Impact of the Nutritional Support on the Response of the Anatomical Site of Gastrointestinal Malignancy to the treatment in Cancer Patient in Qena

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Abstract

Background: Nutritional status affects gastrointestinal cancer prognosis, which treatment worsens. Malnutrition assessment and management by the PG-SGA improves prognosis and treatment tolerance. Malnourished individuals exhibited worse survival, treatment tolerance, and infection risks. Customised diets decrease risks and increase performance.

Objectives: Investigate how tailored nutritional support influences the treatment outcomes of gastrointestinal cancer patients, focusing on the anatomical site-specific responses to various therapeutic interventions.

Patients and methods: A randomized controlled clinical trial at Qena University Hospital included 60 patients with GIT cancer, using PG-SGA for nutritional assessment. Criteria: age 20-65, confirmed GIT cancer. Methods: history, physical exams, tumor biopsies. PG-SGA scores correlated with treatment response and serum protein levels.

Results: Patients were mostly female (60%), the mean age 47.50 years old, and had diabetes (20%) and hypertension (30%). BMI showed 30% underweight, 20% healthy, 20% overweight, and 30% obese. Colon cancer (40%), cholangiocarcinoma (20%), and pancreatic cancer (20%) were predominantly stage IV (60%) and regressive (70%). PG-SGA scores were significantly associated with age, comorbidities, tumor features, treatment response++, and performance status($p<0.001$). PG-SGA was positively correlated with performance status ($r=0.611$, $p<0.001$), age ($r=0.513$, $p<0.001$), and negatively correlated with blood protein levels ($r=-0.296$, $p=0.022$). Nutrition assistance is linked to BMI, body surface area, and blood protein levels ($p<0.001$), highlighting its impact on clinical outcomes.

Conclusion: GI cancer patients need nutritional assessment and support. PG-SGA has identified older men with advanced tumors and comorbidities as high-risk. BMI, body surface area, serum protein and clinical outcomes improve with nutrition support. Regular dietary assessments improve GI cancer prognosis.

Keywords: Nutritional status assessment; GI cancer patients; PG-SGA; Nutritional support.

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Introduction

Nutritional status strongly affects gastrointestinal cancer outcomes. These patients often have malnutrition due to cancer or adverse effects of surgery, chemotherapy, and radiation **(Santos et al., 2021).** Effective nutritional management is necessary to improve prognosis and tolerance to cancer therapy protocols. **(Ścisło et al., 2022).**

The validated oncology-specific Patient generated subjective global assessment assesses nutritional status thoroughly. It includes weight change, food, nutrition symptoms, physical functioning, and physical examination. This multi-dimensional technique helps identify malnutrition early and provide prompt nutritional therapy. The PG-SGA also diagnoses malnutrition and evaluates nutritional assistance during cancer therapy **(Henriksen et al., 2022; Ripamonti, 2023).**

GI cancer patients with malnutrition had higher infection risk, worse chemotherapy tolerance, longer hospital stays, and lower survival rates **(Nakyeyune et al., 2022).** Malnourished GI cancer patients have lower results than well-nourished patients, underscoring the need for regular nutritional examination and management. The PG-SGA is commonly used in clinical settings to identify patients at risk and provide nutritional therapy **(Movahed et al., 2021; van Vliet, 2021).**

Comprehensive GI cancer care requires nutritional assistance. Based on malnutrition severity and patient nutrient consumption and absorption, interventions may include dietary counselling, oral nutritional supplements, enteral nutrition, or parenteral nutrition. These measures can boost immunological function, minimise treatment-related toxicities, and improve treatment outcomes by improving nutrition. The PG-SGA provides a framework for customising these treatments to patient needs for optimum nutritional support **(Tan et al., 2021).**

Nutritional assistance and the PG-SGA are useful, but routine nutritional evaluation in clinical practice is difficult. Time restrictions, lack of healthcare provider training, and unpredictability in evaluation outcomes might hampered PG-SGA adoption. These hurdles can be overcome by raising knowledge of nutrition involvement in cancer care and continuing research and teaching. GI cancer patients clinical results improve with rigorous nutritional assessment and assistance **(Muscaritoli et al., 2021; Deo, 2022).**

The main aim of the study was to evaluate the nutritional status by the scored Patient-generated Subjective Global Assessment (PG-SGA) and the role of nutritional support in gastrointestinal cancer and its association with the response to the treatment.

Patients and methods

This randomized controlled clinical trial was conducted at the Clinical Oncology Department at Qena University Hospital upon 60 patients to evaluate nutritional status using the scored Patient-generated Subjective Global Assessment (PG-SGA) and to assess the role of nutritional support in gastrointestinal (GI) cancer. The inclusion criteria for study subjects required participants to be between 20 and 65 years of age and have pathologically proven GI cancer.

The study employed several tools to gather comprehensive data on patients. These included history and physical examination, focusing on patient characteristics such as age, sex, symptoms, food intake, and activities and function. Tumor biopsies were conducted to determine the site, histopathology, and stage of the tumor.

Ethical code: #SVU-MED-ONM027-2-21-12-291

Nutritional status was assessed using the scored Patient-generated Subjective Global Assessment (PG-SGA) scale. The PG-SGA includes both a patient-completed component, which addresses weight loss, nutrition impact symptoms, intake, and functional capacity, and a clinician-completed component, which involves a physical examination assessing fat, muscle stores, and fluid status, along with a global assessment of nutritional status. Points ranging from 0 to 4 are awarded for each component based on the impact on nutritional status, with typical scores ranging from 0 to 35. Higher scores indicate a greater risk of malnutrition, and scores of 9 or higher signify a critical need for nutritional intervention and symptom management. The study evaluated the range of PG-SGA scores that could be associated with a positive response to treatment in terms of the regressive course of GIT tumors and also assessed total serum protein levels **(Williams et al., 2020).**

In cases identified as being at nutritional risk based on PG-SGA scale, we administered Ensure® Original Vanilla Nutrition Shake as a form of nutritional support. This shake is formulated to provide balanced nutrition, comprising essential vitamins, minerals, protein, and calories, specifically catering to individuals requiring supplementary nutrition. The mean PG-SGA scores were 6 for patients classified as mild or moderate risk and 9 for those classified as high risk.

Statistical analysis

Data was collected and entered into IBM SPSS version 27. Categorical variables were presented as numbers and percentages, while numerical variables were shown as means and standard deviations. The chi-square test, or Fisher exact test when necessary, was used for qualitative variables. The independent t-test compared two groups with numerical variables and parametric distribution, while the Mann-Whitney and Kruskal-Wallis tests were used for non-parametric distributions involving two and more than two groups, respectively. Spearman correlation assessed the relationship between PG-SGA and performance status scales, and Pearson correlation analyzed the relationship between PG-SGA, age, and serum protein. A 5% margin of error and a 95% confidence interval were used, with p-values classified as non-significant ($P > 0.05$), significant ($P < 0.05$), and highly significant ($P < 0.01$).

Results

(Table .1) shows the patients demographic features; their ages ranged from 28 to 63 years with a mean age of 47.50 ± 11.78839 years. Female patients constituted 60% of cases while males were 40%. Twelve patients among 60 cases (20%) were diabetic, 30% were hypertensive, 10% had Ischemic heart disease (IHD), and 10% had chronic obstructive pulmonary disease. Body mass index (BMI) of cases; 18 patients (30%) were underweight, 12 patients (20%) were healthy, 12 patients (20%) were overweight, and 18 patients (30%) were obese. The mean BSA was 1.70 ± 0.46212 M^2 and ranged from 1 to 2 M^2. The mean serum protein was 6.57 ± 0.52215 g/dl and ranged from 5.80 to 7.40 g/dl. Concerning treatment response, 70% of patients showed a good response to treatment.

Table 1. Patients demographic and clinical features and clinical data (N=60)

Parameters		Frequency	Percentage (%)
Gender	Male	24	40%
	Female	36	60%
Age (years)	20-29	6	10%
	30-39	12	20%

	40-50	12	20%
	51-59	18	30%
	60-65	12	20%
	Mean ± SD	47.50 ± 11.78839	
	Median (range)	50.50 (28-63)	
Comorbidity	Diabetes mellitus	12	20%
	Hypertension	18	30%
	Ischemic heart disease	6	10%
	chronic obstructive pulmonary disease (COPD)	6	10%
	No comorbidity	30	50%
Body mass index (Kg/cm²)	Underweight	18	30%
	Healthy weight	12	20%
	Overweight	12	20%
	Obese	18	30%
	Mean ± SD	25.0622 ± 7.67404	
	Median (range)	24.9783 (13.50-35.10)	
Body surface area (M^2)	1-1.50	18	30%
	1.51-2	42	70%
	Mean ± SD	1.70 ± 0.46212	
	Median (range)	2 (1-2)	
Serum protein (g/dl)	5-5.90	12	20%
	6-6.90	30	50%
	7-7.90	18	30%
	Mean ± SD	6.57 ± 0.52215	
	Median (range)	6.50 (5.80-7.40)	
Serum Albumin (g/dL)	**2-3**	6	10%
	>3	54	90%
Response to treatment	**Responders**	42	70%
	Non-responders	18	30%

(Table.2) shows the tumor features; concerning tumor sites, the most common was colon cancer in 24 cases (40%), followed by cholangiocarcinoma and pancreatic cancer in 20% of cases, followed by rectal and rectosigmoid cancer in each in 10% of cases. Regarding the tumor stage, the most common was stage IV in 36 cases (60%), followed by stage II and III each in 20% of cases. In terms of tumor course, 42 cases (70%) had a regressive course, while 30% had a progressive one. Eighteen patients out of 60 patients (30%) were at high risk of malnutrition according to the Scored Patient-generated Subjective Global Assessment (PG-SGA) scale and 42 patients (70%) were not at nutritional risk according to this score. Forty-eight patients out of 60 (80%) had normal activity according to the ECOG Performance status score and 12 cases (20%) were symptomatic and ambulatory; with self-care according to this score.

Table 2. Patients oncological and nutritional features (N=60)

Features		Frequency	Percentage
Tumor site	Colon	24	40%
	Rectosigmoid and Rectal	6	20%
	Cholangiocarcinoma	12	20%
	Pancreas	12	20%
Tumor stage	Stage I	0	0%
	Stage II	12	20%
	Stage III	12	20%
	Stage IV	36	60%
Tumor course	Regressive	42	70%
	Progressive	18	30%
PG-SGA score	0-8 (not at nutrition risk)	42	70%
	≥9 (at high risk of malnutrition)	18	30%
ECOG Performance status score	0 (normal activity)	48	80%
	1 (symptomatic and ambulatory, self-care)	12	20%

(Table.3) shows a statistically significant difference between the PG-SGA scale and gender (P value = 0.006), where 66.67% of patients at nutritional risk were males, compared to 28.6% among those without nutritional risk. A statistically significant difference exists between the PG-SGA scale and age (P value <0.001), where 66.67% of patients at nutrition risk were between 51 and 59 years, compared to 14.33% among those without nutritional risk and the mean age was significantly higher among patients at nutritional risk than those without (56.00 ± 3.850 vs. 43.857 ± 12.18). A statistically significant difference exists between the PG-SGA scale and the associated comorbidities (P value <0.001), where 33.33% of patients at nutritional risk had D.M. with hypertension and hypertension with ischemic heart disease compared to 0% among those without nutritional risk. There was statistically significant difference between the PG-SGA scale and the tumor site (P value = 0.039), where 33.33% of patients at nutritional risk had cholangiocarcinoma compared to 14.33% of patients without. A statistically significant difference exists between the PG-SGA scale and tumor stage (P value <0.001), where 100% of patients at nutritional risk had stage IV tumors, compared to 42.9% of patients without. A statistically significant difference exists between the PG-SGA scale and the treatment response (P value <0.001), where 66.67% of patients at nutritional risk were non-responders, compared to 14.30% among patients without nutritional risk. A statistically significant difference exists between the PG-SGA and performance status scales (P value <0.001), where 66.67% of patients at nutritional risk were symptomatic and ambulatory; with self-care compared to 0% among patients without risk.

Table 3. Impact of demographic and clinical features on the PG-SGA scale

Parameters		PG-SGA scale		P value
		At nutrition risk (N=18)	Not at nutrition risk (N=42)	
		N (%)	N (%)	
Gender	Male	12 (66.67%)	12 (28.6%)	**0.006***
	Female	6 (33.33%)	30 (71.4%)	
Age groups (years)	20-29	0 (0%)	6 (14.33%)	**<0.001****
	30-39	0 (0%)	12 (28.6%)	
	40-50	0 (0%)	12 (28.6%)	
	51-59	12 (66.67%)	6 (14.33%)	
	60-65	6 (33.33%)	6 (14.33%)	
	Mean ± SD	56.00 ± 3.850	43.857 ± 12.18	**<0.001[a]**
Associated comorbidities	D.M	0 (0%)	6 (14.3%)	**<0.001****
	Hypertension	0 (0%)	6 (14.3%)	
	COPD	0 (0%)	6 (14.3%)	
	D.M, hypertension	6 (33.33%)	0 (0%)	
	Hypertension, IHD	6 (33.33%)	0 (0%)	
	No comorbidity	6 (33.33%)	24 (57.1%)	
Clinical features				
Tumor site	Colon	6 (33.33%)	18 (42.9%)	**0.039****
	Cholangiocarcinoma	6 (33.33%)	6 (14.33%)	
	Rectosigmoid	0 (0%)	6 (14.33%)	
	Rectal	0 (0%)	6 (14.33%)	
	Pancreatic	6 (33.33%)	6 (14.33%)	
Tumor stage	Stage II	0 (0%)	12 (28.6%)	**<0.001****
	Stage III	0 (0%)	12 (28.6%)	
	Stage IV	18 (100%)	18 (42.9%)	
Treatment response	Responders	6 (33.33%)	36 (85.70%)	**<0.001***
	Non-responders	12 (66.67%)	6 (14.30%)	
Performance status scale	Normal activity	6 (33.33%)	42 (100%)	**<0.001***
	Symptomatic and ambulatory care for self	12 (66.67%)	0 (0%)	

*Chi-square test, **Fisher exact test, [a]Student t-test

(Table .4) shows a statistically significant strong positive correlation between the PG-SGA and performance status scales (P value < 0.001, r =0.611) **(Fig.1).**

These is a statistically significant positive moderate correlation between the PG-SGA scale and age (p-value <0.001, r = 0.513) **(Fig. 2)** and a statistically significant negative mild correlation between the PG-SGA scale and serum protein (p-value = 0.022, r = -0.296).

Table 4. Correlation between the PG-SGA and performance status scales, and age and serum protein

Variables	PG-SGA scale	
	r*	P value
Performance status scale	0.611	<0.001
Age	0.513	<0.001
Serum protein	- 0.296	0.022

*Spearman correlation coefficient

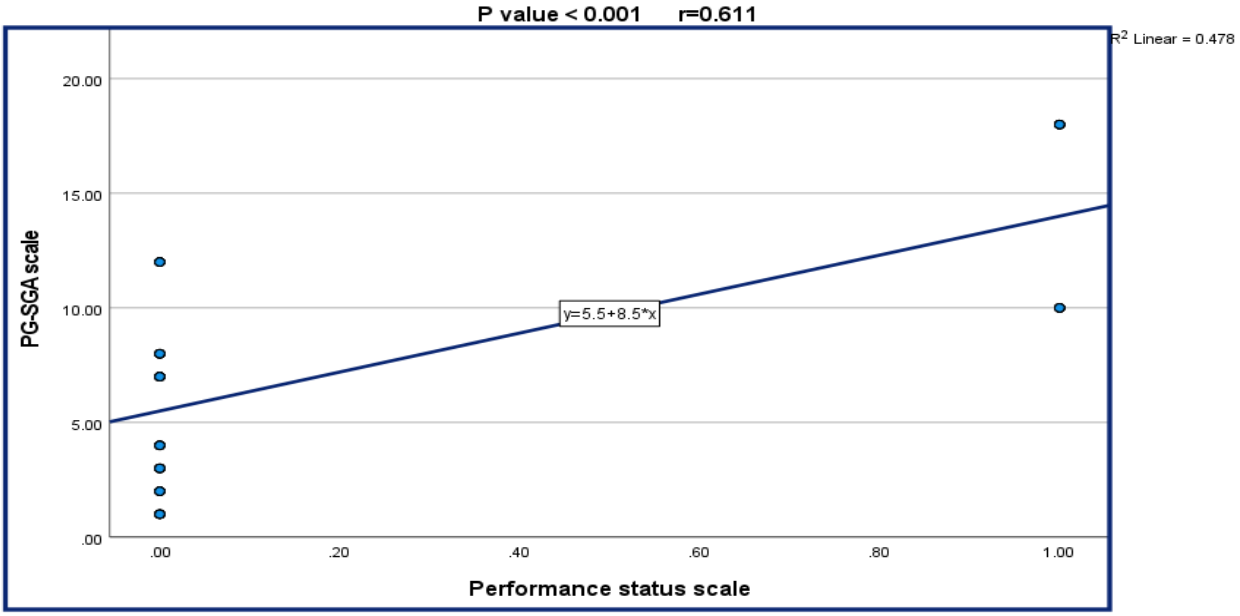

Fig.1. Correlation between PG-SGA and performance status scales

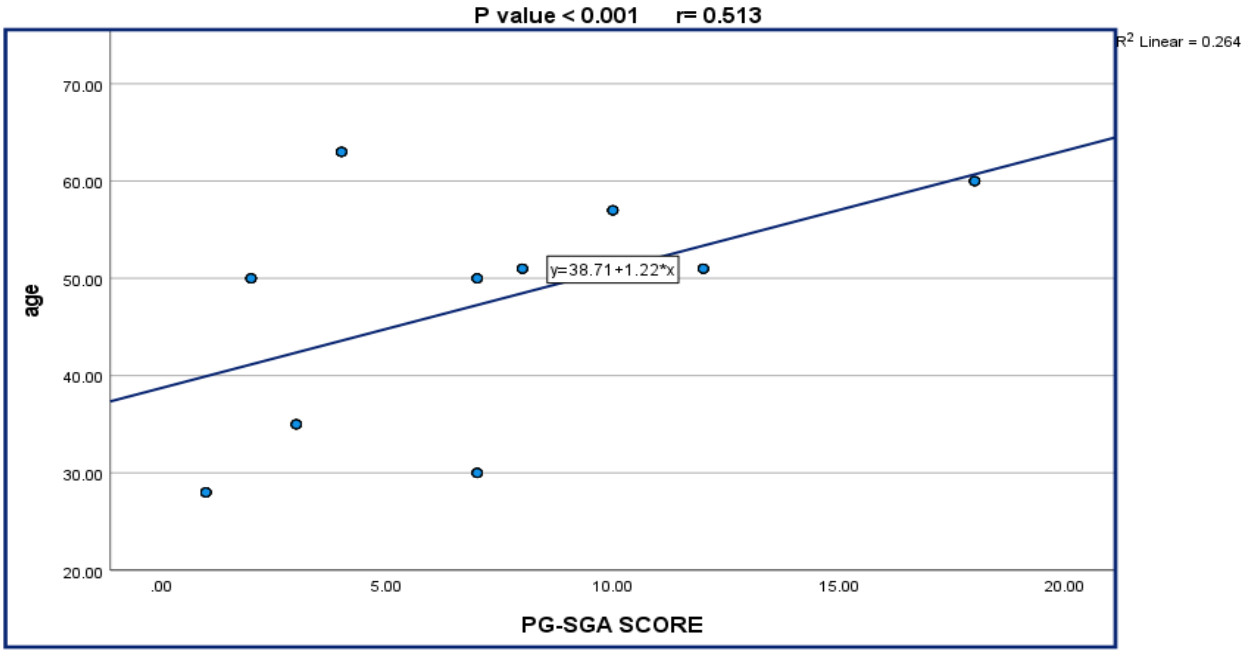

Fig.2. Correlation between PG-SGA scale and age

(Table .5) shows a statistically significant difference between nutrition support and BMI (P-value <0.001), where 18 patients among 24 with negative nutrition support (75%) were underweight, compared to 0% among those with positive nutrition support, and the mean BMI was significantly higher among patients with positive nutrition support than those without nutritional support (28.2439 ± 5.492 kg/m^2 vs. 20.2896 ± 8.096 kg/m^2, and p-value <0.001). A statistically significant difference exists between nutrition support and Body surface area, where the mean BSA was significantly higher among patients with nutritional support than those without (1.7533 ± 0.1555 M^2 vs. 1.5475 ± 0.2351 M^2, and p-value <0.001). A statistically significant difference exists between nutrition support and serum protein, where the mean serum protein was significantly higher among patients with nutritional support than those without nutritional support (6.8833 ± 0.3768 vs. 6.100 ± 0.31485, and p-value <0.001).

Table 5. Impact of nutrition support on the patient nutrition status

Parameters		Nutrition support		P value
		Positive (N=36)	Negative (N=24)	
		N (%)	N (%)	
BMI categories	Underweight	0 (0%)	18 (75%)	<0.001**
	Healthy weight	12 (33.33%)	0 (0%)	
	Overweight	12 (33.33%)	0 (0%)	
	Obese	12 (33.33%)	6 (25%)	
BSA (M^2)	1-1.50	0 (0%)	18 (75%)	<0.001*
	1.51-2	36 (100%)	6 (25%)	
Serum protein (g/dl)	5-5.90	0 (0%)	12 (50%)	<0.001**
	6-6.90	18 (50%)	12 (50%)	
	7-7.90	18 (50%)	0 (0%)	
		Mean ± SD	**Mean ± SD**	
BMI (Kg/m^2)		28.2439 ± 5.492	20.2896 ± 8.096	<0.001***
Weight (Kg)		69.833 ± 11.495	51.50 ± 15.4666	<0.001***
Serum protein (g/dl)		6.8833 ± 0.3768	6.100 ± 0.31485	<0.001***
BSA (M^2)		1.7533 ± 0.1555	1.5475 ± 0.2351	<0.001***

*Chi-square test, **Fisher exact test, ***Student t-test.

Discussion

Our group mean age 47.50 years old, with 60% women. Underweight and obese GI cancer patients made up 30% apiece, whereas 20% were healthy or overweight. D. **Yang et al. (2020)** found the Patient-Generated Subjective Global Assessment (PG-SGA) useful for gastric cancer patients in China, supporting our findings. Their study has 114 individuals with a mean age of 57.1 years and balanced gender distribution. Our population was younger and more female, but both trials stressed the necessity of employing PG-SGA to assess GI cancer patients nutritional status.

Wei et al. (2021) used PG-SGA to assess the nutritional condition of 251 GI tumour patients, most of whom were male and mean age 57.63 years old. Our study found equal distribution of underweight and obese individuals, while Wei et al. focused on those with a BMI of 18.5 kg/m² or higher. Both studies emphasise the need of nutritional evaluation in GI tumour patients of all demographics, however the

discrepancy may be due to patient populations or methods.

In contrast, **Wang et al. (2020)** examined the prediction ability of PG-SGA and objective nutritional indicators for malnutrition in elderly CRC patients. Their research of 131 newly diagnosed CRC patients had a median age of 66.95 years and majority had adenocarcinoma. PG-SGA scores B and C showed 80.92% malnutrition, according to our findings. Although different, both studies emphasise the importance of malnutrition in CRC patients and the necessity for nutritional screening. Randomization and inclusion criteria may explain demographic data disparities, since **Wang et al. (2020)** focused on the elderly.

Our study found 40% of patients had colon cancer, followed by cholangiocarcinoma and pancreatic cancer. 60% of individuals were stage IV at diagnosis. **Wang et al. (2020)** found 45.8% of individuals had colon cancer, 43.5% rectal cancer, 7.6% rectosigmoid cancer, and 3.1% CRC in two locations. Most of their patients had conventional adenocarcinoma, with lower proportion having mucinous or both. Colon cancer prevalence is comparable, however rectal cancer and other forms are distributed differently.

In a study by **Fu et al. (2022)** nutritional status was categorized based on mPG-SGA scores, achieving high areas under the curve and strong sensitivity and specificity. Validity and reliability were confirmed, with significant median overall survival differences observed: well-nourished patients had a median survival of 24 months, while severely malnourished patients survived only 10 months (all Ps < 0.05). The original PG-SGA could not differentiate survival between well-nourished and mildly malnourished groups. **Fu et al. (2022)** further emphasized the importance of effective nutritional assessment tools in cancer care, supporting the need for streamlined methods like the mPG-SGA.

Zhang et al. (2014) classified Gastrointestinal Medical Oncology Unit patients by cancer type and examined their dietary health. They detected 18.0% esophageal cancer, 36.8% gastric cancer, 9.5% colon cancer, 14.4% rectal cancer, 2.7% pancreatic and bile duct cancer, and 3.1% other malignancies. A broader view of gastrointestinal cancers in hospitals reveals varying prevalence rates by type, with Stage IV tumours being the most common (60%), followed by stages II and III (20% each) and 90% regressing. 70% were not at significant malnutrition risk, while 30% were. Normal activity was 80%; symptomatic 20%. Nutritional risk rises with late diagnosis.

Deftereos et al. (2021) observed 42% malnutrition using Subjective Global Assessment (SGA), with 65% accidental weight loss. Malnutrition is a major issue for cancer patients, requiring diligent nutritional evaluation and therapies.

Cho et al. (2022) found no correlation between PG-SGA scores and survival one month post-gastrectomy. greater scores at two months were associated with greater mortality (HR 2.26, 95% CI: 1.22–4.21 for 9–11 vs. ≤ 5). At three months, HR was 2.56 (95% CI: 1.02–6.42) for scores > 9. High NUTRISCORE scores (≥ 7) were associated with increased mortality (HR 3.84, 95% CI: 1.18–12.55). These data indicate that post-gastrectomy PG-SGA and NUTRISCORE malnutrition is associated with poor gastric cancer survival.

Our investigation revealed a strong association between blood albumin levels and treatment response ($p < 0.001$). Hypoalbuminemia caused 100% non-response, compared to 22.2% in normal albumin levels. Hypoalbuminemic individuals had higher median PG-SGA

scores (10 vs. 7) due to serum albumin levels ($p = 0.025$).

These data show that serum albumin is an important indication of GI cancer patients nutritional condition and treatment responsiveness. Hypoalbuminemia was associated with worse treatment results and higher PG-SGA scores, indicating less nutrition. Hypoalbuminemia may reduce therapeutic efficacy. Hypoalbuminemic individuals with high PG-SGA scores may respond poorly to treatment due to dietary deficiencies. Serum albumin oncotic pressure and transport properties make it important. Low levels may indicate severe malnutrition, inflammation, or liver malfunction, affecting treatment response and prognosis **(Eckart et al., 2020; Sheinenzon, 2021).**

Tan et al. (2015) reported that 8% of malnourished patients had albumin levels <35 g/L, which were linked to reduced treatment response.

66.67% of at-risk patients were male and 51–59 years old, indicating that gender and age were important risk factors. At-risk patients mean age 56.00 years old, compared to 43.857 for non-at-risk patients.

Several variables increase elderly men patients nutritional risk. Males lose more weight and have more nutritional inadequacies after cancer therapy due to their stronger metabolisms and muscular mass. Due to natural muscle mass and metabolic efficiency decreases and increased frequency of diabetes and cardiovascular illnesses, ageing increases these risks. Older individuals may have more severe therapy side effects, reducing nutrient intake. This demographic trend shows older men need more nutritional monitoring and targeted assistance to improve clinical outcomes **(Sasaki et al., 2020; Uhlenhopp et al., 2020; L. Yang et al., 2020).**

Wang et al. (2020) found that malnutrition worsened with age. Patients with PG-SGA scores B and C had higher mean ages than those with A (68.00 ± 6.32 years and 66.94 ± 5.78 years vs. 65.44 ± 7.26 years; $P = 0.013$ and $P = 0.031$, respectively). This emphasises the necessity for thorough malnutrition diagnosis and treatment in senior individuals, including nutritional assistance and personalised treatment.

Zhang et al. (2014) found a strong correlation between PG-SGA scores and age ($r = 0.013$, $P < 0.01$), highlighting the influence of age on nutritional status in patients.

Bivariate analysis and univariate logistic regression were used by **Deftereos et al. (2021)** to study preoperative malnutrition and unintended weight loss. Preoperative malnutrition was 49% greater in patients 65 and older than in those under 65 ($p = 0.012$), with elderly patients having nearly twice the odds of being malnourished.

Comorbidities substantially affected gastrointestinal cancer patients dietary risk profile in our research. Diabetes with hypertension or hypertension with ischemic heart disease increased nutritional risk. Diabetes can affect metabolic processes and nutrient absorption, hypertension and related medications can suppress appetite and cause gastrointestinal issues, and ischemic heart disease can cause fatigue, decreased physical activity, and heart failure, which reduces nutrient absorption. Multiple chronic illnesses and cancer complicate and stress dietary issues **(Fowler et al., 2020; Chen et al., 2021).**

In contrast, **Zhang et al. (2021)** examined the Patient-Generated Subjective Global Evaluation Short Form (PG-SGA SF) in nutritional evaluation and survival prediction in older cancer patients. In their 2724-person research, chronic illnesses were similar in 1866 non-malnourished and 858 malnourished patients. This surprising conclusion may be due to demographic differences (such as age and country of

origin) affecting chronic illness distribution, participant clinical features and disease profiles, and study-specific chronic disease criteria.

Our study showed that dietary supplementation raised BMI, BSA, and blood protein levels, improving clinical outcomes. With nutritional supplementation, none of the patients were underweight, compared to 75% without. Nutrition improvement increased cancer treatment tolerance and physical function (PG-SGA and performance status scales, r = 0.611).

Wang et al. (2020) noted that malnutrition is commonly characterised by body composition changes rather than low body weight. A large number of malnourished individuals had a BMI above 24 kg/m², suggesting that higher BMI levels may mask malnutrition. Comprehensive nutritional tests beyond BMI are needed to appropriately detect malnutrition. **Wang et al. (2020)** found that 35.9% of PG-SGA B+C patients had a BMI over 24 kg/m². Fat-free mass index (FFMI) is essential for malnutrition identification due to BMI limitations, especially in older people and growing obesity rates. The ESPEN Consensus Statement suggests a 23 kg/m² BMI criterion for those over 70, recognising BMI limitations in detecting malnutrition, especially in obese and ageing populations.

Yin et al. (2021) observed strong associations between overall PG-SGA scores and nutritional screening instruments including BMI. This validates our study result that dietary evaluation methods strongly influence clinical measures like BMI. Based on PG-SGA scores, they classified patients as well-nourished, mildly/moderately malnourished, or severely malnourished, like our study. While **Yin et al., 2021,** focused on PG-SGA comprehensiveness in detecting malnutrition categories and associated clinical features, our work emphasises nutritional support efficacy in improving GI cancer patients' clinical outcomes.

Zhang et al. (2021) also examined cancer patients hunger and weight loss. Their findings show that a large percentage of patients need nutritional assistance or immediate nutrition-related symptom treatment, highlighting malnutrition in this group. Cancer patients' dietary needs are highlighted by the high rate of weight loss, particularly severe instances. Our study highlights nutritional support role in addressing these issues, but Zhang et al. findings emphasise the need for comprehensive nutritional interventions to address cancer patients complex nutritional needs and reduce malnutrition negative effects on clinical outcomes.

Conclusion

In conclusion, our study underscores the critical importance of nutritional assessment and support in the management of gastrointestinal cancer patients. The Patient-Generated Subjective Global Assessment (PG-SGA) proved to be a valuable tool in identifying patients at high risk of malnutrition, who were predominantly older males with advanced-stage tumors and multiple comorbidities. Nutritional support significantly improved patients BMI, body surface area, and serum protein levels, highlighting its positive impact on clinical outcomes and overall health. These findings advocate for the routine implementation of comprehensive nutritional assessments and interventions to enhance the prognosis for GI cancer patients.

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