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IMPACT OF PREOPERATIVE NUTRITIONAL STATUS ON POSTOPERATIVE OUTCOMES IN PATIENTS UNDERGOING SURGERY FOR GASTROINTESTINAL MALIGNANCIES: A PROSPECTIVE OBSERVATIONAL STUDY FROM A TERTIARY CARE CENTER IN NORTH INDIA

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ABSTRACT

Background: Malnutrition is a common yet under-recognized problem among patients with gastrointestinal malignancies and has been associated with poor surgical outcomes. Its impact in resource-limited tertiary care settings remains inadequately studied.

Objectives: To assess the impact of preoperative nutritional status on postoperative outcomes among patients undergoing surgery for gastrointestinal malignancies.

Methods: A prospective observational study was conducted at a tertiary care hospital in North India from February 2020 to June 2020, including 56 patients with histopathologically confirmed gastrointestinal malignancies. Nutritional status was assessed preoperatively using Body Mass Index (BMI), serum albumin levels, and Subjective Global Assessment (SGA). Patients were categorized into well-nourished and malnourished groups. Postoperative outcomes including complications, length of hospital stay, ICU admission, and wound healing were recorded. Statistical analysis was performed using SPSS version 23.0, with $p<0.05$ considered significant.

Results: Of the 56 patients, 46.4% were malnourished based on SGA criteria. Malnourished patients had a significantly higher rate of postoperative complications compared to well-nourished patients (50.0% vs 20.0%, p=0.018). The mean duration of hospital stay was significantly longer in malnourished patients (10.1 ±3.4 days) compared to well-nourished patients (7.2 ±2.1 days, p=0.003). Additionally, ICU admission (42.3% vs 13.3%, p=0.021) and delayed wound healing (46.2% vs 16.7%, p=0.015) were more frequent among malnourished individuals.

Conclusion: Preoperative malnutrition is significantly associated with poorer postoperative outcomes in patients with gastrointestinal malignancies. Routine nutritional assessment and timely intervention should be incorporated into perioperative care to improve surgical outcomes.

Keywords: gastrointestinal malignancies; malnutrition; postoperative complications; nutritional status; surgical outcomes; SGA

INTRODUCTION

Gastrointestinal (GI) malignancies constitute a major global health burden, accounting for a substantial proportion of cancer-related morbidity and mortality worldwide. Cancers of the esophagus, stomach, pancreas, liver, and colorectum collectively represent a significant share of oncological diseases, with rising incidence in both developed and developing countries [1]. Surgical resection remains the cornerstone of curative treatment for many GI malignancies; however,

postoperative outcomes are often compromised by various patient-related and disease-related factors, among which nutritional status plays a critical role [2].

Malnutrition is highly prevalent among patients with GI cancers due to tumor-induced metabolic alterations, reduced oral intake, malabsorption, and treatment-related side effects [3]. Studies suggest that up to 50–80% of patients with gastrointestinal malignancies exhibit some degree of malnutrition at the time of diagnosis or prior to surgical intervention [4]. This compromised nutritional status has been consistently associated with impaired immune function, delayed wound healing, increased susceptibility to infections, and prolonged hospital stay, ultimately affecting postoperative recovery and survival outcomes [5].

In low- and middle-income countries such as India, the burden of malnutrition is compounded by socioeconomic constraints, delayed diagnosis, and limited access to specialized nutritional support [6]. North India, in particular, reports a high incidence of upper GI malignancies, with many patients presenting at advanced stages accompanied by significant weight loss and cachexia [7]. Despite advances in perioperative care, postoperative complications such as surgical site infections, anastomotic leaks, and prolonged ileus remain common, contributing to increased healthcare costs and patient morbidity [8].

Assessment of nutritional status using standardized tools such as Body Mass Index (BMI), serum albumin levels, and subjective global assessment (SGA) has been advocated to identify high-risk patients preoperatively [9]. Early identification and intervention through nutritional optimization may improve surgical outcomes; however, the extent of its impact in resource-limited tertiary care settings remains inadequately explored. Existing literature predominantly originates from high-income countries, with limited data reflecting the Indian population, particularly from northern regions.

Furthermore, variations in dietary patterns, healthcare infrastructure, and patient demographics necessitate region-specific studies to better understand the relationship between nutritional status and postoperative outcomes. There remains a significant research gap regarding the quantification of this association in small-scale, real-world hospital settings where constraints in resources may influence both nutritional assessment and postoperative care strategies.

Given this background, it is imperative to evaluate the impact of preoperative nutritional status on postoperative outcomes among patients undergoing surgery for GI malignancies in a tertiary care hospital in North India. Such evidence may guide clinicians in implementing targeted nutritional interventions and improving perioperative management protocols.

The present study aims to assess the association between nutritional status and postoperative outcomes, including complications, duration of hospital stay, and recovery profile, among patients undergoing surgical treatment for gastrointestinal malignancies.

METHODOLOGY

Study Design: This was a hospital-based observational analytical study with a prospective cohort design, conducted to evaluate the impact of preoperative nutritional status on postoperative outcomes among patients with gastrointestinal malignancies.

Study Setting: The study was carried out in the Department of General Surgery at a tertiary care hospital in North India, catering to a large population from both urban and rural areas and serving as a referral center for oncological surgeries.

Study Duration: The study was conducted over a period of five months, from February 2020 to June 2020.

Study Population: The study population comprised patients diagnosed with gastrointestinal malignancies who were admitted for elective surgical intervention during the study period.

Inclusion Criteria

Patients aged ≥18 years
Histopathologically confirmed gastrointestinal malignancy (esophageal, gastric, pancreatic, colorectal, hepatobiliary)
Patients planned for elective curative or palliative surgery
Patients providing informed written consent

Exclusion Criteria

Patients undergoing emergency surgeries
Patients with recurrent malignancy or previous major abdominal surgery within the last 6 months
Patients with severe comorbid conditions (e.g., advanced cardiac, renal, or hepatic failure)
Patients on preoperative nutritional supplementation programs or immunonutrition therapy
Patients unwilling to participate

Sample Size: The sample size was calculated using the formula for estimating a proportion in observational studies:

$$n = \frac{Z^2 \times p \times q}{d^2}$$

Where:

Z = 1.96 (for 95% confidence interval)
p = anticipated prevalence of malnutrition among GI cancer patients (assumed 60% based on prior studies)
q = 1 – p = 40%
d = allowable error of 13%

The calculated sample size was approximately 54. Considering feasibility and rounding, a total of 56 patients were included in the study.

Sampling Technique: A consecutive sampling technique was employed, wherein all eligible patients meeting the inclusion criteria during the study period were enrolled until the required sample size was achieved.

Data Collection Tools & Procedure: Data were collected using a predesigned, semi-structured proforma. Baseline demographic details, clinical history, and tumor characteristics were recorded. Nutritional status was assessed preoperatively using objective parameters including Body Mass Index (BMI) and serum albumin levels, along with Subjective Global Assessment (SGA). Patients were categorized into well-nourished and malnourished groups based on standard cut-offs (BMI <18.5 kg/m², serum albumin <3.5 g/dL, and SGA classification). Postoperative outcomes were monitored during hospital stay, including occurrence of complications (surgical site infection, anastomotic leak, pulmonary complications), duration of hospital stay, and need for intensive care support. Patients were followed until discharge.

Study Variables: The primary independent variable was preoperative nutritional status, assessed using BMI, serum albumin, and SGA classification. Dependent variables included postoperative outcomes such as incidence of complications (categorical), length of hospital stay (continuous), and recovery indicators including need for ICU admission and delayed wound healing. Covariates such

as age, sex, type of malignancy, and comorbidities were also recorded to control for potential confounding.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 23.0. Descriptive statistics were used to summarize demographic and clinical characteristics. Continuous variables were expressed as mean ±standard deviation, while categorical variables were presented as frequencies and percentages. The association between nutritional status and postoperative outcomes was assessed using Chi-square test or Fisher's exact test for categorical variables and independent t-test for continuous variables. A p-value of <0.05 was considered statistically significant.

Ethical Considerations: Written informed consent was obtained from all participants prior to enrollment. Confidentiality and anonymity of patient data were maintained throughout the study. The study adhered to the ethical principles outlined in the Declaration of Helsinki for research involving human subjects.

RESULTS

A total of 56 patients were included in the study, with the majority aged ≥50 years and a male predominance (Table 1)

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants (n = 56)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	<50	18	32.1
	≥50	38	67.9
Gender	Male	34	60.7
	Female	22	39.3
Type of Malignancy	Upper GI	31	55.4
	Lower GI	25	44.6
Comorbidities	Present	21	37.5
	Absent	35	62.5

Upper gastrointestinal malignancies were slightly more common than lower GI malignancies. Approximately one-third of the patients were underweight, and nearly half were classified as malnourished based on Subjective Global Assessment (Table 2)

Table 2: Preoperative Nutritional Status of Patients (n = 56)

Parameter	Category	Frequency (n)	Percentage (%)
BMI (kg/m²)	<18.5 (Underweight)	20	35.7
	≥18.5 (Normal/Overweight)	36	64.3
Serum Albumin (g/dL)	<3.5	24	42.9
	≥3.5	32	57.1
SGA Classification	Well-nourished (A)	30	53.6
	Malnourished (B & C)	26	46.4

A statistically significant association was observed between poor nutritional status and increased postoperative complications. Malnourished patients had a higher complication rate compared to well-nourished patients (Table 3).

Table 3: Association Between Nutritional Status and Postoperative Complications (n = 56)

Nutritional Status (SGA)	Complications Present (n, %)	Complications Absent (n, %)	p-value
Well-nourished (n=30)	6 (20.0%)	24 (80.0%)	0.018*
Malnourished (n=26)	13 (50.0%)	13 (50.0%)	

*Statistically significant (Chi-square test, $p<0.05$)

Additionally, malnourished patients experienced a significantly longer duration of hospital stay (Table 4).

Table 4: Comparison of Length of Hospital Stay Based on Nutritional Status (n = 56)

Nutritional Status (SGA)	Mean Hospital Stay (days) ± SD	p-value
Well-nourished	7.2 ± 2.1	0.003*
Malnourished	10.1 ± 3.4	

*Statistically significant (Independent t-test, $p<0.05$)

Indicators of postoperative recovery further demonstrated worse outcomes among malnourished individuals, including higher rates of ICU admission and delayed wound healing (Table 5)

Table 5: ICU Requirement and Recovery Indicators by Nutritional Status (n = 56)

Outcome Variable	Well-nourished (n=30)	Malnourished (n=26)	p-value
ICU Admission (n, %)	4 (13.3%)	11 (42.3%)	0.021*
Delayed Wound Healing	5 (16.7%)	12 (46.2%)	0.015*

*Statistically significant (Chi-square test, $p<0.05$)

DISCUSSION

The present study evaluated the impact of preoperative nutritional status on postoperative outcomes among patients undergoing surgery for gastrointestinal malignancies in a tertiary care setting in North India. The key findings indicate that nearly half of the study population was malnourished, and poor nutritional status was significantly associated with increased postoperative complications, prolonged hospital stay, higher ICU admissions, and delayed wound healing.

The prevalence of malnutrition observed in this study (46.4% by SGA) is consistent with earlier reports indicating a high burden of malnutrition among patients with GI malignancies [3,4]. Cancer-related cachexia, reduced oral intake, and metabolic derangements contribute to this high prevalence. Similar findings have been reported in Western populations, where malnutrition rates among GI cancer patients range from 40% to 80% [4]. This highlights that malnutrition is a universal concern, irrespective of geographic region, although it may be exacerbated in low-resource settings such as India due to delayed presentation and socioeconomic factors [6].

A significant association between malnutrition and postoperative complications was demonstrated in this study, with malnourished patients exhibiting a higher complication rate. This aligns with the findings of previous studies, which have shown that hypoalbuminemia and poor nutritional reserves impair immune response and wound healing, thereby increasing susceptibility to infections and surgical complications [5,8]. The biological plausibility of this association lies in the role of adequate nutrition in maintaining tissue integrity, collagen synthesis, and host defense mechanisms.

The study also found that malnourished patients had a significantly longer hospital stay compared to their well-nourished counterparts. This observation is supported by earlier research demonstrating

that malnutrition is an independent predictor of prolonged hospitalization due to delayed recovery and increased complication rates [2]. Prolonged hospital stay not only reflects poorer clinical outcomes but also imposes an additional economic burden on both patients and healthcare systems, particularly in resource-limited settings.

Furthermore, the requirement for ICU admission and the incidence of delayed wound healing were significantly higher among malnourished patients. These findings are in agreement with prior studies emphasizing that nutritional deficits compromise physiological resilience, thereby increasing the likelihood of postoperative morbidity and need for intensive care support [8]. The consistency of these findings across multiple outcome measures strengthens the evidence for a strong association between nutritional status and surgical outcomes.

From a clinical perspective, these findings underscore the importance of routine preoperative nutritional assessment in patients with GI malignancies. Tools such as SGA, BMI, and serum albumin are simple, cost-effective, and feasible in most tertiary care settings. Early identification of malnourished patients allows for timely nutritional intervention, which may include dietary counseling, enteral supplementation, or parenteral nutrition when indicated. Incorporating nutritional optimization into standard preoperative protocols could potentially reduce postoperative complications and improve overall outcomes.[10,11]

The study has several strengths. It adopts a prospective design, allowing for systematic data collection and temporal assessment of outcomes. The use of multiple parameters (BMI, serum albumin, and SGA) provides a comprehensive evaluation of nutritional status. Additionally, the study reflects real-world clinical practice in a tertiary care hospital in North India, thereby enhancing its contextual relevance.

However, certain limitations must be acknowledged. The relatively small sample size (n=56) may limit the generalizability of the findings. The study was conducted at a single center, which may introduce selection bias. Additionally, long-term outcomes such as survival and quality of life were not assessed. The study also did not evaluate the effect of specific nutritional interventions, which could be an area for future research.

Future studies with larger, multicentric cohorts and interventional designs are warranted to further validate these findings and assess the impact of targeted nutritional therapy on postoperative outcomes. Integration of nutritional care into enhanced recovery after surgery (ERAS) protocols may also be explored.

CONCLUSION

This study demonstrates a significant association between poor preoperative nutritional status and adverse postoperative outcomes in patients undergoing surgery for gastrointestinal malignancies. Nearly half of the patients were identified as malnourished, and this group exhibited higher rates of postoperative complications, increased need for intensive care, delayed wound healing, and prolonged hospital stay. These findings highlight the critical role of nutritional status as a modifiable risk factor influencing surgical outcomes.Routine preoperative nutritional assessment using simple and cost-effective tools such as BMI, serum albumin, and Subjective Global Assessment should be integrated into standard surgical care protocols. Early identification of at-risk patients allows for timely nutritional optimization, which may contribute to improved recovery and reduced morbidity. Given the resource constraints in many tertiary care settings in India, incorporating structured nutritional interventions could have substantial clinical and economic benefits. Further large-scale and interventional studies are recommended to validate these findings and establish standardized nutritional management guidelines in surgical oncology.

DECLARATIONS

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Conflict of Interest: The authors declare no conflict of interest.

Consent: Written informed consent was obtained from all participants.

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