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Research Article

Impact of Obesity on Postoperative Recovery: An Epidemiological Study of Nutritional Practices and Surgical Complications

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Abstract

Background: Obesity is a major risk factor for postoperative complications and prolonged hospital stays, yet preoperative nutritional management remains insufficiently integrated, particularly in resource-limited settings. ***Objectives***: To evaluate the impact of obesity on postoperative complications and to analyze nutritional management practices in hospitals. ***Methods***: An ambispective analytical observational study was conducted in two public hospitals in Setif, Algeria. It included 2205 surgical patients in 2024 (retrospective phase) and 234 patients between August and November 2025 (prospective phase) to complement missing data on nutritional management; 62 healthcare professionals were also surveyed. Data were collected from medical records and structured questionnaires, including sociodemographic characteristics, body mass index (BMI), postoperative complications, length of hospital stay, and nutritional practices. ***Results***: Obesity prevalence was 54.1%. Postoperative complications occurred in 33.97% of obese patients versus 23.79% of non-obese patients (RR=1.43; 95% CI: 1.25–1.64; OR=1.65; 95% CI: 1.37–1.99). Obese patients had a longer mean hospital stay (7.99±3.75 days) compared to non-obese patients (7.14±3.36 days). Only 1% of patients received preoperative nutritional support, 98% of surgical departments lacked dietitians, and 98% of healthcare professionals had no training in clinical nutrition, while all expressed a need for further training. ***Conclusions***: Obesity is significantly associated with increased postoperative complications and prolonged hospitalization. These findings emphasize the need to integrate nutritional assessment into routine care, strengthen professional training, and recruit dietitians to improve surgical outcomes and quality of care.

Keywords: Length of hospital stay; Nutritional management; Obesity; Postoperative complications.

تأثير السمنة على التعافي بعد العملية الجراحية: دراسة وبائية للممارسات الغذائية والمضاعفات الجراحية

الخلاصة

الخلفية: السمنة عامل خطر رئيسي للمضاعفات بعد العملية وفترات الإقامة الطويلة في المستشفى، ومع ذلك لا تزال إدارة التغذية قبل العملية غير متكاملة بشكل كاف، خاصة في البيئات ذات الموارد المحدودة. **الأهداف**: تقييم تأثير السمنة على المضاعفات بعد العمليات وتحليل ممارسات إدارة التغذية في المستشفيات. **الطرائق**: أجريت دراسة تحليلية رصدية طموحة في مستشفيين حكوميين في سطيف، الجزائر. شمل 2205 مريضا جراحيا في عام 2024 (المرحلة الاستعادية) و234 مريضا بين أغسطس ونوفمبر 2025 (المرحلة المستقبلية) لتعويض البيانات المفقودة حول إدارة التغذية؛ كما تم استطلاع 62 من العاملين في الرعاية الصحية. تم جمع البيانات من السجلات الطبية والاستبيانات المنظمة، بما في ذلك الخصائص الاجتماعية الديموغرافية، مؤشر كتلة الجسم (BMI)، المضاعفات بعد العملية، مدة الإقامة في المستشفى، والممارسات الغذائية. **النتائج**: كانت نسبة انتشار السمنة 54.1٪. حدثت مضاعفات ما بعد العملية لدى 33.97٪ من المرضى السمنين مقابل 23.79٪ من غير السمنة (OR=1.43 *مقابل* OR=1.65). كان متوسط إقامة المرضى السمناء في المستشفى أطول (7.99 يوما) مقارنة بالمرضى غير السمناء (7.14 يوما). فقط 1٪ من المرضى تلقوا دعما غذائيا قبل العملية، و98٪ من أقسام الجراحة تفتقر إلى أخصائيي تغذية، و98٪ من العاملين في الرعاية الصحية لم يتلقوا تدريبا في التغذية السريرية، بينما أعرب الجميع عن حاجتهم لمزيد من التدريب. **الاستنتاجات**: ترتبط السمنة بشكل كبير بزيادة المضاعفات بعد العملية وفترات الاستشفاء المطولة. تؤكد هذه النتائج على ضرورة دمج التقييم الغذائي في الرعاية الروتينية، وتعزيز التدريب المهني، واستقطاب أخصائيي التغذية لتحسين نتائج الجراحة وجودة الرعاية.

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INTRODUCTION

Obesity has become a major global public health concern, with its prevalence steadily increasing across both developed and developing countries. The profile of surgical patients has significantly changed due to this epidemiological transition, as routine clinical practice now frequently encounters excess adiposity. Obesity consistently links to adverse perioperative outcomes, in addition to its well-established association with metabolic and cardiovascular diseases. Evidence indicates that obese patients face a higher risk of postoperative complications, including surgical site infections, delayed wound healing, thromboembolic events, and cardiopulmonary complications [1–4]. Large-scale analyses further suggest that obesity contributes to increased perioperative morbidity across various surgical specialties [5]. In addition to clinical complications, obesity has been associated with prolonged hospitalization and increased healthcare resource utilization, reflecting the broader institutional burden of managing high-risk surgical patients [6]. These findings emphasize that the impact of obesity extends beyond individual risk to affect overall healthcare systems. Nutritional status is a key determinant of

surgical recovery and prognosis. International guidelines highlight the importance of structured perioperative nutritional assessment and targeted interventions, particularly in high-risk patients undergoing major surgery [7]. Moreover, multimodal prehabilitation strategies that incorporate nutritional optimization have shown promising effects in improving postoperative outcomes [8,9]. Despite this evidence, the integration of systematic nutritional screening and multidisciplinary collaboration remains inconsistent in many clinical environments [10]. In Algeria, limited data are available regarding the influence of obesity on postoperative outcomes, as well as the degree to which clinical nutrition is integrated into surgical care. This lack of evidence may restrict the development of targeted strategies aimed at improving perioperative management in obese patients. Accordingly, the present study aimed to evaluate the impact of obesity on postoperative complications and length of hospital stay while also assessing preoperative nutritional practices in two public hospitals in the wilaya of Setif, Algeria. In addition, it examined healthcare professionals' perceptions and identified training needs related to clinical nutrition within surgical practice.

METHODS

Study design

This observational study with an analytical purpose adopted an ambispective approach, combining a retrospective phase and a prospective phase. The retrospective phase involved the review of medical records, while the prospective phase enabled the targeted collection of nutritional and organizational data using standardized questionnaires. The study's general objective was to assess the influence of obesity and nutritional status on postoperative recovery among patients undergoing surgery in public hospital settings. Specifically, it aimed to characterize the sociodemographic, anthropometric, and clinical profiles of surgical patients; estimate the prevalence of obesity and nutritional disorders; analyze the association between weight status and postoperative complications; examine the impact of obesity on length of hospital stay and recovery; evaluate nutritional management practices and related constraints; and propose recommendations to improve the care of obese patients and prevent postoperative complications.

Study setting and population

This study was conducted in the municipality of El Eulma, located in the wilaya of Sétif, Algeria. This urban area has public healthcare facilities that provide care for a large number of patients, particularly in the surgical field. The research was carried out in two public healthcare institutions in the municipality. The first was the Public Hospital Establishment (PHE) Saroub El Khatir of El Eulma, specifically in the general surgery department, where various conditions requiring surgical intervention are treated. The second was the Mother and Child Specialized Hospital Establishment (SHE) Belhadi Eljaida of El Eulma, within the gynecology department, which specializes in the management of patients with gynecological and obstetric conditions. These two institutions were selected primarily because of their high surgical activity, the diversity of patients treated, and the availability of medical records required for retrospective analysis and the prospective survey. This setting enabled the collection of relevant data related to the study objectives in a real hospital practice context. The study population consisted of all patients who underwent surgical management in the selected hospital facilities, as well as healthcare personnel working in the departments under study. For the retrospective phase, all medical records corresponding to surgical procedures performed from January 1, 2024, to December 31, 2024, were included. A total of 2205 records were reviewed, including 1613 from surgical departments and 592 from gynecology-obstetrics departments. All available records for this period were included without sampling, thus constituting the exhaustive retrospective population of the study. For the prospective phase, all surgical procedures performed from August 1, 2025, to November 30, 2025, were considered the source population. A total of 721 surgical procedures and 256 gynecology-obstetrics procedures were recorded. However, due to field constraints — including communication difficulties with some patients, refusal to participate, and the critical clinical condition of some patients preventing questionnaire administration — only 234 patients were ultimately included in the prospective survey. Among them, 142 were from surgical departments and 92 from gynecology-obstetrics departments. In addition, the survey targeting healthcare personnel included all professionals working in the selected departments during the study period. A total of 62 healthcare workers were surveyed, including 27 from the Public Hospital Establishment of El Eulma and 35 from the Mother and Child Specialized Hospital Establishment of El Eulma, representing exhaustive coverage of this population. The distinction between the source population and the analyzed population ensures methodological rigor and appropriate interpretation of the results. Participants included or excluded in the study were selected based on the following criteria:

Inclusion criteria

Patients who underwent surgery in the hospital institutions of El Eulma during the defined study periods; patients aged 18 years and older, of either sex, hospitalized in general surgery or gynecology-obstetrics departments; patients with usable and sufficiently documented medical records for the retrospective phase; newly operated patients during the prospective phase who provided informed consent to participate in the study; patients for whom essential anthropometric data, particularly weight and height allowing the calculation of body mass index, were available; and healthcare professionals working in the selected departments who agreed to complete the staff questionnaire.

Exclusion criteria

Patients with incomplete or unusable medical records; patients who underwent surgery outside the defined study periods; minor patients, to ensure population homogeneity; patients suffering from severe conditions likely to independently influence postoperative outcomes, such as advanced cancers or decompensated chronic diseases; and healthcare professionals not working in the selected departments or who refused to participate.

Data collection procedure

Medical record consultation was conducted after obtaining the necessary administrative authorizations from the directors of the concerned hospital institutions. This process was carried out in collaboration with department heads and archive unit staff. Record review was performed in strict compliance with ethical rules, confidentiality, and professional secrecy, ensuring patient anonymity and protection of personal data, in accordance with the principles of the Declaration of Helsinki (WMA, 2013) [11]. For the patient survey, questionnaires were systematically offered to all patients included in the prospective phase. To facilitate understanding and accessibility, an Arabic-language version was provided. For patients with reading or writing difficulties, particularly older adults, the questions were read and explained by the investigator without influencing responses in a neutral and respectful environment.

Reliability and validation of data collection tools

Scientific validation of the questionnaires was ensured by Dr. Timizar Farouk, an epidemiology specialist physician at the University Hospital Center of Setif, who evaluated the relevance, clarity, and consistency of the items in relation to the study objectives. This step ensured the content validity of the instruments used. The reliability of the tools was assessed with the support of Ms. Khetala Chorouk, a public health midwife at Mother and Child Specialized Hospital El Eulma, through evaluation of question comprehension, internal consistency, and homogeneity of responses. A pilot survey was conducted with 20 patients from the same study population, including 10 patients from the general surgery department and 10 from the gynecology department. The objectives of this pilot survey were to verify clarity and comprehension of the questions, assess the time required to complete the questionnaire, and identify ambiguous or redundant items. Following the pilot phase, necessary adjustments were made to the research tool before its use in the final sample. Patients included in the pilot survey were not included in the final study sample.

Ethical considerations

The research was authorized by the Ethical Committee of the Faculty at M'sila University (Algeria) on December 14th, 2023, under the code D01N01UN280120230002.

Statistical analysis

Statistical analysis was performed using Excel and SPSS version 27 software. Descriptive statistics were used to summarize the data and compare qualitative variables. Inferential statistical tests included the Chi-square (χ^2) test for qualitative variables and Student's t-test for comparison of means, with the significance level set at $p< 0.05$.

RESULTS

In the retrospective phase, patient characteristics were examined, encompassing sex, age, and the types of surgical procedures performed. The study population showed a clear female predominance. In the general surgery department, women accounted for 904 cases compared to 709 men. In the gynecology department, all 592 procedures involved female patients. Overall, women represented the majority of patients who underwent surgery during the study period (Table 1).

Table 1: Demographic distribution of the study population (n=2205)

Age group (year)	Males	Females	Total
18 – 29	95(25)	285(75)	380(17.23)
30 – 44	162(31)	360(69)	522(23.67)
45 – 59	175(36.1)	310(63.9)	485(21.99)
60 – 74	186(36)	350(64)	516(23.4)
75 – 90	91(30.1)	211(69.9)	302(13.17)
Total	709(32.1)	1496(67.8)	2205(100)

Values are presented as frequency and percentage.

Patients' age ranged from 18 to 85 years, with a mean age of 50.96 ± 19.30 years. The majority of patients were concentrated in the intermediate age groups, particularly between 40 and 65 years. Patients over 65 years of age represented a significant proportion, reflecting substantial surgical activity among older adults (Table 1). In the general surgery department, emergency surgeries predominated, with 948 cases compared to 665 elective surgeries. In the gynecology department, 381 elective surgery interventions and 211 emergency interventions were recorded. Overall, across all departments, emergency surgeries constituted the majority of procedures performed (Figure 1).

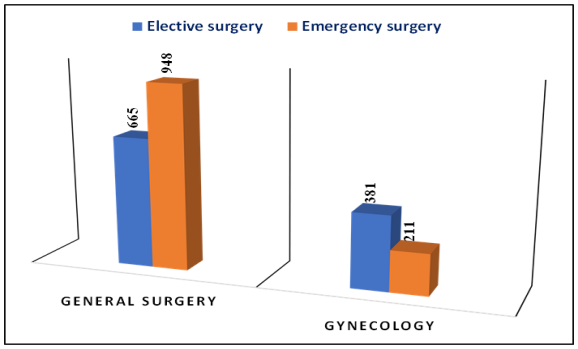

Figure 1: Grouped bar chart of patients by type of surgery (elective vs. emergency).

Anthropometric parameters form the foundation for assessing obesity. Their analysis enables a reliable

classification and helps evaluate their potential impact on postoperative recovery. The analysis of BMI indicated that a significant proportion of patients had a BMI greater than 25 kg/m² (31.48 ± 7.87; n= 2205). Higher BMI values were more frequently observed among patients who experienced prolonged hospital stays (Table 2).

Table 2: Classification of patients according to type of obesity

Type of obesity	Result
Normal	527(23.9)
Overweight	486(22)
Moderate obesity	452(20.5)
Severe obesity	385(17.5)
Morbid obesity	355(16.1)
Total	2205(100)

Values are presented as frequency and percentage.

The majority of patients were classified as overweight or having moderate obesity. 54.1% of the study population was classified as obese (moderate, severe, and morbid categories combined). Severe and morbid obesity, although less prevalent, were associated with a higher frequency of postoperative complications. The length of hospital stays ranged from 2 to 15 days. The average length of time was longer for obese patients (7.99 ± 3.75 days) than for non-obese patients (7.14 ± 3.36 days). In addition, a progressive increase in hospital stay was observed with increasing severity of obesity, with patients presenting with severe or morbid obesity tending to have longer stays (Figure 2).

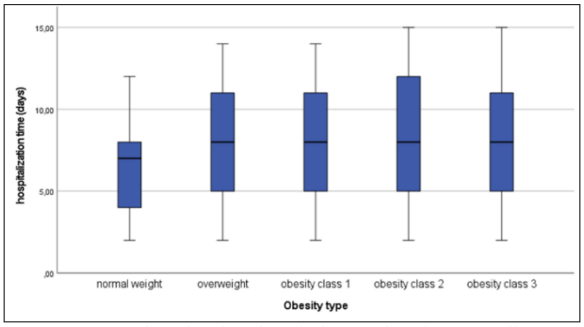

Figure 2: Box plot of patient hospital stays duration according to type of obesity.

A one-way ANOVA revealed a statistically significant difference in the length of hospital stay across different obesity categories ($F = 20.047$, $p< 0.001$). Post hoc analysis using Tukey's test indicated that patients with normal weight had a significantly shorter hospital stay compared to overweight and obese patients ($p< 0.001$ for all comparisons). However, no significant differences were observed between some adjacent obesity categories. In our cohort of 2205 surgical patients, 646 (29.3%) experienced postoperative complications, while 1559 patients (70.7%) had none. Obese patients showed an increased prevalence of major complications, including surgical site infections, delayed wound healing and wound dehiscence, and respiratory complications, as well as thromboembolic events. Other less frequent complications, such as urinary tract infections, cardiovascular events, acute renal failure, and chronic pain with functional delay, were also observed (Table 3).

Table 3: Distribution of patients according to type of complication

Complication	Result	*p*-value*
Surgical Site Infection	193(29.9)	< 0.001
Delayed Wound Healing	156(24.1)	
Respiratory Complications	146(22.6)	
Other	151(23.4)	
Total	646(100)	

Values are presented as frequency and percentage. *p*-values were calculated using the Chi-square test at $p< 0.05$.

Postoperative complications were significantly more frequent in obese patients than in non-obese patients (33.97% vs. 23.79%). Obesity was associated with increased odds of complications (OR = 1.65, 95% CI: 1.37–1.99) and a higher relative risk (RR = 1.43, 95% CI: 1.25–1.64) (Table 4).

Table 4: Degree of obesity and occurrence of complications

Groups	Complication	No complication	Total
Obese patients	405(33.97)	787(66)	1192
Non-obese patients	241(23.79)	772(76.2)	1013
Total	646(29.3)	1559(70.7)	2205

Values are presented as frequency and percentage.

To control for potential confounding factors, a multivariate binary logistic regression was performed, including age and admission type (emergency vs. elective) as covariates. Obesity remained a significant independent predictor of postoperative complications, with an adjusted odds ratio (aOR: 1.51, 95% CI: 1.24–1.83, $p< 0.001$). Furthermore, a multiple linear regression confirmed that obesity exerted a significant independent effect on the length of hospital stay ($\beta = 0.14$, $p = 0.012$) after adjusting for age and admission type. During the prospective phase of our complementary study, which also aimed to assess the nutritional profile of patients in the two hospital structures under investigation, a total of 234 surgical patients were included between August 1, 2025, and November 30, 2025. These patients were primarily recruited from the general surgery department (142 patients, 60.7%) and the gynecology department (92 patients, 39.3%), reflecting the surgical activity of these services and allowing for a meaningful comparative analysis. Analysis of body mass index (BMI) showed that a significant proportion of patients were overweight or obese. Specifically, 70 patients (29.9%) were classified as overweight, 55 (23.5%) as having moderate obesity (class I), 18 (7.7%) as severe obesity (class II), and 6 (2.6%) as morbid obesity (class III), while 85 patients (36.3%) had a normal BMI, and no patients were underweight. Overall, more than 60% of the study population had a BMI ≥ 25 kg/m², highlighting the high prevalence of overweight and obesity in these departments and emphasizing the importance of appropriate nutritional management during both preoperative preparation and postoperative care. Regarding postoperative complications, 92 patients (39.3%) experienced at least one adverse event. Surgical site infections were the most common (35 patients, 38%), followed by delayed wound healing (22 patients, 24%), respiratory complications (20 patients, 22%), and other miscellaneous complications (15 patients, 16%). BMI-stratified analysis revealed that the vast majority

of patients who developed complications (83 patients, 90%) belonged to the overweight or obese categories (BMI ≥ 25 kg/m²), underscoring the significant impact of excess weight on the risk of postoperative complications and the need for targeted management in this high-risk population. Regarding preoperative nutritional management, the results indicate an almost complete absence of preoperative nutritional consultation. None of the patients undergoing general surgery (0/142) received a consultation or nutritional program prior to surgery. In contrast, in the gynecology department, only 2 out of 92 patients reported having received preoperative nutritional care. Analysis of patient responses revealed low adherence to postoperative nutritional recommendations. Several patients reported not following the prescribed dietary guidelines, citing mainly a lack of information, entrenched eating habits, and socio-economic constraints (Figure 3).

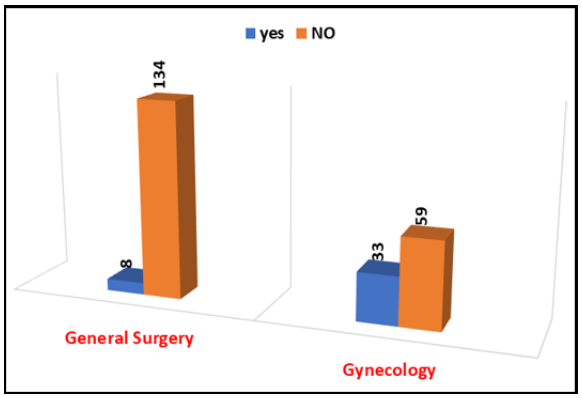

Figure 3: Bar chart of patient adherence to nutritional recommendations.

In the general surgery department, the team consisted of 14 surgeons, 24 nurses, 8 nursing assistants, and 27 anesthetists, with a complete absence of dietitians within the department. In the gynecology department, the team included 15 general practitioners, 4 gynecology specialists, 6 midwives, 4 nurses, 2 nursing assistants, 4 anesthetists, and only one dietitian assigned to the service (Figure 4).

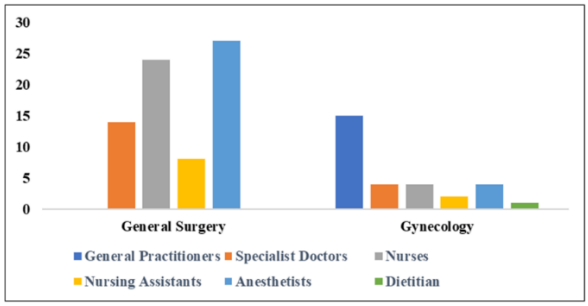

Figure 4: Clustered bar chart of the professional characteristics of the teams.

The majority of the staff surveyed considered nutrition to be an essential component in preventing postoperative complications among obese patients. However, they emphasized that this aspect remains insufficiently integrated into daily practice due to organizational constraints and the lack of specialized personnel. All staff expressed a strong interest in clinical nutrition training, while noting that such training is rarely available in continuing education programs. This gap makes it harder to follow nutritional advice. Additionally, several professionals reported imperfect adherence to dietary programs by hospital catering services, as well as partial non-compliance with medical prescriptions, which may compromise the quality of nutritional management.

DISCUSSION

The present study offers a robust and comprehensive evaluation of nutritional and surgical management, supported by several methodological strengths. Conducted across two hospital institutions and involving specialized departments in gynecology and general surgery, it provides broad clinical coverage. The ambispective design further enhances the reliability of the findings by combining a large retrospective cohort with a prospective phase and a complementary survey of healthcare professionals. Findings indicate a high prevalence of obesity (54.1%) among surgical patients in the studied institutions. This finding reflects a profound transformation in the epidemiological profile, characterized by a significant burden of metabolic disorders. This trend is in line with what is happening around the world, where obesity has become a major factor in perioperative outcomes for many types of surgery, from gastrointestinal to orthopedic [12]. As noted in recent literature, this nutritional transition necessitates a reassessment of surgical risk stratification, as excess adiposity is no longer an outlier but a common clinical reality [13]. In our study, postoperative complications were significantly more frequent in obese patients (33.97%) compared to non-obese patients (23.79%), corresponding to a relative risk (RR) = 1.43 and an odds ratio (OR) = 1.65. These results are consistent with a growing body of evidence indicating that obesity substantially increases the risk of postoperative morbidity. For instance, recent meta-analyses in colorectal and gastric cancer surgery have demonstrated that higher Body Mass Index (BMI) is independently associated with increased rates of surgical site infections, anastomotic leaks, and pulmonary complications [14]. Furthermore, international data from broad surgical populations confirm that even in elective general surgery, obesity remains a primary driver of adverse events [15]. Regarding the length of hospital stay, our results show a higher mean in obese patients (7.99 ± 3.75 days) compared with non-obese patients (7.14 ± 3.36 days). This prolonged hospitalization reflects the complexity of managing postoperative recovery in the presence of metabolic comorbidities. Studies in hepatic resection and spine surgery have similarly reported that obese patients often require more intensive nursing care and have slower functional recovery, leading to increased institutional costs and resource utilization [16,17]. A critical finding of our study is the systemic neglect of nutritional optimization; only 1% of patients received preoperative nutritional management, and 98% of departments lacked dedicated dietitians. This "nutritional vacuum" goes against the ESPEN

practical guidelines, which say that nutritional support before and after surgery is very important for lowering the risk of complications in high-risk patients [18]. The fact that 100% of professionals expressed a need for education highlights a significant opportunity for institutional change. Multimodal prehabilitation, which combines better nutrition with more physical activity, has been shown to greatly improve functional capacity and lower the risk of complications. However, it is still not used enough in our clinical setting [19]. Bridging this gap through multidisciplinary teams, including dietitians and trained clinicians, is imperative to improve the safety and efficacy of surgical care for the obese population [20].

Study Limitations

The present study has several limitations that should be acknowledged. Despite the substantial sample size, its observational design restricts the ability to establish a direct causal relationship between the studied variables. In addition, the study was conducted in only two hospitals within the same geographical region, which may limit the generalizability of the findings at the national level. Furthermore, although the ambispective approach allowed for a comprehensive analysis, the retrospective phase relied on medical records that may be subject to incomplete or missing data, potentially introducing information bias. Finally, the use of a binary BMI classification (Obese *vs*. Non-Obese), in which overweight patients were included within the reference category, may have attenuated the observed effect sizes and therefore produced conservative estimates of the reported odds ratios and relative risks.

Conclusion

This work demonstrates a high prevalence of obesity among surgical patients, significantly associated with increased postoperative complications and prolonged hospital stays. These findings underscore obesity as a major determinant of surgical outcomes, with important implications for patient morbidity and the organization of care. Beyond the well-established pathophysiological impact of excess body weight, our study reveals a concerning gap in the integration of clinical nutrition within the surgical care pathway. The near absence of preoperative nutritional screening, the shortage of specialized human resources, and the lack of targeted training for healthcare professionals point to a structural issue rather than an individual one. These observations emphasize the necessity of an integrated multidisciplinary approach, systematically including preoperative nutritional assessment, strengthening clinical nutrition expertise, and developing standardized protocols guided by international recommendations. In public hospital settings with limited resources, optimizing nutritional management could serve as a strategic lever to reduce postoperative morbidity, improve the quality of care, and make more efficient use of available resources. However, larger-scale prospective interventional studies are needed to assess the tangible impact of implementing structured perioperative nutrition programs on surgical outcomes in the Algerian context.

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Conflict of interests

The authors declared no conflict of interest.

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Data sharing statement

The data that supports the findings of this study are available from the corresponding author upon a reasonable request.

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