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Hypoalbuminemia As An Independent Prognostic Factor For Postoperative Morbidity And Mortality In Emergency Laparotomies.

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ABSTRACT

Serum albumin, a key protein in human plasma, maintains oncotic pressure and transports various substances. In gastrointestinal surgeries, the impact of low preoperative serum albumin on postoperative morbidity and mortality is significant but not fully understood. To determine the role of serum albumin levels as a predictor of postoperative morbidity and mortality in patients undergoing Emergency Laparotomies. This prospective cohort study, Department of General Surgery, Thanjavur Medical College, Thanjavur, Tamil Nadu, India from January 2023 to September 2023. The study included 86 patients in the age range of 18 to 45 years and of either gender who had undergone elective gastrointestinal surgeries and had preoperative serum albumin levels measured within 7 days before the surgery. Patients having exploratory laparotomy involving organs other than GIT, those who lost to follow-up, and patients with conditions that significantly affect serum albumin levels, such as chronic liver disease or nephrotic syndrome, were excluded from the study. Hypoalbuminemia (<3.5 mg/dL) was observed in 61 patients (70.9%), while 25 patients (29.1%) had normal albumin levels (>3.5 mg/dL). All 30-day mortalities occurred in the hypoalbuminemia group ($p< 0.05$). Superficial surgical site infections were significantly higher in the hypoalbuminemia group as well (73.4% vs. 26.6%, $p < 0.05$). Other complications were more frequent in patients with hypoalbuminemia but were not statistically significant ($p > 0.05$). The study findings indicate that preoperative serum albumin levels were a significant predictor of postoperative complications in patients undergoing elective gastrointestinal surgeries.

Keywords: Serum Albumin, Gastrointestinal Surgery, Hypoalbuminemia, Surgical Site Infections.

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INTRODUCTION

Hypoalbuminemia is associated with increased mortality and morbidity rates in both hospitalized patients and community-dwelling elderly persons. In surgery, an association between hypoalbuminemia and adverse outcomes has been recognized for many years [1]. It is common and occurs in about 30% of surgical patients with GI diseases and in up to 60% of those in whom hospital stay has been prolonged because of post-operative complications. Patients with malnutrition have a higher risk of complications and an increased risk of death [2]. A dietary history, physical examination (Including anthropometric measurements), and relevant laboratory investigations are required to know a patient's pre-operative nutritional status. The serum albumin level is the most readily available and clinically useful parameter. A serum albumin level >3 gm/dL suggests adequate protein stores. It predicts perioperative morbidity and mortality [3]. Serum albumin is the most important laboratory test for the diagnosis of protein-calorie undernutrition. Most patients with severe protein depletion have low serum albumin levels that would correspond to poor clinical outcomes [4]. The major risk factors that have been commonly studied regarding the adverse postoperative outcomes in laparotomy patients are intra-abdominal sepsis, old age, obesity, co-morbidities like Diabetes Mellitus, Coronary Artery Disease, Jaundice, and pulmonary diseases [5,13,14]. Serum albumin is a good indicator of the presence and degree of malnutrition and thus an indirect indicator of surgical risk. Hypoalbuminemia causes delayed recovery of bowel function and thus is strongly associated with postoperative complications after surgeries for colonic pathologies and other major GI surgeries [6]. The role of albumin in the maintenance of homeostasis is well known but the mechanism of its deficiency and the harmful effects of the same in critically ill patients especially those who have undergone major surgery like laparotomies have not been well understood till now. In hypoalbuminemia patients, wound infection, and remote infections (pneumonia, anastomotic leakage), are commonly found [7,11,12]. Current indications for nutritional support before elective surgery include a history of weight loss over 10% of body weight or an anticipated prolonged post-operative recovery period during which the patient will not be fed orally [8,9]. This study tried to determine the relationship between hypoalbuminemia and the development of complications following laparotomy for GI diseases for both emergency and elective surgeries. The rate of mortality related to hypoalbuminemia was also studied.

MATERIALS AND METHODS

This prospective cohort study, Department Of General Surgery, Thanjavur Medical College, Thanjavur, Tamil Nadu, India from January 2023 to September 2023. The study included patients with age range 18 to 45 years and of either gender who had undergone elective gastrointestinal surgeries including but not limited to Gastrectomy, Colectomy and small bowel resection. Pancreaticoduodenectomy (Whipple procedure) Hepatectomy and preoperative serum albumin levels were measured within the last 7 days before the surgery. Patients having emergency gastrointestinal surgeries, requiring exploratory laparotomies, and with major systematic illnesses like chronic liver diseases, chronic kidney diseases, sepsis, or patients with severe malnutrition or on albumin supplementation in the last 30 days before surgery, were excluded from the study. The primary outcome was 30-day postoperative mortality while secondary outcomes included intra-abdominal or anastomotic bleeding, bowel obstruction, intra-abdominal sepsis, localized or generalized peritonitis, superficial surgical site infection, and wound dehiscence. These outcomes were recorded to assess the impact of preoperative serum albumin levels on postoperative complications in gastrointestinal surgeries. SPSS version 23.0 was used for data analysis. Descriptive statistics included mean and standard deviation for continuous variables (e.g., age, serum albumin levels) and frequencies/percentages for categorical variables (e.g., gender, postoperative surgical complications). Patients were divided into 2 groups based on their serum albumin levels (<3.5 mg/dL and >3.5 mg/dL). The chi-square test was used to compare postoperative mortality and morbidity in albumin groups.

RESULTS

Table 1: Descriptive Statistics.

Variables	Mean ± SD/N (%)
Age (Years)	37 ± 04 Years
Preoperative Serum Albumin (mg/dL)	3.62 gm/dL
Gender	
Male	49 (57%)
Female	37 (43)

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Hypoalbuminemia	
Present (<3.5 mg/dL)	61 (70.9%)
Absent (>3.5 mg/dL)	25 (29.1%)

The study included 86 patients with a mean age of 37 years (± 4 years) (Table 1). The mean preoperative serum albumin level was 3.62 gm/dL. Among the participants, 49 (57%) were male, and 37 (43%) were female. Hypoalbuminemia (serum albumin <3.5 mg/dL) was present in 61 patients (70.9%), while 25 patients (29.1%) had serum albumin levels>3.5 mg/dL

Table 2: Postoperative Outcomes

Outcomes	N (%)
30-day Postoperative Mortality	2 (2.3)
Postoperative Complications	
Intra-abdominal or Anastomotic Bleeding	3 (3.5)
Bowel Obstruction	1 (1.2)
Intra-Abdominal Sepsis	1 (1.2)
Peritonitis (Localized/Generalized)	1 (1.2)
Superficial Surgical Site Infection	15 (17.4)
Wound Dehiscence	3 (3.5)
Total	26 (30.3)

In Table 2 the postoperative outcomes among patients with GI surgeries. Poor postoperative outcomes occurred in 26 patients (30.3%). The 30-day postoperative mortality rate was 2.3%, with 2 patients dying within 30 days after surgery. The complications included intra-abdominal or anastomotic bleeding in 3 patients (3.5%), bowel obstruction in 1 patient (1.2%), intra-abdominal sepsis in 1 patient (1.2%), and peritonitis (localized or generalized) in 1 patient (1.2%). Superficial surgical site infection was the most common complication, affecting 15 patients (17.4%), while wound dehiscence occurred in 3 patients (3.5%).Comparison of postoperative complications by serum albumin levels was detailed in Table 3

Table 3: Comparison of Postoperative Complications by Serum Albumin Levels

Postoperative Complications	Serum Albumin <3.5 mg/Dl N (%)	Serum Albumin >3.5 mg/Dl N (%)	P-Value
30-day Postoperative Mortality	2 (100%)	0 (0%)	< 0.05*
Intra-abdominal or Anastomotic Bleeding	2 (66.7%)	1 (33.3%)	> 0.05
Bowel Obstruction	1 (100%)	0 (0%)	> 0.05
Intra-Abdominal Sepsis	1 (100%)	0 (0%)	> 0.05
Peritonitis (Localized/Generalized)	1 (100%)	0 (0%)	> 0.05
Superficial Surgical Site Infection	11 (73.4%)	4 (26.6%)	< 0.05*
Wound Dehiscence	3 (100%)	0 (0%)	> 0.05
Total	21	5	-

** Statistically Significant*

Table 3 Patients with serum albumin <3.5 mg/dL (hypoalbuminemia) had higher rates of complications. Specifically, 30-day postoperative mortality was 100% in the hypoalbuminemia group, with no deaths in the group with serum albumin >3.5 mg/dL ($p < 0.05$). Intra-abdominal or anastomotic bleeding occurred in 66.7% of patients with hypoalbuminemia compared to 33.3% in those with higher albumin levels ($p > 0.05$). Bowel obstruction, intra-abdominal sepsis, peritonitis, and wound dehiscence were all 100% in patients with hypoalbuminemia, with no occurrences in patients with serum albumin >3.5 mg/dL ($p > 0.05$ for each). Superficial surgical site infection was more frequent in the hypoalbuminemia group (73.4%) compared to those with higher albumin levels (26.6%), and this difference was statistically significant ($p < 0.05$).

DISCUSSION

Published evidence hints at a high prevalence (up to 50%) of malnutrition in hospitalized patients and it is often hypothesized to influence patient outcome, affect length of hospital stay, cost, mortality, and morbidity [15]. It is important to note that, hypoalbuminemia is known to be most significantly associated with poor healing of

tissues, decreased synthesis of collagen, and formation of granuloma in surgical wounds, eventually leading to delayed wound healing [16]. Traditionally, levels of serum albumin have been assessed prior to surgery for many of the reasons and deemed a reliable prognostic indicator (preoperatively) for a wide array of surgical interventions including (but not limited to) cardiac, general surgery and trauma [17]. Research has showcased that albumin < 3.5 g/dL is among the most reliable preoperative predictors of mortality and 30-day morbidity and mortality [18]. Additionally, low serum albumin levels were an independent predictor of acute renal failure, bleeding, coma, need for assisted ventilation, transfusions, systemic sepsis and more than two dozen other adverse outcomes (P< 0.001 for all the complications) [19]. Studies suggest that in elective procedures, the decision to delay or cancel surgery due to low albumin levels must be weighed against the potential risks and benefits of corrective measures. While albumin supplementation may be effective in improving outcomes, it is not without risks, such as fluid overload and electrolyte imbalances. Moreover, the relationship between albumin levels and post-operative outcomes was complex, and other factors such as overall health status, nutritional state, and surgical technique also play a significant role [20]. Our research yielded poor postoperative outcomes with only 2 30-days mortalities having occurred during the course of the research. The mean serum albumin level noted among patients encountering a poor outcome (morbidity or mortality) was significantly lower than patients with better outcomes; thereby supporting our hypothesis and strengthening the belief that serum albumin level, may be taken as a reliable indicator of disease prognosis (postoperative mortality and morbidity) [21]. Though acute factors, namely: surgical stress and trauma may affect the level of serum albumin, but stratified results published in literature show that even after accounting for such effect modifiers, the serum albumin levels remain a potent predictor of operative outcome [22]. Out research yields similar findings and showcases a synonymous trend of adverse outcome among patients with low levels of serum albumin.[23] The pre-operative mean serum albumin level among patients with postoperative surgical site infection was significantly lower in comparison to the patients without surgical site infection in this present study as well. [24, 25],

CONCLUSIONS

The study findings indicate that preoperative serum albumin levels were a significant predictor of postoperative complications in patients undergoing elective gastrointestinal surgeries. Patients with hypoalbuminemia (serum albumin <3.5 mg/dL) exhibited higher rates of complications, including a statistically significant increase in 30-day postoperative mortality and superficial surgical site infections. Although other complications such as intra-abdominal or anastomotic bleeding, bowel obstruction, intra-abdominal sepsis, peritonitis, and wound dehiscence were more frequent in patients with lower serum albumin levels, these differences were not statistically significant.

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