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Original Research

Preoperative Nutritional Status and Postoperative Outcomes in Elective Abdominal Surgery: An Observational Study from a Tertiary Care Centre

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Abstract:
Background: Preoperative nutritional status is a critical factor influencing postoperative outcomes in elective abdominal surgery. This study aimed to evaluate the association between preoperative nutritional status and postoperative complications in patients undergoing elective abdominal surgery at a tertiary care center in North-East India.
Methods: This cross-sectional study included 393 patients undergoing elective abdominal surgery. Preoperative nutritional status was assessed using Body Mass Index (BMI) and Subjective Global Assessment (SGA). Postoperative outcomes, including wound complications and length of hospital stay, were evaluated.
Results: The mean age of participants was 41.1 ± 10.6 years, with 62.3% females. Preoperatively, 4.6% of patients were undernourished (BMI <18.5 kg/m²), and 2.0% were severely malnourished (SGA 'C'). Postoperative wound complications occurred in 16.5% of patients. A significant association was found between preoperative nutritional status and wound complications ($p<0.001$). Among undernourished patients, 88.9% experienced complications, compared to 5.1% in the normal BMI group. All severely malnourished patients (SGA 'C') developed complications. The mean length of hospital stay was significantly longer for malnourished patients (16.7 days for SGA 'C' vs 4.5 days for SGA 'A', $p<0.001$).
Conclusion: Preoperative malnutrition is strongly associated with increased postoperative wound complications and prolonged hospital stays in patients undergoing elective abdominal surgery. These findings emphasize the importance of preoperative nutritional assessment and intervention to optimize surgical outcomes.
Key-words: abdominal surgery, BMI, preoperative nutrition, postoperative complications, subjective global assessment

Introduction:

Malnutrition is a complex clinical condition that arises from an imbalance between nutritional intake and metabolic demands, leading to alterations in body composition, diminished body cell mass, and subsequent impairment of physiological and cognitive functions. This nutritional deficiency, particularly in protein and calorie intake, has been widely recognized as a significant determinant of clinical outcomes, influencing both disease progression and recovery. Preoperative nutritional status plays a crucial role in determining postoperative morbidity and mortality, with mounting evidence highlighting its impact on recovery, wound healing, immune function, and overall patient prognosis.Undernutrition may result from multiple etiological factors, including inadequate

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dietary intake, increased metabolic demands associated with an underlying disease, gastrointestinal malabsorption, excessive nutrient losses, or a combination of these conditions. Patients undergoing major abdominal surgery are particularly vulnerable to malnutrition due to the metabolic stress induced by surgical trauma, prolonged preoperative fasting, and the hypermetabolic state that follows surgical interventions. These factors collectively contribute to a catabolic state that may delay recovery, increase the risk of postoperative complications, and prolong hospital stays.[1–3]

Optimal postoperative outcomes necessitate an integrated approach to nutrition, emphasizing preoperative assessment, early intervention, and postoperative nutritional support. Proper nutritional status is vital for maintaining immune competence and promoting wound healing, both of which are fundamental to ensuring a favorable surgical outcome. Malnutrition has been identified as an independent predictor of postoperative morbidity and mortality, underscoring the necessity for early screening and targeted nutritional interventions. Current guidelines advocate for the routine screening of nutritional status in the preoperative period, incorporating risk stratification strategies to identify patients at heightened risk of adverse outcomes.[3–5]

Given the critical implications of malnutrition in surgical outcomes, this study aims to evaluate the preoperative nutritional status of patients undergoing elective abdominal surgery and explore its association with postoperative recovery in a tertiary care centre in North-East India. By assessing the prevalence of malnutrition and its impact on surgical outcomes, this study seeks to contribute valuable insights into the necessity of preoperative nutritional screening and intervention strategies in optimizing patient care.

Material and Methods:

Study design& setting

This study was a hospital based cross-sectional study, conducted fromFebruary 2023 to June 2024 in the Department of General Surgery of Agartala Government MedicalCollege (AGMC), Agartala, Tripura.

Selection criteria

All eligible adult patients aged between 18- and 60-years undergoing elective abdominal surgeries in the Department of General Surgery Agartala Government Medical College and GB Pant Hospital, Agartala, West Tripura. Patients undergoing emergency surgeries, who had received preoperative parenteral nutrition or were taking immunosuppressive and/or anti-coagulant drugs, who underwent an operation during the preceding year or exploratory laparotomy because of advanced tumours were excluded from this study. Patients were also excluded if they had a chronic disabling disease that required nursing help, could not participate in the interviews, were lost to follow up, or were pregnant or nursing at the time of study.

Sample size

A total of 393 cases ofelective abdominal surgeries managed in the Department of Surgery of Agartala Government Medical College were considered as final sample size considering the inclusion and exclusion criteria.

Study procedure& data collection

Demographic variables, including age, sex, and socioeconomic status, were collected through structured, interviewer-administered questionnaires at the time of admission. Clinical data, such as past medical and surgical history and gastrointestinal symptoms, were obtained through a review of medical records. With informed consent, anthropometric and biochemical data were collected during the preoperative period. Follow-up assessments were conducted on the 3rd and 5th postoperative days, at discharge, and on postoperative day 30 in the surgical outpatient department. Preoperative nutritional status was evaluated using Body Mass Index (BMI) and Subjective Global Assessment (SGA).

Malnutrition was assessed using Body Mass Index (BMI) and Subjective Global Assessment (SGA). BMI was calculated as body weight (kg) divided by height squared (m^2), with the Asian BMI classification applied in this study.[6,7] SGA, a standardized screening tool, categorized nutritional status into three groups: well-nourished (Grade A), suspected or moderate malnutrition (Grade B), and severe malnutrition (Grade C). The assessment incorporated both medical history and physical examination. The history focused on weight changes, dietary intake, gastrointestinal symptoms, functional capacity, and underlying medical conditions. The physical examination evaluated clinical signs of malnutrition, including loss of subcutaneous fat, muscle wasting, edema, and ascites, with severity graded from “none” to “severe.” Based on these findings, patients were classified into one of the three nutritional status categories.[8]

Postoperative wound healing was assessed using a standardized wound healing checklist. Complications observed during hospitalization were classified into seroma, hematoma, wound infection, and wound dehiscence. Seroma was defined as the collection of serous fluid beneath the skin without signs of infection, whereas hematoma referred to the accumulation of subcutaneous blood in the absence of infection. Wound infection was identified based on the presence of at least two of the following clinical signs: purulent discharge, erythema, increased pain, induration, and fever. Wound dehiscence was defined as wound breakdown due to hematoma, seroma, or infection, necessitating reopening, evacuation, irrigation, debridement, and secondary healing.

The length of hospital stay (LOS) was recorded from the day of surgery until the patient was discharged. All patients were monitored on postoperative day (POD)

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3, POD 5, at the time of discharge, and on POD 30. During these follow-up visits, the duration of postoperative hospitalization and the occurrence of any major complications were documented.

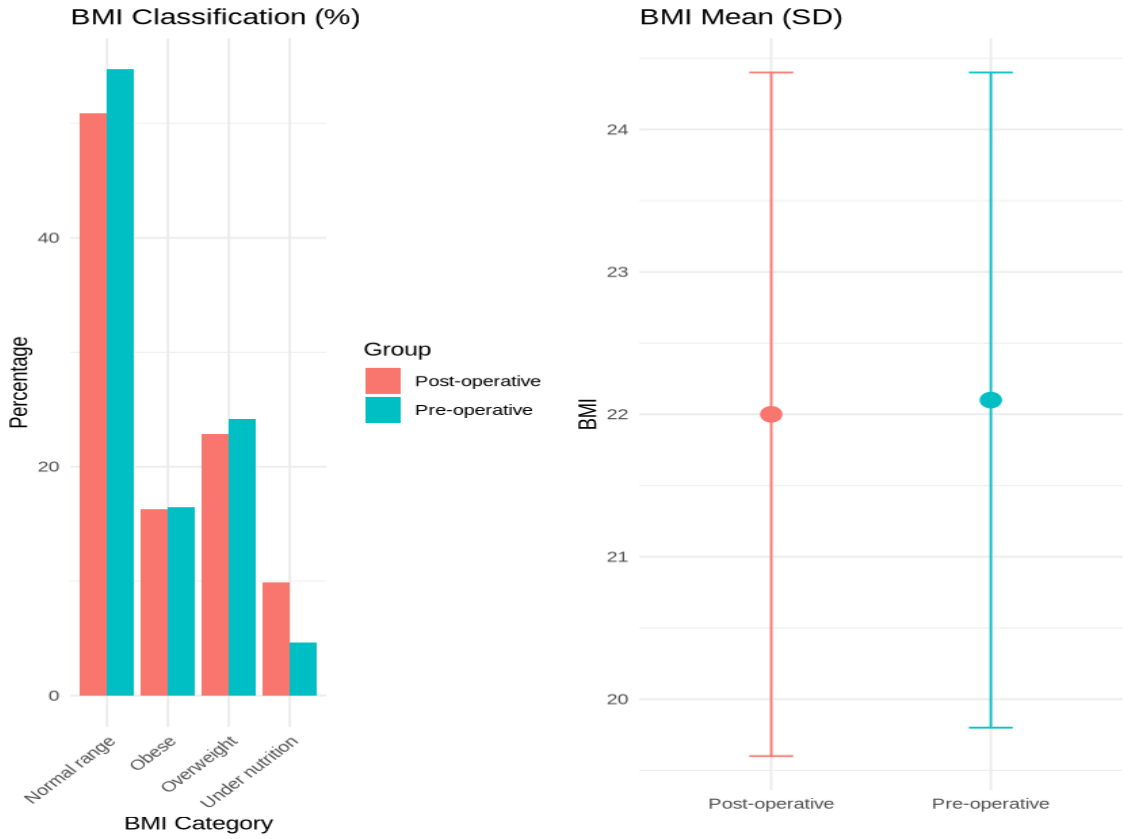
Data analysis

Data entry and analysis were performed using SPSS. Qualitative variables were presented as frequencies and percentages, while quantitative variables were summarized as means with standard deviations for normally distributed data and medians with ranges for skewed data. Inferential statistics included the chi-square test for categorical variables and ANOVA for continuous variables. A p-value of <0.05 was considered statistically significant.

Results:

The mean age of the study population was 41.1 ± 10.6 years, with an age range of 20 to 60 years. The majority of participants were in the 51–60-year age group. The cohort had a higher proportion of females, accounting for 62.3% (245/393), while males comprised 37.7% (148/393). Preoperative assessment revealed a mean body mass index (BMI) of 22.1 ± 2.3 kg/m². Among the participants, 18 (4.6%) had a BMI below 18.5 kg/m², indicating undernutrition. A total of 215 (54.7%) participants had a BMI within the normal range, while 95 (24.2%) were classified as overweight and 65 (16.5%) as obese. Postoperatively, the mean BMI was 22.0 ± 2.4 kg/m². The distribution of BMI categories changed slightly, with 39 patients (9.9%) classified as undernourished, 200 (50.9%) falling within the normal range, 90 (22.9%) categorized as overweight, and 64 (16.3%) classified as obese.

Figure 1: Comparison of BMI between pre and post-operative condition



Nutritional status, assessed using the Subjective Global Assessment (SGA) score, showed that before surgery, 336 patients (85.5%) were categorized as well-nourished (SGA 'A'), 49 patients (12.5%) as suspected or moderately malnourished (SGA 'B'), and 8 patients (2.0%) as severely malnourished (SGA 'C'). the majority of patients were well-nourished (SGA 'A'), representing 345 patients (87.8%). A smaller proportion were identified as suspected or moderately malnourished (SGA 'B') at 42 patients (10.7%), and 6 patients (1.5%) were classified as severely malnourished (SGA 'C'). Following surgery, the SGA score distribution indicated that

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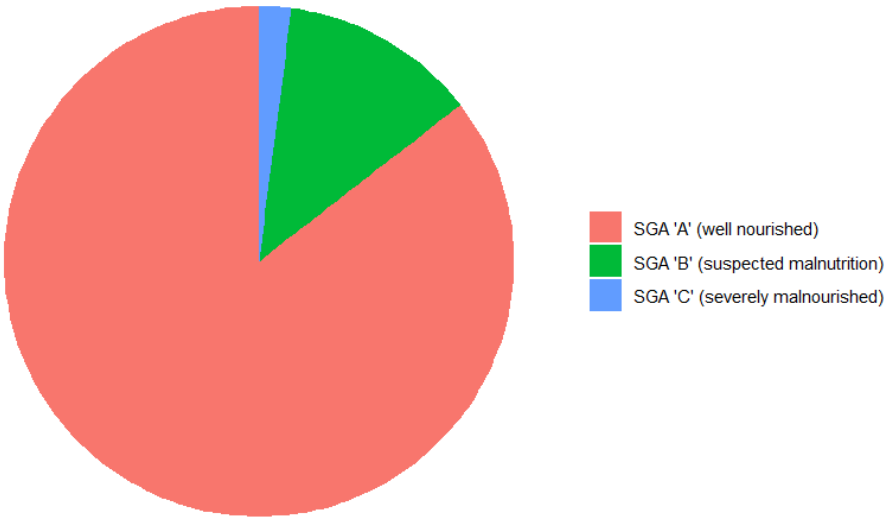
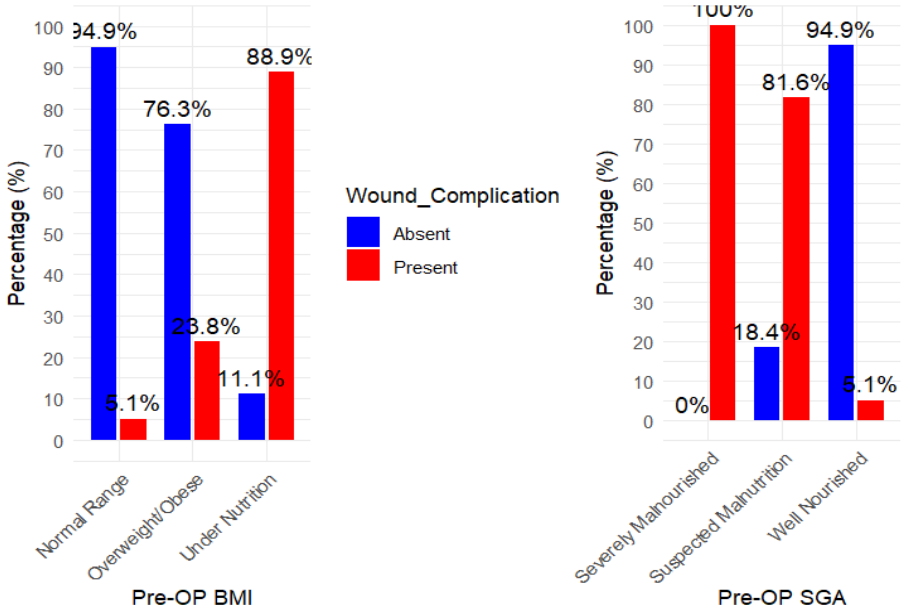
Figure 2: Distribution of patients based on post-op nutritional status by SGA



Out of the total patients, 65 (16.5%) experienced wound complications. Among these, 29 patients developed seroma, 27 patients had a surgical site infection, and 9 patients experienced wound dehiscence.There was a significant association (p-value<0.001) between pre-operative BMI, Subjective Global Assessment (SGA), and post-operative occurrence of wound complications. Among patients with undernutrition, 88.9% (16/18) experienced wound complications compared to 11.1% (2/18) who did not, while in the normal BMI group, only 5.1% (11/215) had complications versus 94.9% (204/215) without. For overweight/obese patients, 23.8% (38/160) experienced complications, while 76.3% (122/160) did not. In terms of nutritional status assessed by SGA, 5.1% (17/336) of well-nourished patients (SGA 'A') had wound complications compared to 94.9% (319/336) who did not. Conversely, 81.6% (40/49) of moderately malnourished patients (SGA 'B') experienced complications, while 18.4% (9/49) did not. Notably, all eight patients (100%) categorized as severely malnourished (SGA 'C') developed wound complications. The data indicate a clear association between nutritional status (both BMI and SGA) and the prevalence of post-operative wound complications, with higher complication rates observed in under-nourished and severely malnourished patients.

Figure 3: Wound complications based on post-op nutritional status



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The mean length of stay in the post-operative period was 5.46 ± 4.28 days. Stratified by SGA categories, the mean duration of stay was 4.5 ± 3.3 days for patients in SGA group A, 10.1 ± 4.4 days in SGA group B, and 16.7 ± 1 day in SGA group C, with a statistically significant difference observed between the groups ($p < 0.001$).

Discussion:

The present study's findings underscore the critical role of preoperative nutritional status in determining postoperative wound complications for patients undergoing elective abdominal surgery. The research utilized both Body Mass Index (BMI) and Subjective Global Assessment (SGA) to evaluate nutritional status, revealing a significant correlation between these measures and the incidence of wound complications.

Undernourished patients exhibited the highest complication rates (88.9%). Also Notably, all eight patients (100%) categorized as severely malnourished (SGA C) had complications, highlighting the detrimental effects of malnutrition on surgical outcomes. This aligns with previous research indicating that malnourished individuals are more susceptible to poor surgical outcomes due to impaired immune response, delayed wound healing, and reduced collagen synthesis.[9–11] The substantial risk among undernourished patients highlights the importance of early nutritional intervention to mitigate adverse outcomes. Though incidence of post operative complications was high among the malnourished not association was found by Thomas et al., House et al. and Akula et al.[12–14]

Conversely, patients with normal BMI showed the lowest complication rates (5.1%), emphasizing the protective effect of optimal nutritional status. These findings are consistent with previous studies, which reported lower infection rates and improved recovery in well-nourished individuals.[10,14]The research indicated that patients who were overweight or obese had a complication rate of 23.8%, which was higher than those with a normal BMI but lower than that of undernourished individuals. This finding aligns with existing evidence suggesting that excess body fat can hinder wound healing by reducing blood supply and increasing inflammation.[15]

Our data demonstrate that severely malnourished patients spent significantly more time in the hospital (mean 16.7 days) compared to well-nourished individuals (mean 4.5 days), further supporting these observations. Prior research found that malnourished surgery patients have longer hospital stays as a result of greater incidence of complications.[10,16,17]These results collectively emphasize the importance of comprehensive preoperative nutritional assessment and intervention strategies to optimize surgical outcomes and reduce postoperative complications.The present study contributes to the growing body of evidence supporting the integration of nutritional screening and management into preoperative care protocols. By identifying patients at high risk for postoperative complications based on their nutritional status, healthcare providers can implement targeted interventions to improve outcomes.

Strengths and limitations

The strengths of this study include its large sample size and the use of a standardized scale to evaluate nutritional status. Nonetheless, there are limitations. The observational nature of the study limits the ability to establish causal relationships, and the single-center design may affect the generalizability of the findings. Additionally, factors that could have influenced the outcomes, such as variations in surgical complexity and adherence to postoperative care, were not accounted for. To address these limitations, future research should involve multicenter studies with a more diverse participant group and a broader inclusion of nutritional biomarkers.

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