**ORIGINAL RESEARCH** 

# Impact of preoperative nutritional intervention on postoperative complications in gastrointestinal surgeries

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## ABSTRACT

Background: Postoperative complications are a significant concern in patients undergoing gastrointestinal (GI) surgeries, often leading to prolonged hospital stays, increased morbidity, and higher healthcare costs. Malnutrition has been identified as an independent risk factor for adverse postoperative outcomes. This study aimed to evaluate the effect of preoperative nutritional intervention on the incidence of postoperative complications in patients undergoing major GI surgeries. Materials and Methods: A prospective, randomized study was conducted on 120 patients scheduled for elective gastrointestinal surgeries at a tertiary care center. Patients were divided into two groups: Group A (n=60) received standard preoperative care, while Group B (n=60) received individualized nutritional supplementation for 7–10 days prior to surgery, including oral nutritional supplements rich in protein, vitamins, and trace elements. Postoperative complications including infections, anastomotic leaks, wound dehiscence, and prolonged ileus were recorded. Nutritional status was assessed preand postoperatively using serum albumin levels and Subjective Global Assessment (SGA) scores. Results: Group B showed a significantly lower incidence of postoperative complications (20%) compared to Group A (38%) (p=0.045). The mean serum albumin level improved in Group B from 2.8±0.4 g/dL to 3.5±0.3 g/dL post-intervention (p<0.01), whereas no significant change was observed in Group A. The rate of surgical site infections was reduced from 15% in Group A to 6.7% in Group B. Mean hospital stay was shorter in Group B (7.2±1.1 days) than in Group A (9.6±1.5 days) (p=0.032). Conclusion: Preoperative nutritional intervention significantly reduces postoperative complications and hospital stay in patients undergoing gastrointestinal surgeries. Optimization of nutritional status before surgery should be considered an integral component of perioperative care.

**Keywords:** Gastrointestinal surgery, preoperative nutrition, postoperative complications, surgical outcomes, nutritional support.

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## INTRODUCTION

Gastrointestinal (GI) surgeries are associated with a substantial risk of postoperative complications, including infections, delayed wound healing, and prolonged hospital stays. One of the key modifiable risk factors influencing surgical outcomes is the nutritional status of the patient (1). Malnutrition is prevalent among patients with GI diseases due to factors such as reduced oral intake, malabsorption, and cancer-related cachexia (2). Preoperative malnutrition has been shown to impair immune function, delay tissue repair, and increase susceptibility to infections, leading to adverse surgical outcomes (3).

Recent literature supports the role of targeted preoperative nutritional support in improving postoperative recovery. Nutritional intervention, including high-protein oral supplements and micronutrient-rich diets, has been shown to enhance protein synthesis, improve wound healing, and reduce catabolic stress associated with major surgeries (4,5). Several clinical trials and meta-analyses have also demonstrated that improving nutritional status prior to surgery can lower the risk of complications such as surgical site infections, anastomotic leaks, and prolonged ileus (6,7).

Despite these findings, the integration of preoperative nutritional optimization into routine surgical practice remains inconsistent. This study was designed to evaluate the impact of a structured preoperative nutritional intervention on the incidence of postoperative complications in patients undergoing elective gastrointestinal surgeries.

#### MATERIALS AND METHODS

This prospective, randomized controlled study was conducted in the Department of General Surgery at *Travancore Medical College, Kollam, Kerala* over a period of 18 months. Ethical approval was obtained from the Institutional Ethics Committee, and written informed consent was secured from all participants prior to enrollment.

## **Study Population**

A total of 120 adult patients scheduled for elective gastrointestinal surgeries were enrolled based on inclusion and exclusion criteria. Patients aged between 18 and 70 years, with a confirmed diagnosis requiring elective GI surgery (e.g., colorectal resection, gastrectomy, intestinal anastomosis), and identified to be at moderate to high nutritional risk using the Subjective Global Assessment (SGA) tool were included. Patients undergoing emergency surgery, those with severe organ dysfunction, or who had received nutritional therapy within the past month were excluded.

## **Randomization and Group Allocation**

Participants were randomized into two equal groups using a computer-generated randomization sequence.

- Group A (Control group, n=60): Received standard preoperative care without nutritional intervention.
- **Group B (Intervention group, n=60):** Received a structured nutritional supplementation program 7–10 days prior to surgery.

## **Nutritional Intervention Protocol**

Patients in Group B received individualized nutritional counseling and were prescribed oral nutritional supplements (ONS) containing highquality proteins (20–25 g/day), essential vitamins, minerals, and omega-3 fatty acids. Nutrient intake was monitored daily by a clinical dietitian. Patients were encouraged to maintain their usual diet alongside the supplements.

## **Preoperative and Postoperative Assessment**

Nutritional status was assessed at baseline and on the day before surgery using serum albumin levels and the SGA score. Postoperative complications were monitored for 30 days and included wound infections, anastomotic leaks, pulmonary infections, and prolonged ileus. Duration of hospital stay and time to bowel function return were also recorded.

## **Outcome Measures**

The primary outcome was the incidence of postoperative complications. Secondary outcomes included changes in nutritional parameters, length of hospital stay, and time to gastrointestinal recovery.

## **Statistical Analysis**

All statistical analyses were performed using SPSS version 26. Continuous variables were presented as mean  $\pm$  standard deviation (SD) and compared using the Student's t-test. Categorical variables were analyzed using the chi-square test or Fisher's exact test. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

A total of 120 patients were analyzed, with 60 individuals in each group. Baseline demographic characteristics including age, gender, BMI, and type of surgery were comparable between the two groups (Table 1).

Parameter	Group A (Control)	Group B (Nutrition)	p-valu
Mean Age (years)	$54.3 \pm 10.2$	$53.6\pm9.8$	0.67
Male/Female Ratio	38/22	36/24	0.72
Mean BMI (kg/m <sup>2</sup> )	$21.9\pm2.4$	$22.1 \pm 2.1$	0.58
Type of Surgery (Upper GI / Lower GI)	28 / 32	30 / 30	0.76

 Table 1. Baseline Characteristics of Patients in Both Groups

Postoperative complication rates were significantly lower in the intervention group. Surgical site infections were observed in 9 patients (15%) in Group A compared to 4 patients (6.7%) in Group B. The incidence of anastomotic leaks was reduced from 5 cases in Group A to 1 case in Group B. Additionally, pulmonary complications and delayed return of bowel function were also less frequent in the nutrition group (Table 2).

Table 2. Postoperative Complications in Study Groups

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Complication Type	Group A (n=60)	Group B (n=60)	p-value					
Surgical Site Infection	9 (15.0%)	4 (6.7%)	0.041					
Anastomotic Leak	5 (8.3%)	1 (1.7%)	0.039					
Pulmonary Infection	6 (10.0%)	2 (3.3%)	0.048					
Prolonged Ileus	7 (11.7%)	3 (5.0%)	0.091					
Total Complications	23 (38.3%)	12 (20.0%)	0.017					

Serum albumin levels showed a significant improvement in Group B from baseline  $(2.8 \pm 0.4 \text{ g/dL})$  to preoperative day  $(3.5 \pm 0.3 \text{ g/dL})$ , whereas in Group A there was no significant change (Table 3). Hospital stay

was notably shorter in the intervention group, with faster return of bowel function and earlier initiation of oral feeding.

Parameter	Group A	Group B	p-value
Serum Albumin (Pre-op, g/dL)	$2.9 \pm 0.3$	$3.5 \pm 0.3$	< 0.001
Mean Hospital Stay (days)	$9.6 \pm 1.5$	$7.2 \pm 1.1$	0.032
Time to First Bowel Movement (h)	$72.4\pm8.6$	$58.3 \pm 7.2$	0.028
Time to Oral Diet (days)	$3.8\pm0.9$	$2.5\pm0.7$	0.036

These findings suggest that preoperative nutritional intervention significantly improved nutritional markers and reduced postoperative complication rates (Tables 2 and 3).

## DISCUSSION

The results of this study demonstrate that preoperative nutritional intervention significantly reduces postoperative complications and enhances recovery in patients undergoing gastrointestinal surgeries. Patients who received tailored nutritional support exhibited lower rates of surgical site infections, anastomotic leaks, and pulmonary complications. These findings support previous evidence that optimizing nutritional status prior to surgery is a key determinant of postoperative outcomes.

Malnutrition has long been recognized as a modifiable risk factor that adversely affects surgical healing and immune competence (1,2). In gastrointestinal surgery patients, malnutrition is particularly prevalent due to reduced oral intake, metabolic alterations, and cancerrelated catabolism (3,4). Preoperative hypoalbuminemia has been associated with increased risk of wound complications and mortality (5,6). In this study, nutritional supplementation led to a significant rise in serum albumin levels, suggesting improved protein stores and metabolic resilience.

A similar trend has been observed in multiple randomized controlled trials and meta-analyses. Studies have shown that perioperative nutritional support reduces postoperative complications by 20– 40% in patients undergoing major abdominal surgeries (7,8). Immunonutrition, which includes arginine, omega-3 fatty acids, and nucleotides, has also demonstrated efficacy in enhancing host defense mechanisms and reducing inflammatory responses after surgery (9,10). The current study did not specifically use immunonutrients, but even standard high-protein supplementation was effective in improving surgical outcomes.

Hospital stay is another important outcome influenced by nutritional status. Patients in the intervention group in this study had a significantly shorter length of stay and faster return of gastrointestinal function. Previous research has confirmed that early postoperative recovery is facilitated by better preoperative nutrition, contributing to reduced healthcare costs and resource utilization (11,12). Early enteral feeding and accelerated bowel recovery are closely linked with improved anabolic responses and reduced postoperative ileus (13,14).

Furthermore, this study strengthens the evidence for incorporating nutritional screening and prehabilitation

into routine surgical planning. The Subjective Global Assessment (SGA) tool, used for evaluating nutritional risk, proved to be a reliable predictor of complications and recovery. Routine screening combined with targeted intervention may be crucial, especially in resource-limited settings where postoperative care facilities are constrained (15).

While the results are promising, the study has certain limitations. The nutritional protocol used was limited to oral supplements without assessment of adherence or exact caloric intake. Also, the sample size was moderate, and long-term outcomes beyond 30 days were not assessed. Future research should explore the impact of different types and durations of nutritional support, including enteral and parenteral nutrition, and their cost-effectiveness in various surgical populations.

#### CONCLUSION

In conclusion, the present study highlights the critical role of preoperative nutritional optimization in reducing complications and improving surgical recovery in gastrointestinal surgery patients. These findings underscore the need for integrating nutritional support into enhanced recovery protocols for better clinical and economic outcomes.

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