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Original Article

Surgery Section

Preoperative Serum Albumin, Serum Prealbumin, Serum Transferrin and Body Mass Index as Predictors of Postoperative Morbidity and Mortality in Laparotomy Cases: A Prospective Observational Study

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ABSTRACT

Introduction: Malnutrition significantly impacts postoperative outcomes in patients undergoing emergency laparotomy. Despite advances in surgical care, the role of preoperative nutritional parameters in predicting surgical outcomes remains crucial.

Aim: To study the efficacy of preoperative serum albumin, serum prealbumin, serum transferrin and Body Mass Index (BMI) as predictors of postoperative morbidity and mortality in laparotomy cases.

Materials and Methods: A prospective observational study was conducted at BM Patil College Hospital and Research Center, Vijayapura, Karnataka, India, from April 2023 to March 2024, which included 83 patients undergoing emergency laparotomy were included. Preoperative serum albumin, prealbumin, transferrin levels and BMI were measured. Primary outcomes included postoperative complications, mortality and length of hospital stay. Chi-square test, Student's t-test, and Receiver Operating Characteristic curve (ROC) analysis were used for statistical evaluation ($p<0.05$).

Results: The study population predominantly comprised middle-aged adults, with 34 (41%) aged 41-60 years, and showed a male predominance i.e., 58 (69.9%). Low albumin levels (<2.5 g/dL) were significantly associated with wound infection rates (77.8%, $p<0.001$). Transferrin levels <160 mcg/dL were associated with increased mortality (18.9%, $p=0.04$). Higher BMI was associated with increased mortality ($p=0.007$). ROC curve analysis showed BMI as the strongest predictor of mortality (AUC=0.735). Wound infection occurred in 48.2% of cases, with overall mortality rate of 9.6%.

Conclusion: Preoperative serum albumin, prealbumin, transferrin, and BMI are significant predictors of postoperative outcomes in laparotomy patients, with low protein levels linked to complications and BMI showing the strongest association with mortality. Routine nutritional assessment is essential for improving surgical outcomes.

Keywords: Nutritional status, Postoperative complications, Prognostic factors, Risk assessment, Surgical wound infection

INTRODUCTION

The relationship between nutritional status and surgical outcomes has long been a critical area of focus in perioperative medicine. In the context of major abdominal surgery, particularly laparotomy, preoperative nutritional assessment has emerged as a crucial component in predicting postoperative complications, morbidity, and mortality [1]. The complex physiological stress response to surgery, combined with the metabolic demands of wound healing, makes nutritional status a key determinant of surgical outcomes [2].

Malnutrition, often underdiagnosed in surgical patients, significantly impacts postoperative recovery and complications [3]. Studies have shown that 30-50% of hospitalised patients exhibit some degree of malnutrition, with even higher rates among surgical patients [4,5]. This concerning prevalence has led to increased attention to preoperative nutritional screening and assessment, particularly through biochemical markers and anthropometric measurements that can objectively quantify nutritional status [6].

Serum albumin, a well-established marker of nutritional status, has been extensively studied in surgical contexts. With a half-life of approximately 20 days, albumin levels reflect relatively long-term nutritional status and have shown strong correlations with surgical outcomes [7]. Low preoperative albumin levels have been associated with increased rates of surgical site infections, delayed wound healing, and prolonged hospital stays. The relationship between hypoalbuminaemia and poor surgical outcomes is particularly significant in emergency laparotomy cases, where preoperative optimisation may be limited by time constraints [8].

Prealbumin, also known as transthyretin offers several advantages as a nutritional marker due to its shorter half-life of approximately 2-3 days. This makes it more sensitive to acute changes in nutritional status and potentially more valuable in short-term nutritional assessment [9]. The rapid turnover rate of prealbumin allows it to reflect recent nutritional interventions more accurately than albumin, making it particularly useful in monitoring the effectiveness of preoperative nutritional support [10].

Transferrin, with a half-life intermediate between albumin and prealbumin (approximately 8-10 days), provides additional insight into nutritional status. Its role in iron transport and metabolism makes it particularly relevant in surgical patients, where adequate iron stores are crucial for wound healing and recovery [11]. The combination of these three protein markers provides a more comprehensive assessment of nutritional status than any single marker alone.

BMI, while a relatively crude measure of nutritional status, remains an important tool in surgical risk assessment. Both extremes of BMI have been associated with increased surgical complications. Obesity (BMI ≥30 kg/m^2) has been linked to higher rates of wound complications and technical difficulties during surgery, while underweight status (BMI <18.5 kg/m^2) often correlates with poor nutritional reserves and increased postoperative complications [12].

The integration of these nutritional markers with BMI provides a more comprehensive approach to preoperative risk assessment. Recent studies have demonstrated that the combination of biochemical and anthropometric measurements offers superior predictive value compared to individual parameters [13,14]. This multimodal approach to nutritional assessment allows for better identification of high-risk patients and more targeted preoperative interventions.

The present study aimed to evaluate the predictive value of preoperative serum albumin, prealbumin, transferrin, and BMI in determining postoperative outcomes in patients undergoing laparotomy. It further seeks to evaluate the efficacy of these nutritional markers in predicting post-laparotomy outcomes and to determine the association between these markers and postoperative complications, including the duration of hospital stay. There is limited literature assessing the combined predictive value of these markers in emergency laparotomy, especially in the Indian context [15,16]. This highlights the need for improved nutritional screening in acute surgical settings. The study's novelty lies in its integrated use of biochemical and anthropometric markers to predict complications, mortality, and hospital stay.

MATERIALS AND METHODS

This prospective observational study was conducted at the Department of General Surgery, Sri BM Patil College Hospital and Research Center, Vijayapura, Karnataka, India, from April 2023 to March 2024 after obtaining ethical clearance (IEC/BLDEU/2023/07).

Sample size calculation: The sample size was determined using the formula: $n=(Z^2 \times p \times (1-p))/d^2$,with Z=1.96, d=0.05, and p=0.056. The proportion (p=0.056) was derived from previous study reporting mortality in normoalbuminaemic patients [17]. The calculated sample size was 81. The study enrolled 83 patients undergoing laparotomy through purposive convenient sampling.

Inclusion and Exclusion criteria: The study included patients of both genders aged above 18 years undergoing emergency or elective laparotomy and excluded those with severe anaemia, diabetes mellitus, chronic renal/liver disease, cirrhosis, or those on steroids/chemotherapy.

Study Procedure

A structured proforma was used to collect demographic data, clinical history, and preoperative information after obtaining written informed consent. Preoperative blood samples were collected to measure serum albumin (bromocresol green method), prealbumin (immunoturbidimetric analysis), and transferrin (immunoturbidimetric assay). BMI was calculated from height and weight measurements taken with patients in light clothing. Cases were classified as elective or emergency laparotomies, with the latter further divided into contaminated and non-contaminated cases. Contaminated cases were defined as those involving gross spillage from the gastrointestinal tract, acute non-purulent inflammation, or major breaks in sterile technique. Non-contaminated cases (clean or clean-contaminated) involved no spillage, no signs of infection, and maintenance of aseptic conditions throughout the procedure [18]. Contamination status was defined according to CDC surgical wound classification. Contaminated cases included those with gross spillage, inflamed tissue without pus, or major breaks in aseptic technique, while non-contaminated (clean) cases lacked these features [19]. The following standard cut-offs were used: serum albumin <2.5 g/dL [20], prealbumin <16 g/dL, and transferrin <200 mg/dL [21]. BMI was classified according to WHO guidelines [22]. Postoperatively, patients were monitored daily for surgical site infections (per CDC criteria) (Centers for Disease Control and Prevention), wound dehiscence, and other complications [23]. Hospital stay duration was recorded, and mortality was assessed within 30 days of surgery. Patients were followed up at days 7-10 (suture removal), day 15 (initial outcome assessment), and day 30 (final evaluation).

STATISTICAL ANALYSIS

Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics included frequencies, percentages, means, and standard deviations. Chi-square test was used for analysing categorical variables. Student's t-test was used to assess significance between means, with $p<0.05$ considered significant. ROC curve analysis evaluated the predictive value of nutritional parameters for mortality and wound infection.

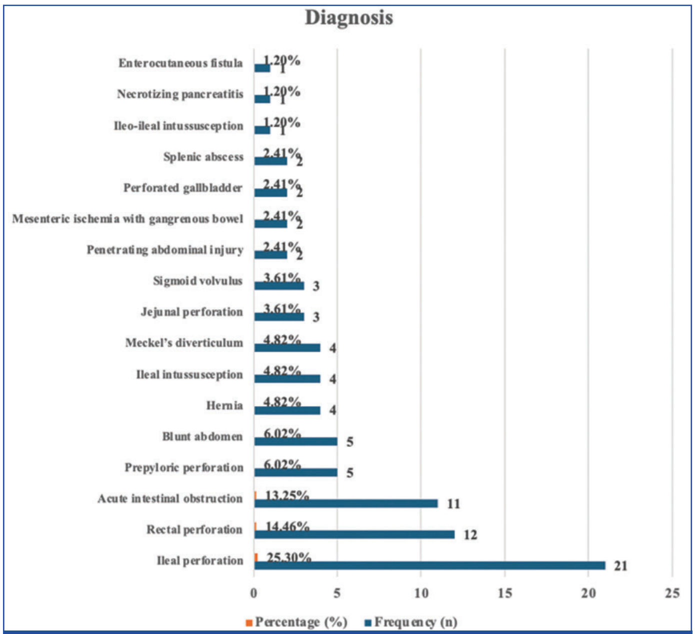
RESULTS

The study population predominantly comprised middle-aged adults, with 41% (n=34) aged 41-60 years, and showed a male predominance i.e., 58 (69.9%). Most patients (78.3%) had a normal BMI (18.5-24.9), while only 2 (2.4%) were obese. Despite this, biochemical markers revealed significant nutritional deficiencies: 68 (81.9%) had low prealbumin levels (<16 g/dL), 27 (32.5%) had hypoalbuminaemia (<2.5 g/dL), and 37 (44.6%) had transferrin levels below 160 mcg/dL. These findings indicate that while BMI was within normal limits for the majority, biochemical evidence pointed to widespread protein-energy malnutrition, underscoring the importance of including biochemical parameters in preoperative nutritional assessments [Table/Fig-1].

Parameters	Category	Frequency (%)
Age in years	20-40	17 (20.5%)
	41-60	34 (41%)
	61-80	29 (34.9%)
	>80	3 (3.6%)
Gender	Male	58 (69.9%)
	Female	25 (30.1%)
BMI	18.5-24.9	65 (78.3%)
	25-29.9	16 (19.3%)
	>30	2 (2.4%)
Prealbumin (g/dL)	<16	68 (81.9%)
	16-30	15 (18.1%)
	>30	0
Albumin (g/dL)	<2.5	27 (32.5%)
	2.5-3.5	48 (57.8%)
	>3.5	8 (9.6%)
Transferrin (mcg/dL)	<160	37 (44.6%)
	160-200	39 (47%)
	>200	7 (8.4%)

[Table/Fig-1]: Patient demographics and baseline nutritional parameters.

The most common diagnosis among laparotomy patients was ileal perforation in 21 (25.30%) cases, followed by rectal perforation in 12 (14.46%), and acute intestinal obstruction in 11 (13.25%). Other notable diagnoses included blunt abdominal trauma in 5 (6.02%), prepyloric perforation in 5 (6.02%), hernia in 4 (4.82%), ileal intussusception in 4 (4.82%), and Meckel's diverticulum in 4 (4.82%). Rare diagnoses included ileo-ileal intussusception, necrotising pancreatitis, and enterocutaneous fistula, each in 1 (1.20%) patient. These findings emphasise that gastrointestinal perforations and obstructions were the predominant indications for laparotomy in this cohort [Table/Fig-2].



[Table/Fig-2]: Distribution of patients according to diagnosis.

Wound infection was the most common postoperative complication, observed in 40 (48.2%) of patients, while wound dehiscence occurred in 6 (7.2%) of cases. Additionally, mortality was reported in 8 (9.6%) patients within the postoperative period [Table/Fig-3]. These findings highlight a high burden of wound-related morbidity and notable mortality following laparotomy.

Complications	Frequency	Percentage
Wound infection	40	48.20%
Wound dehiscence	6	7.20%
Mortality	8	9.6%

[Table/Fig-3]: Distribution of patients according to complications.

The majority of patients 61 (73.5%) had a hospital stay of less than 15 days, while 21 (25.3%) stayed between 15 and 30 days. Only one patient (1.2%) had a prolonged hospitalisation exceeding 30 days, indicating relatively short postoperative recovery durations for most laparotomy cases [Table/Fig-4].

Hospital stay (days)	Frequency	Percentage
<15	61	73.50%
15-30	21	25.30%
>30	1	1.20%
Total	83	100%

[Table/Fig-4]: Distribution of patients according to hospital stay.

Patients with serum albumin <2.5 g/dL had a significantly higher incidence of wound infection 21 (77.8%, p<0.001) compared to those with higher albumin levels. However, differences in wound dehiscence (p=0.81), mortality (p=0.48), and mean hospital stay (p=0.35) were not statistically significant, although a trend toward longer hospitalisation was observed in hypoalbuminaemic patients [Table/Fig-5].

Patients with prealbumin <16 mg/dL had a significantly higher wound infection rate 38 (55.9%) compared to those with levels 16-30 mg/dL (n=2, 13.3%, p=0.002). Although wound dehiscence, mortality, and hospital stay were more frequent or prolonged in the low prealbumin group, these differences were not statistically significant (p>0.05) [Table/Fig-6].

Parameters	Albumin <2.5 g/dL	Albumin 2.5-3.5 g/dL	Albumin >3.5 g/dL	p-value
Wound infection	21 (77.8%)	17 (35.4%)	2 (25%)	<0.001
Wound dehiscence	2 (7.4%)	3 (6.2%)	1 (12.5%)	0.81
Mortality	2 (7.4%)	6 (12.5%)	0	0.48
Hospital stay (days, mean±SD)	14.7±6.6	12.8±6.5	11.9±4.7	0.35

[Table/Fig-5]: Association of serum albumin with clinical outcomes.

Parameters	Prealbumin (mg/dL)		p-value
	<16	16-30	
Wound infection	38 (55.9%)	2 (13.3%)	0.002
Wound dehiscence	4 (5.9%)	2 (13.3%)	0.31
Mortality	6 (8.8%)	2 (13.3%)	0.59
Length of hospital stay (days) (mean±SD)	13.7±6.7	11.6±1.3	0.24

[Table/Fig-6]: Association of prealbumin with complications and hospital stay.

Patients with serum transferrin <160 mcg/dL showed the highest wound infection 22 (59.5%) and mortality rate 7 (18.9%), with mortality being statistically significant across groups (p=0.04). Although differences in wound infection (p=0.06), dehiscence (p=0.66), and hospital stay (p=0.12) were observed, they were not statistically significant. Lower transferrin levels were generally associated with poorer clinical outcomes [Table/Fig-7].

Parameters	Transferrin <160 mcg/dL	Transferrin 160-200 mcg/dL	Transferrin >200 mcg/dL	p-value
Wound infection	22 (59.5%)	17 (43.6%)	1 (14.3%)	0.06
Wound dehiscence	3 (8.1%)	2 (5.1%)	1 (14.3%)	0.66
Mortality	7 (18.9%)	1 (2.6%)	0	0.04
Hospital stay (days, mean±SD)	14.9±6.2	12.1±6.7	11.9±4.9	0.12

[Table/Fig-7]: Association of serum transferrin with clinical outcomes.

Patients with higher BMI showed a rising trend in postoperative complications. Mortality was significantly associated with increasing BMI (p=0.007), rising from 3 (4.6%) in the normal BMI increasing 4 (25%) in overweight and 1 (50%) in obese patients. Although wound infection and hospital stay also increased with BMI, these associations were not statistically significant (p=0.24 and p=0.21, respectively) [Table/Fig-8].

Parameters	BMI			p-value
	18.5-24.9	25-29.9	>30	
Wound infection	29 (44.6%)	10 (62.5%)	1 (50%)	0.24
Wound dehiscence	4 (6.2%)	2 (12.5%)	0	0.62
Mortality	3 (4.6%)	4 (25%)	1 (50%)	0.007
Length of hospital stay (days) (mean±SD)	12.7±5.2	15.5±9.7	17±11.3	0.21

[Table/Fig-8]: Association of BMI with complications and hospital stay.

Emergency surgery patients had a higher wound infection rate of 18 (67.74%) compared to elective surgery patients, whose infection rate was 22 (42.31%). Similarly, mortality was also higher in emergency cases at 4 (12.9%), versus 4 (7.69%) in elective surgeries. The mean hospital stay was slightly longer for emergency patients, averaging 13.61 days (SD=8.06) compared to 13.19 days (SD=5.31) for elective cases. Wound dehiscence was noted in 3 (9.67%) of emergency surgeries and 3 (5.77%) of elective surgeries [Table/Fig-9]. These findings indicate that emergency surgeries were associated with increased risk of both infection and mortality, likely due to the lack of preoperative optimisation and urgent nature of presentation. This emphasises the importance of early diagnosis, stabilisation, and structured perioperative management to improve outcomes, especially in emergency settings.

Surgery type	Total	Wound dehiscence	Wound infection rate	Mortality rate	Mean hospital stay	SD hospital stay
Elective	52	3 (5.77%)	42.31% (22)	7.69% (4)	13.19	5.31
Emergency	31	3 (9.67%)	67.74% (18)	12.9% (4)	13.61	8.06

[Table/Fig-9]: Emergency vs. elective surgery outcomes.

ROC curve analysis revealed that BMI had the highest predictive value for both mortality (AUC=0.735) and wound infection (AUC=0.64), indicating moderate diagnostic accuracy. In contrast, albumin (AUC=0.42), prealbumin (AUC=0.406), and transferrin (AUC=0.238) demonstrated poor predictive value for mortality, with similarly low AUCs for wound infection. These results suggested that BMI was a more reliable indicator of postoperative risk compared to the studied biochemical markers [Table/Fig-10].

Parameters	AUC for Mortality Prediction	AUC for Wound Infection Prediction
BMI	0.735	0.64
Albumin	0.42	0.36
Prealbumin	0.406	0.37
Transferrin	0.238	0.42

[Table/Fig-10]: Predictive value of nutritional parameters (ROC curve analysis).

Multivariate logistic regression showed that none of the variables serum albumin, prealbumin, transferrin, or BMI were independently associated with 30-day mortality (p>0.05 for all). Although albumin and BMI showed a protective trend (OR <1), the associations were not statistically significant, likely due to limited sample size and subgroup variability [Table/Fig-11].

Variables	Coefficient (B)	Standard Error	Z-value	p-value	Odds Ratio
Serum Albumin (g/dL)	-0.144	0.812	-0.177	0.859	0.87
Serum Prealbumin (mg/dL)	0.111	0.097	1.152	0.249	1.12
Serum Transferrin (mg/dL)	-0.014	0.011	-1.253	0.21	0.99
BMI	-0.023	0.063	-0.359	0.719	0.98
Constant (Intercept)	-1.116	4.605	-0.242	0.809	0.33

[Table/Fig-11]: Multivariate logistic regression for mortality.

DISCUSSION

This study demonstrated that low preoperative serum albumin and prealbumin levels were significantly associated with increased wound infections, while reduced transferrin levels associated with higher mortality. BMI showed the highest predictive value for both mortality and wound complications. Notably, many patients with normal BMI exhibited biochemical malnutrition, emphasising the need for combined biochemical and anthropometric assessment in surgical risk evaluation. The age distribution in this study predominantly featured patients between 41-60 years (41%), which aligns with findings from Bhelim SH et al., (45.2% in 31-45 years) and Kiran SU et al., (majority in 41-60 years) [24,25]. The gender distribution showed male predominance (69.9%), consistent with Bhelim SH et al., and Bhuvyan K et al., (77% male) [24,26].

The mean hospital stay in present study (73.5% staying <15 days) compares favourably with the ACS-NSQIP database analysis reported a median stay of 11 days for emergency laparotomy [27].

The study found 81.9% of patients had prealbumin levels below 16 g/dL, indicating widespread nutritional deficiency. This was notably higher than Robinson MK et al., study, where 51% were classified as malnourished [28]. The high prevalence of low prealbumin was attributed to the emergency nature of surgeries and associated metabolic stress. Prealbumin levels <16 g/dL were significantly associated with higher rates of wound infection (p=0.002), highlighting its value as a predictor of postoperative complications. This finding supports previous research by Bae HJ et al., who identified prealbumin as a useful marker for predicting infectious complications after gastric surgery [29].

Low serum albumin (<2.5 g/dL) was associated with high wound infection rates (77.8%), comparable to Belim SH et al., findings of increased postoperative morbidity. Kudsk A et al., reported a 73% complication rate for patients with albumin below 2.5 g/dL [24,30]. A significantly higher incidence of wound infection was noted in patients with lower serum albumin levels, consistent with the findings of Rohith VN et al., who demonstrated that hypoalbuminaemia was strongly associated with surgical site infection and wound dehiscence in emergency laparotomy cases [31]. This pattern was similar to Kiran SU et al. (54.5% complications), Bhuyan K et al., (36% SSI with <3.2 g/dL albumin), Kiran SU et al., (54.5% complications), and Rohith VN et al., (65% hypoalbuminaemia) [25,26,31].

The significant relationship between transferrin levels and mortality (p=0.04) echoed Sawayama H et al., findings [32]. Patients with transferrin levels <160 mcg/dL had a mortality rate of 18.9%, compared to 2.6% in those with levels 160-200 mcg/dL and 0% in those with levels >200 mcg/dl. This suggests that transferrin may be particularly valuable in predicting survival outcomes, possibly due to its role in iron metabolism and oxygen transport, functions critical to recovery from major surgery.

The present study demonstrated a statistically significant association between increased BMI and mortality (p=0.007), with mortality rates escalating from 4.6% in normal-weight patients to 50% in obese individuals. This finding was in agreement with Subburathanam R and Anto M, who also reported that abnormal BMI was significantly associated with increased postoperative morbidity and mortality in patients undergoing elective major surgeries [33]. In contrast to current study, Mullen JT et al., found the highest mortality in underweight and morbidly obese patients, with underweight patients having a 5.24-fold increased mortality risk [34].

A higher incidence of postoperative wound infection was observed among patients undergoing emergency laparotomy procedures (67.7%) compared to those who underwent elective surgeries (42.3%). This disparity underscores the elevated infection risk associated with emergency interventions, which may be attributed to limited preoperative preparation time, suboptimal physiological stabilisation, and a higher likelihood of contamination during surgery. These findings highlight the importance of enhanced intraoperative aseptic measures and postoperative surveillance in emergency surgical settings. Kassahun WT et al., reported higher complication (77.8%) and mortality rates (44.8%) in obese patients undergoing emergency laparotomy [35]. Although their multivariate model did not retain BMI as an independent predictor, the trend of increasing mortality with rising BMI mirrored this results highlighting BMI as a valuable risk stratification tool in emergency abdominal surgery.

Complication rates were remarkably consistent across studies. This study reported a 48.2% wound infection rate and 9.6% mortality, closely matching Belim SH et al., (41.07% wound infection), Kiran SU et al., (36% overall complications), and Bhuvyan K et al., (51.8% overall morbidity) [24-26].

The findings from this study have several important clinical implications. First, the high prevalence of nutritional deficiencies among emergency laparotomy patients underscores the need for routine preoperative nutritional screening. Second, the strong associations between nutritional parameters and surgical outcomes suggest that targeted nutritional interventions may improve patient outcomes. Finally, the superior predictive value of BMI for mortality highlights the importance of including anthropometric measurements in preoperative risk assessment.

Limitation(s)

Despite the valuable insights gained from this study, several limitations should be considered. First, the single-center nature of the study may limit the generalisability of the findings to broader populations or different healthcare settings. Second, the inability to control for all confounding variables could introduce bias and limit causal interpretations of the associations observed. Lastly, the emergency nature of cases restricted preoperative assessments and interventions, which may have influenced patient outcomes and highlights the need for further research in more controlled settings. Although multivariate logistic regression was performed, none of the nutritional parameters were found to be independent predictors of mortality, likely due to the limited sample size and subgroup variability. The emergency nature of most cases limited the scope for comprehensive preoperative assessment or optimisation, which may have influenced outcomes. Importantly, no nutritional or therapeutic intervention was administered as part of this study, and patients were managed according to existing clinical protocols. These limitations highlight the need for larger, multicenter studies with standardised interventions to validate and extend the current findings.

CONCLUSION(S)

The findings of the present study highlight the significant role of preoperative nutritional parameters specifically serum albumin, prealbumin, transferrin, and BMI as predictors of postoperative morbidity and mortality in patients undergoing laparotomy. The results indicate that lower levels of albumin and prealbumin are associated with higher rates of complications, particularly wound infections, while increased BMI associates with elevated mortality rates. Moreover, the analysis revealed that BMI had the highest predictive performance for mortality among the evaluated parameters, suggesting that maintaining a healthy weight could be crucial for improving surgical outcomes. These findings advocate for a multidisciplinary approach to preoperative care, including nutritional optimisation, which may lead to reduced morbidity and mortality rates in surgical patients.

REFERENCES

[1] Evans DC, Martindale RG, Kiraly LN, Jones CM. Nutrition optimization prior to surgery. Nutr Clin Pract. 2014;29(1):10-21. Doi: 10.1177/0884533613517006. Epub 2013 Dec 17. PMID: 24347529.

[2] Leissner KB, Shanahan JL, Bekker PL, Amirfarzan H. Enhanced recovery after surgery in laparoscopic surgery. J Laparoendosc Adv Surg Tech A. 2017;27(9):883-91. Doi: 10.1089/lap.2017.0239. Epub 2017 Aug 22. PMID: 28829221.

[3] Katundu KG, Mutafya TW, Lozani NC, Nyirongo PM, Uebele ME. An observational study of perioperative nutrition and postoperative outcomes in patients undergoing laparotomy at Queen Elizabeth Central Hospital in Blantyre, Malawi. Malawi Med J. 2018;30(2):79-85. Doi: 10.4314/mmj.v30i2.5. PMID: 30627333; PMCID: PMC6307065.

[4] Griffin A, O'Neill A, O'Connor M, Ryan D, Tierney A, Galvin R. The prevalence of malnutrition and impact on patient outcomes among older adults presenting at an Irish emergency department: A secondary analysis of the OPTI-MEND trial. BMC Geriatr. 2020;20(1):455. Doi: 10.1186/s12877-020-01852-w. PMID: 33160319; PMCID: PMC7648316.

[5] Nakahara S, Nguyen DH, Bui AT, Sugiyama M, Ichikawa M, Sakamoto T, et al. Perioperative nutrition management as an important component of surgical capacity in low- and middle-income countries. Trop Med Int Health. 2017;22(7):784-96. Doi: 10.1111/tmi.12892. Epub 2017 Jun 13. PMID: 28510990.

[6] Norman K, Pichard C, Lochs H, Pirlich M. Prognostic impact of disease-related malnutrition. Clin Nutr. 2008;27(1):5-15. Doi: 10.1016/j.clnu.2007.10.007. Epub 2007 Dec 3. PMID: 18061312.

[7] Gibbs J, Cull W, Henderson W, Daley J, Hur K, Khuri SF. Preoperative serum albumin level as a predictor of operative mortality and morbidity: Results from the National VA Surgical Risk Study. Arch Surg. 1999;134(1):36-42. Doi: 10.1001/archsurg.134.1.36. PMID: 9927128.

[8] Vincent JL, Russell JA, Jacob M, Martin G, Guidet B, Wernerman J, et al. Albumin administration in the acutely ill: What is new and where next? Crit Care. 2014;18(4):231. Doi: 10.1186/cc13991. Erratum in: Crit Care. 2014;18(6):630. Roca, Ricard Ferrer [corrected to Ferrer, Ricard]. PMID: 25042164; PMCID: PMC4223404.

[9] Devoto G, Gallo F, Marchello C, Racchi O, Garbarini R, Bonassi S, et al. Prealbumin serum concentrations as a useful tool in the assessment of malnutrition in hospitalized patients. Clin Chem. 2006;52(12):2281-85. Doi: 10.1373/clinchem.2006.080366. Epub 2006 Oct 26. PMID: 17068165.

[10] Ranasinghe RN, Biswas M, Vincent RP. Prealbumin: The clinical utility and analytical methodologies. Ann Clin Biochem. 2022;59(1):07-14. Doi: 10.1177/0004563220931885. Epub 2020 Jun 11. PMID: 32429677.

[11] Dellière S, Cynober L. Is transthyretin a good marker of nutritional status? Clin Nutr. 2017;36(2):364-70. Doi: 10.1016/j.clnu.2016.06.004. Epub 2016 Jun 20. PMID: 27381508.

[12] Mullen JT, Moorman DW, Davenport DL. The obesity paradox: Body mass index and outcomes in patients undergoing nonbariatric general surgery. Ann Surg. 2009;250(1):166-72. Doi: 10.1097/SLA.0b013e3181ad8935. PMID: 19561456.

[13] Doley J, Marian MJ (eds). Adult Malnutrition: Diagnosis and Treatment. CRC Press; 2022.

[14] Frisancho AR. Triceps skin fold and upper arm muscle size norms for assessment of nutrition status. Am J Clin Nutr. 1974;27(10):1052-58. Doi: 10.1093/ajcn/27.8.1052. PMID: 4419774.

[15] Bhowmik S, Singh CB, Neogi S, Roy S, Singh CB. Evaluating the emergency surgery score (ESS) in predicting postoperative outcomes following emergency laparotomy: Insights from an Indian Tertiary Center. Cureus. 2024;16(3).

[16] Lodha M, Khoth A, Badkur M, Meena SP, Banerjee N. Comparative evaluation of P-POSSUM and NELA scores in predicting 30-day mortality following emergency laparotomy: A prospective observational study. Turkish Journal of Surgery. 2025;41(1):56.

[17] Dewi R, Silitonga FG, Mangunatmadja I. Impact of albumin levels on clinical outcomes in children underwent abdominal surgery. Paediatrica Indonesiana. 2020;60(3):149-53.

[18] Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR, Hospital infection control practices advisory committee. Guideline for prevention of surgical site infection, 1999. Infection Control & Hospital Epidemiology. 1999;20(4):247-80.

[19] Centers for Disease Control and Prevention. National Healthcare Safety Network (NHSN) patient safety component manual. Atlanta, GA: Centers for Disease Control and Prevention. 2019.

[20] Engelman DT, Adams DH, Byrne JG, Aranki SF, Collins Jr JJ, Couper GS, et al. Impact of body mass index and albumin on morbidity and mortality after cardiac surgery. The Journal of Thoracic and Cardiovascular Surgery. 1999;118(5):866-73.

[21] Roche M, Law TY, Kurowicki J, Sodhi N, Rosas S, Elson L, et al. Albumin, prealbumin, and transferrin may be predictive of wound complications following total knee arthroplasty. The journal of knee surgery. 2018;31(10):946-51.

[22] https://www.who.int/data/gho/data/themes/topics/topic-details/GHO/body-mass-index.

[23] Sasmal PK, Mishra TS, Rath S, Meher S, Mohapatra D. Port site infection in laparoscopic surgery: A review of its management. World Journal of Clinical Cases: WJCC. 2015;3(10):864.

[24] Belim SH, Sharma VM. Hypoalbuminemia as an independent prognostic risk factor for adverse postoperative outcomes in an emergency laparotomy in adult patients. paripex - Indian Journal of Research. 2020;9(12):23-25.

[25] Kiran SU, Tribhuneswari M, Dunga S, Sanath S, Minhaaj M, Naren SS. A study on the relation between preoperative serum albumin levels and postoperative outcome in emergency abdominal surgeries. Journal of Dr. YSR University of Health Sciences. 2024;13(1):24-27.

[26] Bhuyan K, Das S. Preoperative serum albumin level as independent predictor of surgical outcome in Acute Abdomen. Int Surg J 2016;3:277-79.

[27] NELA Project Team. Sixth Patient Report of the National Emergency Laparotomy Audit. RCoA London, 2020.

[28] Robinson MK, Trujillo EB, Mogensen KM, Rounds J, McManus K, Jacobs DO. Improving nutritional screening of hospitalized patients: The role of prealbumin. Journal of Parenteral and Enteral Nutrition. 2003;27(6):389-95.

[29] Bae HJ, Lee HJ, Han DS, Suh YS, Lee YH, Lee HS, et al. Prealbumin levels as a useful marker for predicting infectious complications after gastric surgery. Journal of Gastrointestinal Surgery. 2011;15(12):2136-44.

[30] Kudsk KA, Tolley EA, DeWitt RC, Janu PG, Blackwell AP, Yeary S, et al. Preoperative albumin and surgical l identify surgical risk for major postoperative complications. Journal of Parenteral and Enteral Nutrition. 2003;27(1):1-9.

[31] Rohith VN, Arya SV, Rani A, Chejara RK, Sharma A, Arora JK, et al. Preoperative serum albumin level as a predictor of abdominal wound-related complications after emergency exploratory laparotomy. Cureus. 2022;14(11).

[32] Sawayama H, Miyamoto Y, Hiyoshi Y, Shimokawa M, Kato R, Akiyama T, et al. Preoperative transferrin level is a novel prognostic marker for colorectal cancer. Annals of Gastroenterological Surgery. 2021;5(2):243-51.

[33] Subburathanam R, Anto M. Preoperative serum albumin and body mass index as predictors of postoperative morbidity and mortality in elective major surgeries. Int J Sci Res. 2017;16(7):10-12.

[34] Mullen JT, Davenport DL, Hutter MM, Hosokawa PW, Henderson WG, Khuri SF, Moorman DW. Impact of body mass index on perioperative outcomes in patients undergoing major intra-abdominal cancer surgery. Annals of surgical oncology. 2008;15:2164-72.

[35] Kassahun WT, Mehdorn M, Babel J. The impact of obesity on surgical outcomes in patients undergoing emergency laparotomy for high-risk abdominal emergencies. BMC surgery. 2022;22(1):15.

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