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Impact of Bariatric Surgery on Quality of Life and Psychological Well-Being Among Patients with Hidradenitis Suppurativa: A Cross-Sectional Study

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Background: Hidradenitis suppurativa (HS) is a chronic inflammatory skin disease associated with obesity, substantial psychosocial burden, and symptom-related discomfort. Bariatric surgery achieves sustained weight loss and may improve psychological well-being, yet its effect on HS-related quality of life and symptom burden remains uncertain.

Objective: To evaluate the association of bariatric surgery with psychological well-being, quality of life, and pain among patients with HS using validated patient-reported outcome measures.

Methods: We conducted a analytical cross-sectional study between January 2024 and January 2025 at King Saud University Medical City, Riyadh, Saudi Arabia. Consecutive adult patients with HS were enrolled after informed consent. Disease severity was assessed using Hurley staging. Participants completed the Dermatology Life Quality Index (DLQI), Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), and a visual analog scale (VAS) for pain. Outcomes were compared between patients with and without prior bariatric surgery using independent t-tests and general linear models adjusted for age, sex, Hurley stage, and diagnostic delay.

Results: Among 135 participants, 77 (57.0%) were female and 15 (11.1%) had undergone bariatric surgery. Patients with prior bariatric surgery had lower mean DLQI (8.13 vs 8.62), PHQ-9 (5.73 vs 7.50), GAD-7 (5.87 vs 6.31), and VAS pain (2.80 vs 3.69) scores than those without surgery; however, these differences were not statistically significant after adjustment (all $p>0.05$). DLQI correlated positively with PHQ-9 ($r=0.334$) and GAD-7 ($r=0.323$), while pain correlated moderately with DLQI ($r=0.546$; $p<0.001$).

Conclusion: In this cross-sectional sample, prior bariatric surgery was not associated with statistically significant differences in quality of life, depressive symptoms, anxiety symptoms, or pain after adjustment. However, patients with prior bariatric surgery showed consistently lower mean scores across these outcomes. Larger prospective longitudinal studies with more detailed surgical subgroup data are needed to determine the magnitude and durability of any potential benefit.

Keywords: hidradenitis suppurativa, acne inversa, bariatric surgery, quality of life, dermatology life quality index, depression, patient health questionnaire-9

Introduction

Hidradenitis suppurativa (HS), also known as acne inversa, is a chronic, relapsing inflammatory disorder of the hair follicle that primarily affects intertriginous apocrine areas such as the axillae, groin, perineum, and inframammary regions.[1] Globally, pooled analyses estimate a prevalence of approximately 1%, with marked regional variation and a consistent female predominance.[2] HS imposes a profound physical, psychological, and functional burden. On average, dermatology-specific quality-of-life scores fall within the impaired range, with pooled Dermatology Life Quality Index (DLQI) values of approximately 10–11, and more than half of patients scoring above 10.[1] In a large systematic review and meta-analysis, depression was reported in 20.9% of patients with HS compared with 8.4% of the general population, and anxiety in 19.3% compared with 8.1%, confirming the substantial psychiatric comorbidity associated with the disease.[3]

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Obesity is among the most prevalent comorbidities in HS, affecting more than half of patients in several cohorts. It is consistently associated with greater disease severity, higher pain levels, and poorer quality of life.[4] Proposed mechanisms include mechanical friction in skin folds, hormonal influences, and a chronic low-grade proinflammatory state driven by cytokines and adipokines. These insights have positioned weight reduction as an important adjunctive therapeutic goal in HS management.[5]

Bariatric surgery represents the most effective long-term intervention for severe obesity, achieving substantial and sustained weight loss, remission of metabolic comorbidities, and significant improvements in patient-reported outcomes compared with lifestyle or pharmacologic measures.[6] Psychologically, postoperative improvements often include reduced depressive symptoms, enhanced self-esteem, improved body image, and better overall mental health.[7] These benefits appear related not only to weight reduction but also to improved self-concept and a renewed sense of control. However, these outcomes are not universal. A subset of patients experiences persistent or recurrent psychological distress, especially when expectations are unmet or weight regain occurs, highlighting the complexity of psychosocial adaptation after surgery.[7]

The influence of bariatric surgery on HS remains uncertain. Some studies suggest clinical and psychosocial improvement following surgical weight loss, whereas others report de novo or worsening disease activity after surgery, possibly related to redundant skin folds or postoperative metabolic and nutritional changes.[8–12] Thus, the available literature remains mixed. In addition, much of the existing evidence has focused primarily on clinical outcomes, while the effect of bariatric surgery on patient-reported psychosocial outcomes in HS, including quality of life, depressive symptoms, anxiety symptoms, and pain burden, remains insufficiently characterized.

Therefore, this study aimed to evaluate the impact of bariatric surgery on the psychological well-being, quality of life, and pain perception of patients with HS using validated patient-reported outcome measures, including the DLQI, the Patient Health Questionnaire-9 (PHQ-9), the Generalized Anxiety Disorder-7 (GAD-7) scale, and a Visual Analog Scale (VAS) for pain.[13–15]

Methods

We conducted a analytical cross-sectional study between January 2024 and January 2025 at the dermatology clinic of King Saud University Medical City (KSUMC), a tertiary care center in Riyadh, Saudi Arabia. The study included all adult patients with a confirmed clinical diagnosis of HS who were actively followed in the dermatology clinic during the study period and provided informed consent to participate. Patients who were younger than 18 years or were unable to provide informed consent or complete the questionnaires were excluded. A formal a priori sample size calculation was not performed, as all eligible patients followed during the study period were considered for inclusion. The study was approved by the Institutional Review Board at King Saud University Medical City (Project No. E-25-10128, Ref. No. 25/0844/IRB), and all procedures were conducted in accordance with the ethical standards of the institutional research committee and the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants. Disease severity was assessed by a board-certified dermatologist using Hurley staging, which classifies HS into stage I (single or multiple abscesses without sinus tracts or scarring), stage II (recurrent abscesses with sinus tract formation and scarring, widely separated lesions), and stage III (diffuse or near-diffuse involvement with multiple interconnected sinus tracts and abscesses).

The primary objective was to evaluate the impact of bariatric surgery on the psychological well-being, quality of life, and pain perception of patients with HS using validated PRO instruments, including the DLQI, the PHQ-9 for depression, the GAD-7 scale for anxiety, and the VAS for pain.[13–15] As a secondary objective, we explored correlations among these PROs to examine the interrelationship between quality of life, psychological symptoms, and pain severity. Participants were interviewed face-to-face by trained investigators using standardized Arabic or English versions of the validated instruments.[15–18] PROs were collected through face-to-face interviews, and Hurley staging was assessed by a board-certified dermatologist at the time of evaluation. The demographic and clinical variables, including age, sex, disease duration, comorbidities, smoking status, bariatric surgery history, and treatment history were obtained from electronic medical records. Diagnostic delay was defined as the interval between patient-reported symptom onset and the documented clinical diagnosis of HS.

Descriptive statistics were used to summarize demographic, clinical, and PRO data. Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on distribution, and categorical variables were expressed as frequencies and percentages. The distribution of continuous variables was assessed before applying parametric tests. To evaluate the effect of bariatric surgery, we first performed independent

samples t-tests to compare PROs (DLQI, PHQ-9, GAD-7, and VAS pain scores) between patients with and without a history of bariatric surgery. To further account for potential confounders, univariate general linear models (GLMs) were applied with each PRO as the dependent variable and bariatric surgery status as the main independent variable, adjusting for age, gender, Hurley stage, and diagnostic delay as covariates. To assess the correlation between quality of life, psychological symptoms, and pain, Pearson's correlation test was used. Analyses were performed using available-case data, and no imputation was applied for missing items or covariates. All analyses were two-tailed, with statistical significance set at $p < 0.05$, and were performed using IBM SPSS software, version 31.

Results

The study included 135 patients with HS. The median age was 34 years (interquartile range, 25–40), and 77 (57%) were female. Most participants were single (n = 89, 65.9%). The mean weight of the cohort was 86.6 ± 19.7 kg, and the mean body mass index (BMI) was 31.2 ± 6.8 kg/m^2, indicating that most patients were obese. Common comorbidities included hypertension in 13 (10.0%), diabetes mellitus in 23 (17.4%), and dyslipidemia in 27 (20.0%) patients. Current smoking was reported by 45 (34.1%), while 49 (38.3%) patients were previous smokers. Fifteen patients (11.1%) had a history of bariatric surgery. Of these, 14 underwent sleeve gastrectomy and one underwent Roux-en-Y gastric bypass. Regarding disease severity, Hurley stage II was the most common (n= 55, 40.7%), followed by stage I (n= 40, 29.6%) and stage III (n= 40, 29.6%) (Table 1).

Table 1 Baseline Demographics and Clinical Characteristics (N=135)

Characteristic	N=135	%
Age, years, median (range)	34 (25–40)	
Sex, female	77	57.0
Marital status, single	89	65.9
Weight, kg, mean (range)	86.6 ± 19.7	
BMI, kg/m^2, mean (range)	31.2 ± 6.8	
Hypertension	13	10.0
Diabetes mellitus	23	17.4
Dyslipidemia	27	20.0
Current smoking	45	34.1
Former smoking	49	38.3
Hurley stage I	40	29.6
Hurley stage II	55	40.7
Hurley stage III	40	29.6
Systemic antibiotics (ever)	106	78.5
Systemic retinoids (ever)	47	34.8
Biologic therapy (ever)	47	34.8
Adalimumab	45	33.3
Infliximab	2	1.48
Local HS surgery (I&D/excision)	37	27.4
History of bariatric surgery	15	11.1

Baseline characteristics stratified by bariatric surgery history are shown in Table 2. There were no statistically significant differences between patients with and without prior bariatric surgery in age, sex, marital status, BMI, smoking status, comorbidities, Hurley stage, or prior treatment history (all p>0.05).

Table 2 Comparison of Sociodemographic and Clinical Characteristics of HS Patients by Surgery History

Sociodemographic and Clinical Characteristics		**Surgery**		**P-value**
		No	**Yes**	
Gender	Female	69 (57.5%)	8 (53.3%)	0.75
	Male	51 (42.5%)	7 (46.7%)	
Age		34.9 ± 11.3	34.3 ± 7.2	0.85
Marital status	Single	78 (65.0%)	11 (73.3%)	0.75
	Married	40 (33.3%)	4 (26.7%)	
	Divorced	2 (1.7%)	01 (0.0%)	
Education	Elementary school	5 (4.2%)	01 (0.0%)	0.32
	Intermediate school	6 (5.1%)	01 (0.0%)	
	High school	27 (22.9%)	1 (6.7%)	
	Bachelor	64 (54.2%)	11 (73.3%)	
	Diploma	5 (4.2%)	2 (13.3%)	
	Master	6 (5.1%)	01 (0.0%)	
	Postgraduate	5 (4.2%)	1 (6.7%)	
Weight		86.6 ± 19.7	86.5 ± 22.3	0.98
Height		166.7 ± 10.6	169.4 ± 10.5	0.34
BMI		31.2 ± 6.8	30.1 ± 6.3	0.56
Hypertension	No	105 (90.5%)	12 (85.7%)	0.57
	Yes	11 (9.5%)	2 (14.3%)	
Diabetes Mellitus	No	97 (82.2%)	12 (85.7%)	0.74
	Yes	21 (17.8%)	2 (14.3%)	
Dyslipidemia	No	90 (77.6%)	13 (92.9%)	0.18
	Yes	26 (22.4%)	1 (7.1%)	
Family history	No	81 (70.4%)	11 (73.3%)	0.81
	Yes	34 (29.6%)	4 (26.7%)	
Smoking (Yes/No/ND)	No	78 (66.7%)	9 (60.0%)	0.60
	Yes	39 (33.3%)	6 (40.0%)	
Previous smoking history	No	70 (61.9%)	9 (60.0%)	0.88
	Yes	43 (38.1%)	6 (40.0%)	

(*Continued*)

Table 2 (Continued).

Sociodemographic and Clinical Characteristics		Surgery		P-value
		No	Yes	
Hurley stage	I	36 (30.0%)	4 (26.7%)	0.64
	2	50 (41.7%)	5 (33.3%)	
	3	34 (28.3%)	6 (40.0%)	
Biological agents	No	74 (62.7%)	0 (0.0%)	N/A
	Infliximab	2 (1.7%)	0 (0.0%)	
	Adalimumab	41 (34.7%)	0 (0.0%)	
	Both	1 (0.8%)	0 (0.0%)	
Antibiotic	No	24 (20.0%)	5 (33.3%)	0.23
	Yes	96 (80.0%)	10 (66.7%)	
Retinoid	No	77 (64.2%)	11 (73.3%)	0.48
	Yes	43 (35.8%)	4 (26.7%)	

Patients with prior bariatric surgery demonstrated consistently lower mean scores across all patient-reported outcomes, although differences did not reach statistical significance. The mean DLQI was 8.13 ± 5.69 in the bariatric group versus 8.62 ± 7.59 in controls (p = 0.81). Likewise, PHQ-9 scores were 5.73 ± 5.11 versus 7.50 ± 5.43 (p = 0.23), GAD-7 scores were 5.87 ± 4.70 versus 6.31 ± 5.19 (p = 0.75), and VAS pain scores were 2.80 ± 2.51 versus 3.69 ± 3.23 (p = 0.30), respectively (Table 3).

After adjusting for age, gender, Hurley stage, and diagnostic delay, bariatric surgery was not an independent predictor of any PRO. Adjusted mean DLQI scores were 7.82 (95% CI 3.90–11.75) for the bariatric group and 8.72 (95% CI 7.34–10.09) for controls (p = 0.77). Adjusted PHQ-9 scores were 5.93 (95% CI 3.01–8.86) and 7.28 (95% CI 6.26–8.30), respectively (p = 0.63). Adjusted GAD-7 scores were nearly identical between groups (5.99 vs 5.96; mean difference = –0.03, 95% CI –2.90 to 2.83; p = 0.98), and adjusted VAS pain scores remained lower in the bariatric group (2.85 vs 3.64; mean difference = 0.79, 95% CI –1.02 to 2.60; p = 0.39) (Table 4).

Correlation analyses were performed to explore the relationships between quality of life, psychological symptoms, and pain. DLQI demonstrated weak but significant positive correlation with depressive symptoms (PHQ-9; r = 0.334, p < 0.001) and anxiety symptoms (GAD-7; r = 0.323, p < 0.001). Pain severity showed a moderately positive correlation with impaired quality of life (VAS–DLQI; r = 0.546, p < 0.001) and weaker but significant correlations with both depression (VAS–PHQ-9; r = 0.231, p = 0.007) and anxiety (VAS–GAD-7; r = 0.244, p = 0.005) (Table 5).

Table 3 Patient-Reported Outcomes (PROs) by Bariatric Surgery

Variable	Total	Bariatric Surgery		p value
		No	Yes	
PHQ9 score	7.31 ± 5.40	7.50 ± 5.43	5.73 ± 5.11	0.233
GAD7 score	6.26 ± 5.13	6.31 ± 5.19	5.87 ± 4.70	0.753
DLQI score	8.57 ± 7.38	8.62 ± 7.59	8.13 ± 5.69	0.81
VAS Mean pain	3.59 ± 3.16	3.69 ± 3.23	2.80 ± 2.51	0.304

Abbreviations: PHQ9, Patient Health Questionnaire; GAD7, Generalized Anxiety Disorder-7; DLQI, Dermatology Life Quality Index; VAS, Visual Analogue Scale.

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Table 4 Adjusted Mean Scores for DLQI, PHQ-9, GAD-7, Social Anxiety, and Pain (VAS) by Bariatric Surgery

Outcome Variable	Bariatric Surgery	Adjusted Mean (95% CI)*	Mean Difference (95% CI)	p-value
DLQI	No	8.72 (7.34–10.09)	0.89 (–3.27 to 5.06)	0.672
	Yes	7.82 (3.90–11.75)		
PHQ-9	No	7.28 (6.26–8.30)	1.35 (–1.75 to 4.45)	0.391
	Yes	5.93 (3.01–8.86)		
GAD-7	No	5.96 (5.02–6.91)	–0.03 (–2.90 to 2.83)	0.983
	Yes	5.99 (3.29–8.69)		
VAS Pain	No	3.64 (3.04–4.24)	0.79 (–1.02 to 2.60)	0.39
	Yes	2.85 (1.14–4.56)		

Notes: * Adjusted for age, sex, Hurley stage, and diagnostic delay.

Table 5 Correlations Among Pain and Psychological Outcomes

Pair	Correlation (r)	p-value	Interpretation
DLQI vs PHQ-9	0.334	<0.001	Weak, positive, significant
DLQI vs GAD-7	0.323	<0.001	Weak, positive, significant
VAS pain vs DLQI	0.546	<0.001	Moderate, positive, significant
VAS pain vs PHQ-9	0.231	0.007	Weak, positive, significant
VAS pain vs GAD-7	0.244	0.005	Weak, positive, significant

Discussion

In this cross-sectional study, patients with HS who had undergone bariatric surgery demonstrated consistently lower scores across all measures of quality of life, depressive or anxiety symptoms, and pain compared with non-surgical patients. Although these differences did not reach statistical significance after adjustment for demographic and disease-related factors, the overall pattern suggests a favorable trend toward improved well-being among individuals who achieved surgical weight loss.

These findings contribute to the ongoing debate regarding the relationship between weight-loss surgery and HS outcomes. Earlier studies have reported mixed results. Canard et al demonstrated significant reductions in DLQI, pain, and the number of affected sites after bariatric surgery compared with nutritional counseling, emphasizing the potential benefit of weight reduction for HS severity and quality of life.[8] Similarly, Kromann et al reported that nearly half of patients achieved complete remission and 20% experienced partial improvement after weight-loss surgery, supporting the therapeutic relevance of obesity management in HS.[9] In addition, large-scale population data suggest that bariatric surgery may be associated with a lower risk of HS development and a possible reduction in severe recurrences requiring hospitalization.[10] In contrast, Garcovich et al described de novo or worsening HS after biliopancreatic diversion, possibly related to micronutrient deficiencies or rapid postoperative metabolic shifts.[11] Javorsky and Kimball also reported that many patients experienced worsening disease activity after bariatric surgery, particularly gastric bypass, which was attributed in part to redundant skin folds after rapid weight loss.[12] However, some patients in the same series experienced marked improvement after panniculectomy, suggesting that removal of excess skin may contribute to symptom relief and improved hygiene.[12] These divergent findings underscore that the overall effect of bariatric surgery on HS is likely influenced by procedure type, postoperative course, nutritional status, and subsequent management. Potential

postoperative hazards should also be considered, including de novo or worsened HS, excess skin folds that may increase friction, and micronutrient deficiencies that may affect postoperative recovery and symptom control.[11,12]

In our cohort, the absence of a statistically significant difference in patient-reported outcomes, may reflect a balance of these opposing mechanisms. On one hand, weight reduction may decrease friction, inflammation, and metabolic stress, thereby improving symptoms and psychological well-being. On the other, rapid postoperative weight loss may transiently worsen disease due to excess skin folds, nutritional deficiencies, or altered immune function. Additionally, persistent scarring or chronic pain may limit quality of life improvement even after substantial weight loss.

Our study also highlights pain as a key determinant of psychological distress in HS. Pain severity demonstrated a moderate positive correlation with impaired quality of life, as well as weaker but still significant correlations with both depressive and anxiety symptoms. Frings et al similarly reported that pain intensity correlates with reduced quality of life ($r \approx 0.48$) and increased emotional distress ($r \approx 0.30$), underscoring that pain contributes substantially to the psychosocial burden of HS beyond its physical discomfort.[19] Consistent with that study, our data indicate that pain may serve as a simple clinical marker of broader psychological suffering. Routine assessment of pain intensity could therefore help clinicians identify HS patients at higher risk of depression or anxiety who may benefit from early psychological intervention.

This study's strengths include its use of validated PROs and adjustment for key confounders such as age, gender, disease stage, and diagnostic delay. This study has several limitations. First, the cross-sectional design precludes any inference regarding causality or temporal relationships between bariatric surgery and patient-reported outcomes. Second, the relatively small number of patients with prior bariatric surgery may have limited the statistical power to detect subtle between-group differences. Third, important postoperative variables, such as time since surgery and degree of weight loss, were not consistently available and therefore could not be analyzed. Future research should include prospective longitudinal studies assessing both clinical and psychosocial trajectories before and after bariatric surgery, ideally stratified by procedure type, degree of weight loss, and timing of follow-up. Multidisciplinary collaboration between dermatologists, bariatric surgeons, and psychologists will be essential to optimize preoperative counseling and postoperative support for HS patients considering weight-loss surgery, including continued surveillance for skin and nutritional health.

Conclusion

In this cross-sectional cohort, prior bariatric surgery was not associated with statistically significant differences in quality of life, depressive symptoms, anxiety symptoms, or pain after adjustment for measured confounders. However, patients with prior bariatric surgery showed consistently lower mean scores across these outcomes. These findings may suggest possible psychosocial and symptomatic benefit in selected patients, but the small surgical subgroup limits the ability to detect subtle effects with confidence. Larger prospective longitudinal studies with more detailed surgical subgroup characterization are needed to clarify the magnitude, timing, and durability of any benefit.

Data Sharing Statement

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

Ethical Statements

The study was approved by the Institutional Review Board at King Saud University Medical City (Project No. E-25-10128, Ref. No. 25/0844/IRB), and all procedures were conducted in accordance with the ethical standards of the institutional research committee and the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants.

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Disclosure

The authors declare that there are no conflicts of interest.

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