	Roux-en-Y gastric bypass	12 (20.7)
	Others	11 (18.9)
Most common area of excess skin*	Abdomen	50 (86.2)
	Chest	23 (39.7)
	Thigh	18 (31)
Smoking	Non-smoker	35 (61.4)
	Smoker	22 (38.6)
BMI† group	Normal (18.5-24.9 kg/m <sup>2</sup> )	11 (19)
	Overweight (25-29.9 kg/m <sup>2</sup> )	26 (44.8)
	Obesity class I (30-34.9 kg/m <sup>2</sup> )	8 (13.8)
	Obesity class II (35-39.9 kg/m <sup>2</sup> )	2 (3.4)
	Obesity class III (>40 kg/m <sup>2</sup> )	11 (19)

Data are presented as number (%). BS: bariatric surgery. \*Some patients had more than one area of excess skin. †Body mass index.

surgeries were not statistically significant factors. On studying the possible predictors of different QOL domains (Table 3), females had better satisfaction with their body appearance than males ( $P < 0.001$ ) while those who underwent other surgeries had better physical activities compared to those underwent abdominoplasty or breast surgeries ( $P = 0.042$ ). There was no significant effect of patients' age, BMI or occupation on the four QOL domains.

## DISCUSSION

In our hospital, admissions for BCS ranked the second indication for hospitalization after burn. BCS accounts for 34% of the overall plastic surgery admissions. In this study, the majority of the included patients were females with a percentage of 72.4%. The age group of 30-39 years was the most frequent which was observed in 34.5%. Similarly, these results were observed in other studies which assessed the desire and commencement of BCS<sup>5-8,10-12,15</sup>. This can be explained by the high rate of obesity

among females especially those who underwent BS, and those with poor satisfaction with redundant skin, limitation of physical activity, hygienic and skin problems post BS<sup>5-8,10-12</sup>. Dedication and motivation towered lifestyle modification post massive weight loss, positive psychological impact and desire for maintenance of a healthy inner and outer body post resolution of comorbidities were also observed<sup>5-8,10-12</sup>. Moreover, BCS support and improve long-term weight control post BS has been observed in a study by Modartessi et al<sup>13</sup>. In our study, 27.6% (n=16/58) males underwent BCS post BS which was conflicting to the results published by Aldaqal et al from Saudi Arabia where the 26 males out of 128 patients had the desire only, but none had undergone a BCS<sup>16</sup>.

Frequently, patients are not sufficiently informed about the effect following BS and the subsequent medical conditions and limitations of physical activities specifically sport resulting from redundant excess skin<sup>10,11</sup>. These impairments may explain why surgeries in these areas are considered reconstructive rather than purely aesthetic procedure<sup>10,13</sup>.

Table 2: Predictors of quality-of-life, self-confidence and overall satisfaction in patients underwent bariatric surgeries.

Variable	Quality of life				P	Self-confident				P	Satisfaction				P
	1	2	3	4		1	2	3	4		1	2	3	4	
Sex					0.778					0.060					0.959
Female	2 (100)	7 (64)	42 (70)	6 (67)		5 (100)	5 (46)	31 (66)	16 (84)		5 (71)	4 (80)	17 (68)	31 (69)	
Male	0 (0)	4 (36)	18 (30)	3 (33)		0 (0)	6 (55)	16 (34)	3 (19)		2 (29)	1 (20)	8 (32)	14 (31)	
Age (y), mean $\pm$ SD	31 $\pm$ 0	33 $\pm$ 7	37 $\pm$ 9	39 $\pm$ 15	0.446	31 $\pm$ 7	38 $\pm$ 9	37 $\pm$ 10	38 $\pm$ 9	0.493	33 $\pm$ 7	37 $\pm$ 7	43 $\pm$ 8	34 $\pm$ 9	<0.001
BMI, median (IQR)	27 (27-27)	26 (23-28)	27 (25-29)	29 (25-35)	0.276	27 (27-28)	27 (27-30)	27 (26-29)	26 (24-38)	0.920	27 (27-28)	26 (26-26)	28 (26-34)	26 (25-29)	0.077
Occupation					0.012					0.048					0.614
Employed	0 (0)	11 (100)	47 (78)	6 (67)		3 (60)	10 (90)	40 (85)	11 (58)		5 (71)	5 (100)	20 (80)	34 (76)	
Unemployed	2 (100)	0 (0)	13 (22)	3 (33)		2 (40)	1 (9)	7 (15)	8 (42)		2 (29)	0 (0)	5 (20)	11 (24)	
Type of surgery					0.749					0.585					0.418
Abdominoplasty	1 (50)	3 (27)	29 (48)	5 (56)	0.568	3 (60)	2 (18)	23 (49)	10 (53)	0.230	2 (29)	2 (40)	13 (52)	21 (47)	0.731
Breast surgeries	0 (0)	4 (36)	12 (20)	1 (11)	0.443	1 (20)	3 (27)	9 (19)	4 (21)	0.948	3 (43)	0 (0)	3 (12)	11 (24)	0.177
Others	1 (50)	4 (36)	19 (32)	3 (33)	0.947	1 (20)	6 (55)	15 (32)	5 (26)	0.376	2 (29)	3 (60)	9 (36)	13 (29)	0.540

Data are presented as number and percentage, mean and standard deviation or median and interquartile range. Each quality-of-life domain was divided into the following: 1 = poor, 2 = same, 3 = better, 4 = excellent. SD: standard deviation; IQR: interquartile range. Pearson Chi-Square was used to compare categorical variables, one way ANOVA was used to compare age, and Kruskal-Wallis Test was used for body mass index. P value <0.05 was considered statistically significant (bold font).



**Table 3.** Predictors of quality-of-life domains in patients underwent bariatric surgeries.

Variable	Body appearance				Clothing satisfaction				Physical activity				Sexuality				P
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Sex																	0.322
Female	7 (100)	0 (0)	38 (67)	12 (92)	2 (50)	4 (57)	39 (67)	12 (92)	0 (0)	18 (67)	38 (73)	1 (33)	2 (40)	5 (83)	23 (66)	6 (75)	0.455
Male	0 (0)	5 (100)	19 (33)	1 (8)	2 (50)	3 (43)	19 (33)	1 (8)	0 (0)	9 (33)	14 (27)	2 (67)	3 (60)	1 (17)	12 (34)	2 (25)	
Age (y), mean±SD	34±8	40±4	36±10	38±8	36±5	35±14	37±9	37±9	-	37±9	37±10	37±8	39±8	29±5	37±12	40±5	0.225
BMI, median (IQR)	27 (26-28)	29 (27-29)	26 (25-30)	28 (26-29)	25 (23-27)	28 (25-33)	27 (26-29)	27 (26-30)	-	26 (25-28)	27 (25-30)	43 (25-44)	26 (23-27)	28 (27-30)	26 (26-29)	27 (26-42)	0.350
Occupation																	0.643
Employed	5 (71)	5 (100)	44 (77)	10 (77)	2 (50)	6 (86)	45 (78)	11 (85)	0 (0)	21 (78)	40 (77)	3 (100)	3 (60)	6 (100)	25 (71)	4 (50)	
Unemployed	2 (29)	0 (0)	13 (23)	3 (23)	2 (50)	1 (14)	13 (22)	2 (15)	0 (0)	6 (22)	12 (23)	0 (0)	2 (40)	0 (0)	10 (29)	4 (50)	
Type of surgery																	0.087
Abdominoplasty	3 (43)	0 (0)	28 (49)	7 (54)	1 (25)	3 (43)	29 (50)	5 (39)	0 (0)	11 (41)	27 (52)	0 (0)	2 (40)	2 (33)	20 (57)	2 (25)	0.319
Breast surgeries	1 (14)	3 (60)	11 (19)	2 (15)	1 (25)	2 (28)	12 (20)	2 (15)	0 (0)	8 (30)	9 (17)	0 (0)	1 (20)	2 (33)	7 (20)	2 (25)	0.901
Others	3 (43)	2 (40)	18 (32)	4 (31)	2 (50)	2 (29)	17 (29)	6 (46)	0 (0)	8 (30)	16 (31)	3 (100)	2 (40)	2 (33)	8 (23)	4 (50)	0.447

Data are presented as number and percentage, mean and standard deviation or median and interquartile range. Each quality-of-life domain was divided into the following: 1 = poor, 2 = same, 3 = better, 4 = excellent. SD: standard deviation; IQR: interquartile range. Pearson Chi-Square was used to compare categorical variables, one way ANOVA was used to compare age, and Kruskal-Wallis Test was used for body mass index. P value <0.05 was considered statistically significant (bold font).



Our study illustrated the most common areas of concern in the following order; abdomen, chest and thighs followed by the arms, back, buttock and face. These results are analogous to those published by Kitzinger et al in evaluation of the most desired areas to be corrected and similar to Modartessi et al in comparing a controlled group for weight regain<sup>10,13</sup>. Al-Hadithy et al had similar desire result as abdomen came the first followed by chest/breast<sup>15</sup>. Staalesen et al had a similarity in rating the abdomen as primary site<sup>11</sup>. However, in both of these two studies, different order was seen of the subsequent body regions desired<sup>11,15</sup>.

Overall, in our study, the most frequent BCS was abdominoplasty (n=172, 50.6%) followed by breast surgeries (n=102, 30%). Correspondingly, out of the 82 BCS in the post-BS group, abdominoplasty and breast surgeries were the most frequent procedures; 38 (46.3%) and 17 (20.7%), respectively. Staalesen et al had parallel sequence with ours in the most commonly operated body parts in BS group<sup>11</sup>. Aldaqal et al also reported abdominoplasty as the highest procedure to be done and equal percentage of upper arm, breast and thigh lift<sup>16</sup>. The American society of plastic surgery reports statistics of 2012 showed that there is an overall increase in all types of procedures in the general population but a decline in the massive weight loss population<sup>14</sup>.

In term of post-operative complications in the post-BS group, 30.5% (n=25/82) of the BCS performed were associated with complications mainly wound problems (17.1%). A meta-analysis published by Hasanbegovic et al showed a 60% increased risk of complications in the post BS group compared to the non-bariatric group with a statistical significance<sup>18</sup>. Local complications were the most frequently described, such as hematoma, infection, seroma and dehiscence, while rarely systemic complications such as thromboembolic events were seen<sup>18</sup>. Thus, they stated that the relationship between preoperative BMI values and the risk of postoperative complications was difficult to be conclude<sup>18</sup>.

Patient satisfaction and improvement in QOL are important aspects that determine the success of treatment, long-term patient benefit and psychosocial stability. These were assessed using a questionnaire which was formulated based on similar studies evaluating pre and post BCS patient satisfaction and QOL<sup>10,16,17</sup>. Upon our extensive

research in the field of satisfaction and QOL in post BCS in massive weight loss patient, there were no specific measures have been developed for BCS patients<sup>17</sup>. Therefore, there was a need to develop a specific patient reported outcome (PRO) measures for this group of patients<sup>17</sup>.

There was no statistically significant difference in QOL between different sex, age, occupation, pre-BCS BMI, smoking and the type of BS. Most patients stated that BCS had a positive impact on their QOL in general, with approximately a similar level of improvement in different domains (self-confidence, body appearance, clothing satisfaction, physical and sexual activities). Almost one third of patients reported no change of their physical activities post BCS. This could be attributed to the culture and the sedentary lifestyle which is common in this region of the world<sup>1</sup>.

On studying the predictive factors of overall QOL and patient satisfaction post BCS, this study has suggested that patients who are older, employed and females revealed better overall satisfaction ( $P<0.001$ ), better overall QOL ( $P=0.012$ ) and self-confidence ( $P=0.048$ ), better satisfaction with their body appearance ( $P<0.001$ ), respectively. Better physical activity was observed in patients who underwent other surgeries than abdominoplasty and breast surgeries ( $P=0.042$ ). However, upon review of the literature, there are obvious limited studies that tackled such predictors which might make our study unique, especially in the Middle East region.

It was also noted that despite having a low percentage of poor outcome in all domains, body appearance domain had the highest rate. This was justified by the low level of patients' awareness of possible complications and scarring pre-operatively, which highlights the importance of thorough explanation of the procedure and its possible complications for each patient pre-operatively. This elucidates the necessity of including the plastic surgeon in the multidisciplinary team before contemplating BS about the possibilities offered by plastic surgery in the management course of excess skin, long process which may include multiple surgeries each with its own complications and no excessive promises can be made<sup>10,13</sup>.

Upon further review, these patients had lower level of QOL due to their lack of understanding of the body contouring procedures and its complications, which was attributed by asymmetry in body

size post-operatively, as half of the patients have undergone one procedure only leaving them with redundant skin and increase body size in other body regions. This issue has also negatively impacted the patients' self-confidence, clothes choosing and sexual activity. It is therefore worth mentioning that BCS is not a one-stage procedure. If a specific body area is improved, observation may then be diverted to a neighboring area that has not yet been lifted<sup>10</sup>. Moreover, undergoing this process in a governmental hospital will raise the issue of long waiting lists and delayed procedures, no health insurance for these types of procedures in private sectors, which make the patients regain weight or lose the motivated interest to continue the path in follow up<sup>13</sup>.

This study had several limitations such as the small sample size and the missing of some data such as those related to sexual activity as some participants might not be keen to answer sensitive questions. Another limitation is that this study is a single center study and generalization of the results might not be accurate. Despite these limitations, the findings of this study are important being the first study from Bahrain tackling post-BS patients' satisfaction and QOL. The results can help improving patients' care by encouraging involvement of plastic surgeon early in before the weight reduction surgery.

## CONCLUSION

Body contouring surgeries represent a substantial portion of the plastic surgery admissions. Significant percentage of patients with BS history underwent BCS. They were mainly females, nationals, young and overweight. Abdominoplasty and chest surgeries were the most common indications for admission. Post-operative complications were mainly associated with wound problems. Extensive percentage of patients rated their QOL post -BCS as better in most of the questionnaire domains and excellent at satisfaction. There is a need for more and larger prospective studies with well-chosen controls, standardized reporting of complications, investigation of nutritional deficiencies and their impact on complications of body contouring surgery in the post-bariatric population.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

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