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PREVALENCE OF MALNUTRITION AND IMPACT ON POSTOPERATIVE OUTCOMES IN GASTROINTESTINAL CANCER SURGERY: A RETROSPECTIVE STUDY

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Abstract

Background: Malnutrition is a prevalent and often under recognized factor in the cancer patients. It significantly influences treatment tolerance and clinical outcomes. This study aims to determine the prevalence of malnutrition in GI cancer using the Subjective Global Assessment (SGA) and to evaluate its association with post-operative morbidity in GI cancer patients.

Methods: A retrospective observational study of 180 patients who underwent curative intent surgery in GI cancer at a tertiary cancer center in South India between January 2022 and December 2023 was done. Preoperative postoperative nutritional status was analyzed using SGA, and anthropometric and biochemical values. Post operative complications were graded as per Clavien-Dindo classification.

Results: At presentation, 44% of patients had malnutrition (SGA B or C). They were older, more advances stage, lower BMI, albumin and hemoglobin levels compared to patients without malnutrition (SGA A). 30-daypost operative complication was slightly higher in malnourished patients (40% vs 20%, p value 0.002). Major post operative complications were higher in malnourished patients (25% vs 8%, p value 0.001). Malnourished patients had longer hospital stay and higher readmission rates. Nutrition status was significantly improved upon post treatment follow up after nutritional rehabilitation with improvements in weight, albumin and hemoglobin levels.

Conclusions: Malnutrition is common in GI Cancer patients and it has a significant effect on major post operative complications and prolonged recovery. SGA is a valuable and practical tool for

nutritional assessment and risk stratification. Nutrition screening must be routinely employed and aggressively managed in the management of GI cancers.

Keywords: Gastrointestinal cancer, Malnutrition, Subjective Global Assessment (SGA), post operative complications, Nutritional screening.

INTRODUCTION:

Malnutrition is a significant under recognized complication of gastro intestinal cancers. The prevalence ranges from 40 to 80% [1]. Especially high in gastric and pancreatic and bowel cancers, mainly because of mechanical obstruction, malabsorption, cancer cachexia and treatment related effects. Patients often present with anorexia, dysphagia, nausea, vomiting diarrhea, often leading to severe weight loss and metabolic imbalances. Chemotherapy, radiation therapy and surgery often exacerbate this nutritional decline by producing mucositis, diarrhea, dumping syndromes and other nutritional deficiencies [2]. Also, malignancy leads to hypermetabolism, systemic inflammatory syndromes and cachexia which further contributes to this [3]. There are associated psychosocial issues depression, socioeconomic, factors and lack of awareness which supplements these factors.

The consequences of malnutrition are profound. It can impair the immunity, it will delay wound healing, it increases the risk of infection, and it often leads to higher rate of treatment related complications. These patients usually have prolonged hospital stay, poor tolerance to chemotherapy or radiation therapy, and has a higher chance of treatment discontinuation. Also, nutritional deficiencies can reduce the effectiveness of anti-cancer therapies. They also affect the quality of life. It will cause fatigue, psychological distress and functional decline [4].

Despite this profound impact, the routine nutritional screening is often overlooked in oncological practice [5]. Patients are often diagnosed with malnutrition only after a significant weight loss or occurrence of treatment toxicity. In Indian population this is further complicated by the clinical late-stage presentations and other social economic limitations[6]. Addressing this gap is crucial in the management of cancer. Early identification of malnourishment through nutritional screening, timely interventions, and multi-disciplinary supportive care are essential to improve the clinical outcomes. The study emphasizes the need of integrating nutritional strategies in the management of gastrointestinal cancer to improve the survival and quality of life.

The Subjective Global Assessment (SGA) is a validated tool for nutritional status and risk. Clinical assessment of history (weight change, dietary intake, GI symptoms, functional capacity) and physical examination (muscle waste, fat loss, edema) is done to classify patients into well nourished, moderately or severely malnourished. SGA is a gold standard in nutritional assessment in cancer care. It can identify malnourishment even in patients who might not have very low Body Mass Index.

A prospective study by Sagar et al evaluated the role of enteral national support to reduce post operative complications and mortality in malnourished patients with esophageal and gastric cancers [7]. They concluded that perioperative nutritional support significantly reduces postoperative complications, mortality and hospital stay.

A cross-sectional study by Olfa et al has demonstrated that malnutrition is an under recognized factor in cancer patients even in patients with high BMI [8]. They concluded that it can lead to higher chemotherapy related complications and lead to tolerance issues. They advise routine nutrition screening and early intervention in oncology care.

Another retrospective matched cohort study by Howard et al in patients undergoing major abdominal surgery concluded that prehabilitation improves physiologic reserve, reduces complications, and lowers hospital costs even in frailer patients. They suggest that prehabilitation should be integrated into standard surgical pathways for high-risk patient [9].

A study by Liu et al which retrospectively analyzed 442 elderly patients of radical gastrectomy for advanced gastric cancers to identify the risk factors associated with Clavien-Dindo grade 2 or higher complications. A lower Prognostic Nutritional Index (PNI), prolonged surgical duration, advanced age, and a history of diabetes mellitus were independent predictors of severe post-operative complications. They concluded that assessing and optimizing nutritional status preoperatively could reduce the risk of post-operative complications in this population [10].
A study by Reece at al to assess whether preoperative nutrition assessed by SGA correlated with postoperative complications and length of stay in patients undergoing cytoreductive surgery and intraperitoneal chemotherapy concluded that malnutrition is common (33%) and associated with higher infection risk, longer hospital stays and morbidity. They suggest systematic screening and optimization for high-risk groups [11].

MATERIALS AND METHODS:

A retrospective observational study was conducted among patients who underwent surgery for gastrointestinal cancers at a tertiary cancer center between January 2022 and December 2023. Patients above 18 years age, with a confirmed diagnosis of GI tract malignancy (esophageal, gastric, colorectal, pancreatic, hepatobiliary) who underwent curative intent surgery was included. Purely palliative intent patients, and those who did not have complete medical records were excluded. Total 180 patients met the inclusion criteria and were analyzed.

Data collection: Demographic details were recorded in data sheet, clinical details like comorbidity, tumor type, site, stage and treatment details like neoadjuvant treatment, type of surgery, adjuvant therapy were documented. Nutrition status was assessed using the Subjective Global Assessment tool by a trained dietitian within two weeks prior to surgery. And repeated at first post operative visit or after completion of adjuvant therapy.
SGA classified as
SGA A: Score 0-6: Well-nourished.
SGA B: Score 6-12: Moderately or suspected malnourishment.
SGA C: Score 12-18: Severely malnourished.

SGA B or SGA C patients were defined as malnourished and SGA A was defined well-nourished.
Anthropometric and biochemical parameters were also collected from case sheets. Body weight in kilograms was measured at initial admission, 3-6 months after surgery and at follow-up. The change in weight was calculated during treatment course. Laboratory values like serum albumin, hemoglobin level were also captured during these intervals.
Outcome measures: Primary outcome was prevalence of malnutrition by SGA.
Secondary outcomes included
Post operative complications within 30 days of surgery. Complications were classified according to Clavien-Dindo score into Grade 0 to Grade V. (Table 1). For purpose of analysis, Clavien-Dindo grade III and above were considered major complications.

Table 1: Clavien-Dindo classification.

Clavien-Dindo Grade	Definition
Grade I	Any deviation from normal post-operative course without any pharmacological management.
Grade II	Complications requiring pharmacological management
Grade IIIa	Complication requiring interventions under local anaesthesia
Grade IIIb	Requiring general anaesthesia
Grade IV	Life threatening complications requiring intensive care management
Grade V	Complications leading to patient's death

Statistical Analysis: All data were compiled and analyzed using SPSS version 29. Continuous variables were present as mean with standard deviation, or median. Categorical values are represented as percentage. Association between nutritional status and post operative complication were analyzed using chi-square test with 95% confidence intervals. P value less than 0.05 was considered significant. Ethical considerations: Study was approved by the Institution Review Board and cleared by the Institution Ethics Committee. Informed consent was waivered off due to the retrospective nature of the study.

RESULTS:

180 patients who were diagnosed with GI cancers who underwent treatment were included in the study. Demographic details are described in table 2.

Table 2

Gender	Number	Percentage
Male	96	53.3
Female	84	46.7
Comorbidities		
No comorbidities	85	47.2
Hypertension	29	16.1
Diabetes	16	8.9
CAD	1	0.6
Dyslipidaemia	1	0.6
Hypertension, Diabetes	26	14.4
Hypertension, Diabetes, Dyslipidaemia	10	5.6
Hypertension,Diabetes,CAD	9	5
HTN,DM,CAD,Dyslipidaemia	3	1.7
Socio-economic status		
Upper-class	29	16.1
Middleclass	136	75.6
Lower-class	15	8.3
Education		
Nil	33	18.3
Primary	96	53.3
SSLC	32	17.8
Plus two	11	6.1
Degree	8	4.4
Occupation		
Nil	26	14.4
Driver	9	5
Kooli	35	19.4
Painter	4	2.2
Housewife	51	28.3
Business	9	5
Clerk	2	1.1
Office	8	4.4
Shop	13	7.2
Cook	3	1.7
Teacher	5	2.8
Farmer	15	8.3
Habit		
No habits	115	63.9
Alcohol	17	9.4
Tobacco	7	3.9

Smoking	19	10.6
Tobbacco,Alcohol,Smoking	12	6.7
Tobacco ,Smoking	1	0.6
Tobacco, alcohol	8	4
Alcohol ,Smoking	1	0.6
Food habit		
Non vegetarian	180	100

Commonest tumor sites were colorectal followed by gastric and pancreatic. Early stages (Stage I, Stage II) and advanced stages (Stage III and Stage IV) were equally distributed. 20% received neoadjuvant therapy and others were given upfront surgery. More than half of the patients had at least one comorbidity. Disease and treatment related characteristics are given in Table 3.

Table 3: Disease and treatment related details.

Site of primary malignancy	**Number**	**Percentage**
Colon	61	33.9
Oesophagus	16	8.9
Stomach	27	15
Rectum	62	34.4
Pancreas	6	3.3
CA GE junction	8	4.4
Cancer Stage		
Not documented	34	18.9
1	3	1.7
2	81	45
3	50	27.8
4	10	5.6
Surgery performed		
Trans Hiatal Esophagectomy	17	9.4
Subtotal gastrectomy	11	6.1
Total gastrectomy	9	5
Whipple's resection	8	4.4
Feeding jejunostomy	9	5
Hemicolectomy	18	10
Laparoscopic Low Anterior Resection	50	27.8
Open Low Anterior Resection	2	1.1
Abdominoperineal resection	32	17.8
Others	24	13.3

Malnourishment was highly prevalent in baseline. 56% well nourished (SGA A) and 44% malnourished (SGA B and SGA C). Malnourished patients were slightly older (Median 60 vs 55) and more likely to have advanced stage of cancer. Stage III and Stage IV was present in 65% of malnourished patients against 40% of well-nourished patients. There was no significant difference in sex distribution among different nutrition categories. Mean BMI was lower in malnourished group (21+/- 3.5 kg/m^2) compared to the well-nourished group (23+/-4.0 kg/m^2) Base line albumin was also significantly lower in the malnourished group (mean 3.1mg/dl vs 3.8 mg/dl). Baseline hemoglobin was also lower in malnourished patients (mean 11 vs 12.8 mg/dl). Malnourished patients had more prevalence of pancreatic cancers. (18%). Also, more patients in the malnourished group had received neoadjuvant therapy. Socioeconomic status and comorbidities did not differ between the groups.

The 30 day post operative complication rate was 30.6% in the full cohort (55 out of 180). Among them, majority were mild (Grade I and II). 15% had major complications (Grade III

Malnutrition was strongly associated with higher complication risk. In the malnourished group, 32 out of 80 patients had at least some form of postoperative morbidity. Compared to 20 out of 100 patients in well nourished group (20%) p value 0.002). Odds ratio of 2.67 for complication in the malnourished vs well nourished patients. 25% of malnourished patients had Grade III and more complications, compared to 8% among well nourished patients. (p value 0.001). The majority complications were surgical site infections and anastomotic leaks (15% vs 5%). Malnourished patients also had a longer duration of hospital stay (median 10 days vs 8 days for well-nourished p value 0.04). Also, 30-day readmission rates also were more in this group (10% vs 5%, p value 0.20). Most common reasons for readmission were wound infection. Biochemical parameters and post operative outcomes by nutritional status are described in Table 4 and Table 5.

Table 4: Biochemical parameters

	Base Line	**During Treatment**	**After Treatment**	**95% CI**	**P Value**
Weight	51.56±14.06	48.42±13.85	52.27±13.85	(-4.09,-3.61)	0.001*
Albumin	3.91±0.64	3.91±0.64	4.24±0.51	(-0.37,-0.28)	0.001*
Haemoglobin	12.63±1.67	12.63±1.67	13.21±1.43	(-0.69,-0.45)	0.001*

Table 5: Postoperative outcomes by nutritional status.

	Well nourished n=100	Malnourished n=80
Post operative complication	20%	40%
Major complication Grade III and above	8%	25%
Length of hospital stay	8 (6-12)	10 (7-16)
30 day readmission	5%	10%

DISCUSSION:

There change in biochemical parameters were observed on follow up period depending on whether adjuvant therapy was given (median 4 months). During the course of treatment, there was a reduction in the overall nutrition status (mean body weight decreased from 60 to 57 kg, p less than 0.001), which corresponds to a reduction of around 5% of body weight. Weight loss was more common in those patients who received adjuvant chemotherapy.

The SGA classification showed a slight increase on post treatment follow up meaning the number of malnourished patients has increased (SHA A or B 44% to 50%). Some patients showed an increase in nutrition status (from SGA B or C to SGA A). However, the 6% increase in malnourished patients was not statistically significant (p value 0.15). Overall, nearly half of the patients remained malnourished during the end of treatment.

25% of malnourished patients received some form of supplementary nutrition (enteral tube feeding or parenteral nutrition). However, on follow-up, mean albumin levels of previously malnourished patients was 3 vs 3.5 in previously well-nourished patients.

We found that there is high prevalence of malnutrition in GI cancer patients by SGA classification (44%). Similar rates are described in other studies. Also, malnourished patients were more likely to have higher postoperative complications. Akula et al has noted that SGA C patients had 63% complications compared to 27% in well nourished. Out data also showed similar trends (40% in malnourished group vs 20% in well-nourished). The complications in malnourished patients were more likely to be grade III and above. Confirming to other study findings that nutrition status is a key predictor of surgical morbidity [12].

High prevalence of malnutrition warrants routine nutritional screening of all GI cancer patients. Tools like SGA can be easily incorporated in clinical settings. This will help in early identification of patients at increased risk of postoperative morbidity, and can be optimized preoperatively. Dietary counselling, oral supplementation, enteral feeding can improve the patient's nutritional status. Identification of high-risk patients will guide in employing additional steps in treatment care like

intensive physical therapy, tighter glucose control, infection prophylaxis, low threshold for clinical suspicion of anastomotic leaks, intensive monitoring.

Limitations and strengths: Retrospective nature of this study makes it susceptible to biases and nutritional intervention data cannot be generalized. Case sheets were retrospectively analyzed for data collection, which could have led to informational bias as assessments may not be uniformly performed.

The cohort consisted of non-homogenous group with a mix of GI malignancies which might have had a confounding effect. While associations were ascertained, causations could not be established as severe disease might itself have caused malnutrition. While SGA is well validated tool, newer tools like Global Nutritional Initiative on Malnutrition (GLIM) criteria was not utilized.

Our study provides a real-world clinical practice data and includes a large sample size. Our study also provides data on the prevalence of malnutrition in cancer patients in this region of the country. Standardized grading of post operative complications and structured nutritional assessment adds to the value of this study.

CONCLUSION:

Malnutrition is a significant and prevalent issue among GI cancer patients. In our analysis close to half of the patients were malnourished. These patients were at a higher risk of post operative complications, particularly major complications, delayed clinical recovery, longer hospital stays. Nutritional status is a factor in post operative morbidity. SGA assessment is a valuable tool in assessing the nutrition status of the patient. Patients with unfavorable scores in SGA might benefit from additional optimization measures before surgery, and before adjuvant therapy. Addressing the nutritional status might translate to fewer treatment related complications. Nutritional screening has to be an integral part of GI cancer treatment protocols. Randomized control trials are required to definitely validate the types of nutritional intervention and its effect on clinical outcomes.

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