RESEARCH ARTICLE

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Prognostic Nutritional Index Is Associated With Gastrointestinal Symptom Severity in Patients Receiving Chemotherapy for Gastrointestinal Cancer: A Cross-Sectional Study

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Abstract

Objective: This study aimed to investigate the relationship between the Prognostic Nutritional Index (PNI) and chemotherapy-related gastrointestinal (GI) symptom severity in patients with GI cancer. **Methods:** This observational cross-sectional study included 262 adult patients with GI cancer receiving chemotherapy at a research hospital in eastern Türkiye. Nutritional status was assessed using the Prognostic Nutritional Index, calculated from serum albumin levels and lymphocyte counts obtained prior to chemotherapy cycles. Gastrointestinal symptom burden was evaluated using the Gastrointestinal Symptom Rating Scale (GSRS). Descriptive statistics, group comparisons, and correlation analyses were performed to evaluate associations between clinical variables, PNI, and GSRS scores. **Result:** The mean PNI score was 39.34 ± 12.31, and nearly half of the participants were classified as at risk for malnutrition based on sample-specific cut-off values. The mean total GSRS score was 36.23 ± 12.06, indicating mild-to-moderate symptom severity. GSRS scores were significantly higher among patients with advanced disease stages and lower PNI values. Correlation analysis revealed a statistically significant negative association between PNI and GSRS scores ($r = -0.239$, $p < 0.05$), demonstrating that poorer nutritional status was associated with greater gastrointestinal symptom severity. In the multiple linear regression analysis, it was determined that cancer stage and chemotherapy protocol had significant effects on PNI and GSRS scores ($p<0.05$). **Conclusion:** This study demonstrates that lower PNI is linked to greater gastrointestinal symptom severity, underscoring the need to integrate routine nutritional evaluation with gastrointestinal symptom monitoring in GI cancer care.

Keywords: Gastrointestinal cancer, Gastrointestinal symptoms, Prognostic Nutritional Index, Nutritional status

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Introduction

Gastrointestinal cancers are showing a rapidly increasing prevalence worldwide. According to International Agency for Research on Cancer (IARC) data, while the number of individuals diagnosed with gastrointestinal cancer in 2022 was 3.9 million, this number is projected to nearly double to 6.72 million by 2045. In Türkiye, approximately 44,500 individuals battled gastrointestinal cancer in 2022, and this number is expected to rise to 83,600 by 2045 (Figure 1, Figure 2) [1].

Chemotherapy is one of the primary methods commonly used in cancer treatment and, due to its cytotoxic effects, can cause a wide range of gastrointestinal symptoms, from changes in taste and appetite to disruption of bowel habits. These gastrointestinal symptoms are observed in approximately 40% of patients receiving standard-dose chemotherapy, and it is known that these rates increase significantly in patients receiving higher doses [2, 3]. Furthermore, chemotherapy-induced gastrointestinal symptoms negatively affect patients' eating behavior, leading to malnutrition and consequently causing a decrease in the prognostic nutritional index (PNI) [4]. The PNI, a multiparametric biomarker based on serum albumin levels and peripheral lymphocyte count, is defined as a comprehensive indicator reflecting both an individual's nutritional status. A low PNI level can further weaken the patient's nutritional status by increasing the severity of gastrointestinal symptoms that develop during chemotherapy [5]. This cycle may negatively affect treatment tolarence, symptom burden, and overall clinical condition. Additionally, in a retrospective study involving 102 stage IV gastric cancer patients receiving first-line chemotherapy, high PNI values were associated with higher chemotherapy completion rates, indicating better treatment tolerance. Conversely, low PNI values indicate malnutrition and impaired immune function, which may make patients more susceptible to chemotherapy toxicity [6]. The biological rationale for this relationship may be that PNI includes lymphocyte count, which reflects bone

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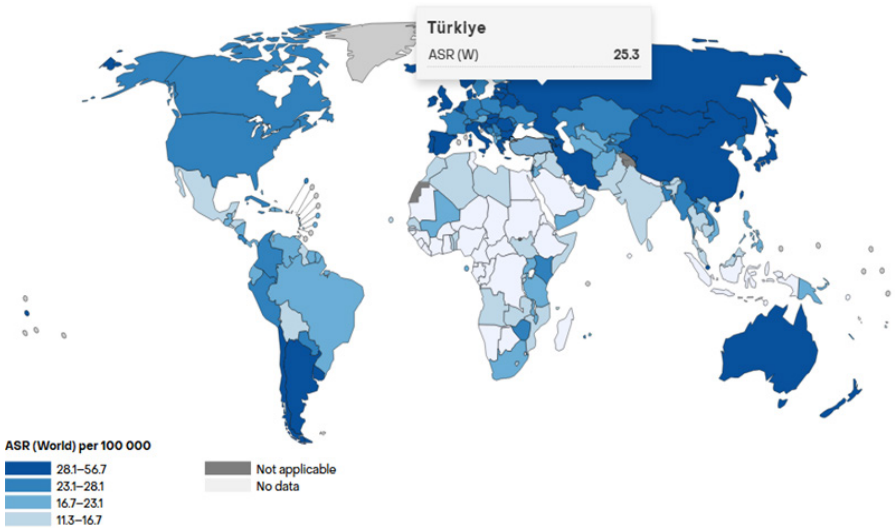

Figure 1. IARC-2022 Age-Standardized Rate per 100 000 Incidence of GI Cancers in Türkiye [1].

marrow function and immune system status [7].

Although PNI and chemotherapy-related gastrointestinal symptoms have been studied in various gastrointestinal cancers, the PNI and gastrointestinal symptoms evaluated together has not yet been sufficiently investigated [5, 8]. However, predicting the relationship between gastrointestinal symptoms in patients with gastrointestinal cancer and the PNI may provide insights into the treatment of these patients and enable the improvement of targeted interventions to enhance nutritional status and clinical outcomes. Therefore, this study aimed to investigate the clinical relevance of chemotherapy-related gastrointestinal symptoms and post-chemotherapy PNI as indicators of nutritional status in GI cancer patients.

Materials and Methods

Study design and setting

This study used a observational cross-sectional design and adhered to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines and examined chemotherapy-related gastrointestinal symptoms and PNI values in patients with gastrointestinal cancer.

Participants

This study was conducted at Atatürk University Research Hospital in eastern Turkiye, from June 2025 to December 2025. There were 447 patients with gastrointestinal cancer in the study population and the sample size was calculated to be 207 using "G.Power-3.1.7", with a 95% confidence level and a maximum error of 5%. A total of 262 patients meeting the inclusion criteria participated in the study. The following inclusion criteria were applied: (1) being 18 years of age or older; (2) being a patient with histopathologically confirmed gastrointestinal cancer; (3) receiving chemotherapy; (4) having no concurrent serious immune disorders or malignancies. Patients were excluded from the study in the following circumstances: (1) inability to take oral medication due to gastrointestinal obstruction;

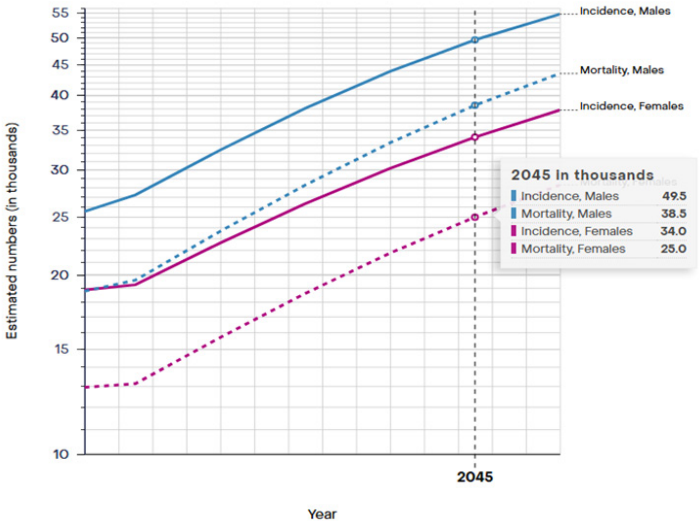

Figure 2. IARC-2022 Estimated Numbers from 2022 to 2045, Males and Females with GI Cancers in Türkiye [1].

(2) receiving treatment in addition to or other than chemotherapy; (3) serious uncontrolled comorbidities; (4) missing data; and (5) serious comorbidities identified by the investigators that could jeopardize patient safety or completion of the study.

Measures

Demographic Characteristics Form: This form, prepared by researchers, included clinical information such as diagnosis, clinical stage, treatment protocol, nutritional status, and nutrition-related laboratory parameters, in addition to patient characteristics such as age, gender, and educational status.

Prognostic Nutritional Index (PNI): PNI is a simple nutritional test that can be used to some extent as an indicator of individual nutritional status in different types of cancer [9]. PNI was applied exclusively for nutritional assessment. A sample-specific median value was used as the cut-off to categorise patients according to nutritional status. The patients' PNI scores were evaluated based on blood results taken 3 days before the next chemotherapy cycle. Serum albumin and lymphocyte counts were classified according to the normal range determined by the hospital laboratory. Due to the descriptive cross-sectional design of the study and the absence of a predefined clinical outcome, ROC analysis was not performed; a sample-specific median value was used as the cut-off to categorise patients according to nutritional status [10, 11], and patients were divided into two groups: PNI ≥ 35,45 (well-nourished) and PNI < 35,45 (at-risk for malnutrition). PNI was calculated as follows:

PNI = serum albumin level (g/L) + 5 × absolute lymphocyte count (10^9/L).

Gastrointestinal Symptom Rating Scale (GSRS): GSRS was first developed by Revicki et al. [12], and was used to assess the severity of gastrointestinal symptoms. The scale consists of 15 items covering five symptom groups: reflux, abdominal pain, indigestion, diarrhea, and constipation. Each item is rated on a 7-point Likert scale ranging from 1 (no symptom) to 7 (very severe symptom). High scores on the scale indicate high symptom severity [12]. The Turkish validity of the scale was established by Turan et al. [13], and the Cronbach α was 0,82. In our study, the Cronbach α was 0,79.

Statistical analysis

The data were analyzed using the SPSS for Windows 22.0 software package. Descriptive statistics, including frequencies, percentages, minimum and maximum values, means, and standard deviations, were used to summarize the characteristics of the sample and study variables. For comparisons between two independent groups, the independent samples t-test or the Mann-Whitney U test was performed according to the distributional properties of the data. For comparisons involving more than two groups, analysis of variance (ANOVA) was conducted. Post hoc analyses were performed using the LSD test when the assumption of homogeneity of variances was satisfied, and Dunnett's C test when this assumption was not met. In cases where the data did not meet parametric test assumptions, the Kruskal-Wallis test was used, followed by pairwise comparisons with the Mann-Whitney U test. For correlational analyses, Pearson's correlation coefficient was used for normally distributed variables, while Spearman's rank correlation coefficient was applied for non-normally distributed variables. The multiple linear regression analysis was performed using the Enter method to determine the effects of cancer stage, treatment protocol, age, and CRP on the PNI and GSRS scores. Internal consistency reliability of the scales was assessed using Cronbach's alpha coefficient. The normality of data distribution was evaluated based on skewness and kurtosis values.

Results

The majority of participants were female (54.6%) and married (95.4%), 77.5% were literate, and 90.1% had a caregiver. Comorbid conditions were present in 60.7% of the sample, while 69.1% were not taking any regular medication. The mean age of participants was 62.56 ± 11.59 years. Laboratory findings indicated a mean serum albumin level of 2.81 ± 0.87 g/dL, mean lymphocyte count of 2261 ± 1735.77 /mm³, mean C-reactive protein (CRP) of 43.84 ± 52.12 mg/L, mean fasting blood glucose of 89.07 ± 25.88 mg/dL, mean urea of 27.64 ± 15.58 mg/dL, mean blood urea nitrogen (BUN) of 15.83 ± 7.73 mg/dL, and mean serum creatinine of 0.93 ± 0.75 mg/dL. Regarding clinical characteristics, 38.9% of participants had a diagnosis of gastric cancer, 61.1% were in stage 3, 38.9% received the Flot protocol, 45.4% had a treatment duration of 12 months or longer, 49.2% received one chemotherapy cycle every 15 days, and 44.7% had a moderate level of nutritional status. (Table 1, Table 2).

The total PNI score was 39.34±12.31, and according to the scale cut-off points, 50.4% of participants scored 35.45 points or higher. Participants scored 36.23±12.06 on the GSRS total, 9.39±3.74 on the Abdominal Pain subscale, 4.80±2.92 on the Reflux subscale, 5.63±3.47 on the Diarrhea subscale, 9.57±5.01 points for the Indigestion subscale, and 6.84±3.79 points for the Constipation subscale (Table 2).

As shown in Table 3, the differences in mean total PNI and GSRS scores across diagnosis, disease stage, treatment protocol, and nutritional status were statistically significant ($p < 0.05$). Patients diagnosed with colon cancer had higher PNI scores compared with those diagnosed with esophageal or gastric cancer. Conversely, GSRS scores were lower among patients with bile duct cancer than among those with esophageal, gastric, or rectal cancer. Regarding treatment protocols, patients receiving Folfox or Folfirinox demonstrated higher PNI scores than those treated with paclitaxel+carboplatin+capecit abine or Flot regimens. In terms of disease stage, PNI scores were significantly lower in stage 4 patients than in those at stages 2,and 3, whereas GSRS scores were significantly higher in stage 4 patients compared with stages 2 and 3. Additionally, GSRS scores of patients receiving gemcitabine+cisplatin therapy were lower than those of patients receiving paclitaxel+carboplatin+cape

Table 1. Demographic Characteristics and Biochemical Parameters

Variables	n	%
Gender		
Female	143	54.6
Male	119	45.4
Marital status		
Single/widow	12	4.6
Married	250	95.4
Educational Status		
Literate	203	77.5
Primary School	12	4.6
High School	26	9.9
University	21	8
Caregiver presence		
Yes	236	90.1
No	26	9.9
Numeric variables	X±SD	-
Laboratory parameters		
Albumin (g/L)	2,81±0,87	-
Lymphocyte (10^9/L)	2261±1735.77	-
CRP (mg/L)	43.84±52.12	-
Glucose (mg/dL)	89.07±25.88	-
Urea (mg/dL)	27.64±15.58	-
BUN (mg/dL)	15.83±7.73	-
Creatinine (mg/dL)	0.93±0.75	-
Age	62.56±11.59	-

Table 2. GSRS and PNI Average Scores

Subscales/scales	n	Min.	Max.	X±SD
Abdominal Pain	262	3	21	9.39±3.74
Reflux	262	2	14	4.80±2.92
Diarrhea	262	3	19	5.63±3.47
Indigestion	262	4	26	9.57±5.01
Constipation	262	3	21	6.84±3.79
GSRS	262	16	82	36.23±12.06
Cut off PNI (Median 35.45)	n	%	-	-
≥35.45	132	50.4	-	-
<35.45	130	49.6	-	-

citabine, Flot, or folfox+capecitabine therapy. Pearson correlation analysis revealed a statistically significant, low-level inverse relationship between PNI and GSRS scores ($p < 0.05$), with higher PNI values corresponding to lower GSRS scores (Table 4).

The multiple linear regression analyses presented in Table 5 indicate that cancer stage and chemotherapy protocol have significant effects on both PNI and GSRS scores ($p<0.05$). In the Model-1, the independent variables explained 5.4% of the variance in PNI scores; it was determined that cancer stage and chemotherapy protocol significantly reduced PNI scores, while age and CRP had no significant effect. The strongest effect was observed for the chemotherapy protocol ($\beta = -0.194$). In the Model-2, the variables explained 9.6% of the variance in GSRS scores; it was determined that cancer stage and chemotherapy protocol significantly increased GSRS scores, while age and CRP had no significant effect. In this model, cancer stage was identified as the strongest predictor ($\beta=0.279$).

Discussion

This study evaluated chemotherapy-related GI symptoms, PNI risk status, and their interrelationships, considering clinical variables such as gender, diagnosis, and treatment protocols. The laboratory findings were consistent with the patients' clinical characteristics, where mean albumin and lymphocyte counts reflected a moderate nutritional status. While elevated CRP levels indicative of systemic inflammation in advanced cancer were associated with decreased PNI scores, the stability of blood glucose, urea, and creatinine levels suggested preserved kidney function. This metabolic stability indicates that patients maintain the physiological capacity to sustain energy and protein intake through oral or supportive routes. Corroborating these findings, Wang et al. [14] associated malnutrition with lower BUN levels in colorectal cancer patients, and Mao et al. [15] identified low albumin combined with high CRP as significant markers of malnutrition risk in gastrointestinal malignancies.

Low PNI can exacerbate chemotherapy-induced gastrointestinal changes, further deteriorating nutritional status and negatively impacting treatment response and overall survival [6]. While the cohort study by Pelc et al. [16], observed low PNI in 30% of gastric cancer survivors, this study found that nearly half of the participants (49.6%) were at risk of malnutrition based on a PNI cutoff of 35.45. This high rate of low PNI likely results from impaired nutritional intake caused by varying symptom severity and gastrointestinal tolerance across different cancer types and chemotherapy regimens. Consistent with Zhao et al. [17], these lower scores are associated with poorer clinical prognosis and reduced treatment tolerance in cancer patients .

Gastrointestinal complications during cancer treatment can compromise patient survival by leading to treatment delays, dose reductions, and a decline in quality of life [18, 19]. Participants in this study experienced mild-to-moderate symptom severity, mirroring the manageable gastrointestinal distress reported by Obulapuram et al. [2] in patients receiving chemotherapy. Furthermore, GSRS scores were significantly higher in patients with poor nutritional status, demonstrating that malnutrition is inversely related to, and directly exacerbates, the burden of gastrointestinal symptoms.

In this study, patients with colon cancer exhibited higher PNI levels than those with esophageal or gastric cancer. This result may be due to the direct impact of upper gastrointestinal tumors on oral intake, which may cause a more pronounced nutritional decline in esophageal and gastric malignancies. Supporting the clinical significance

Table 3. Influence of Demographic and Clinical Variables on the Mean PNI and GSRS Scores

Varibles	PNI			GSRS		
	n	X±SD	Test/p	n	X±SD	Test /p
Gender						
Female	143	39.47±11.99	t=0.186	143	37.52±13.07	t=1.910
Male	119	39.18±12.72	p=0.852	119	34.68±10.57	p=0.057
Comorbidite						
Yes	103	38.85±12.29	t=0.805	159	36.79±12.40	t=-0.923
No	159	40.10±12.35	p=0.421	103	35.38±11.52	p=0.357
Drug use						t=-1.499
Yes	81	41.13±11.95	t=1.578	81	34.57±11.93	p=0.135
No	181	38.54±12.41	p=0.116	181	36.98±12.07	
Cancer type			F=2.342*			F=2.984**
Colon Ca	65	43.91±16.33	p=0.032	65	33.63±11.94	p=0.008
Pancreatic Ca	10	39.21±6.77		10	36.20±16.19	
Esophageal Ca	57	38.89±10.94		57	36.35±14.02	
Biliary Ca	4	33.48±5.80		4	25.50±2.89	
Stomach Ca	102	37.06±10.77		102	37.30±10.05	
Liver Ca	16	39.43±7.85		16	35.50±9.15	
Rectum Ca	8	37.38±8.65		8	49.75±14.51	
Stage			F=4.447*			F=18.249**
2	35	40.73±10.04	p=0.013	35	33.89±8.27	p=0.000
3	160	40.63±12.74		160	33.73±9.83	
4	67	35.52±11.65		67	43.45±15.37	
Chemotherapy protocol						
Folfox, Folforinox	65	43.91±16.33	F=2.342*	65	33.63±11.94	F=2.984**
Folforinox	10	39.21±6.77	p=0.032	10	36.20±16.19	p=0.008
Paksitaksel+Karboplatin+Kapeox	57	38.89±10.94		57	36.35±14.02	
Gemsitabin+Sisplatin	4	33.48±5.80		4	25.50±2.89	
Flot	102	37.06±10.77		102	37.30±10.05	
Atezolizumab+Bevacizumab	16	39.43±7.85		16	35.50±9.15	
Folfox+Kapeox	8	37.38±8.65		8	49.75±14.51	
Treatment period						
0-5 ay	99	39.62±13.86	F=0.985	99	37.64±14.23	F=3.787**
6-11 ay	44	41.34±13.16	p=0.375	44	31.82±9.27	p=0.024
12 ay ve üzeri	119	38.36±10.47		119	36.70±10.63	
Chemotherapy cycle						
Weekly	46	39.40±10.92	F=1.149	46	37.11±16.70	F=1.134
Every 15 days	129	40.37±14.01	p=0.318	129	36.99±11.14	p=0.323
Every 21 days	87	37.78±10.04		87	34.64±10.33	
Nutritional status						
Poor	103	34.45±7.35	F=73.524**	103	38.57±12.96	F=4.000*
Moderate	117	37.69±10.94	p=0.000	117	35.40±9.92	p=0.019
Good	42	55.91±11.90		42	32.81±14.21	

t, Independent samples t-test; F, Variance analysis; *LSD, Least Significant Difference; **, Dunnet C

Table 4. Correlation Analysis Showing the Relationship between PNI and GSRS

		GSRS			PNI
PNI	r	-0.239	GSRS	r	-0.239
	p	0		p	0
	n	262		n	262

*Pearson correlation analysis

of the PNI, Yıldız et al. [20], and Fujita et al. [21] have suggested that PNI can facilitate the selection of adjuvant chemotherapy and identify patients most likely to benefit from treatment in colorectal cancer cases . Regarding symptom burden, GSRS scores were significantly lower in patients with biliary cancer compared to those with

esophageal, gastric, or rectal cancer. This finding may be attributed to the specific sample size and the fact that bile duct tumors do not directly obstruct the gastrointestinal lumen. Consistent with these results, a parallel study by Wang et al. [22] found that patients with esophageal and stomach cancers experience more severe gastrointestinal symptoms compared to other cancer types.

Although evidence linking chemotherapy protocols directly to nutritional status and oncological outcomes remains limited [23], certain agents including Paclitaxel, Carboplatin, and Capecitabine are known to cause GI side effects such as nausea, mucositis, and diarrhea, thereby impairing oral intake and reducing serum albumin levels [24]. In this study, the chemotherapy protocol had the strongest negative effect on the PNI score. The patients treated with Folfox or Folfirinox exhibited higher PNI scores than those receiving Paclitaxel-based or Flot regimens. This difference is likely due to two primary factors: first, these protocols were generally administered to patients with superior performance status and better-preserved nutritional reserves, maintaining the high albumin and lymphocyte levels required for a higher PNI. Second, Folfox and Folfirinox were primarily used for colorectal cancer patients, whose upper gastrointestinal functions typically remain unaffected, allowing for more stable nutritional health. In the study, patients receiving chemotherapy for 6–11 months exhibited higher PNI scores than those in the 0–5 month or 12-month-and-above groups. This finding may be explained by the lower severity of gastrointestinal symptoms observed during the 6–11-month period, which likely facilitated improved oral intake and contributed to the maintenance of nutritional status.

GI toxicity remains a prevalent complication of cytotoxic chemotherapy that will persist until highly selective treatments for malignant cells are developed [24]. Higher severity of these induced symptoms is associated with poorer mental and physical health [18]. In this study, patients treated with Gemcitabine + Cisplatin reported lower GSRS scores compared to those receiving Folfox, Folfox + Capecitabine, or Paclitaxel-based regimens. This suggests the combination is better tolerated by the gastrointestinal system, helping to preserve oral intake and minimize the overall symptom burden.

In this study, while disease stage was a significant variable for both the GSRS and PNI, it was the strongest variable with a positive effect on GSRS scores. The patients in Stage 4 demonstrated significantly lower PNI scores and significantly higher GSRS scores compared with patients in Stages 2 and 3. Supporting these findings, Yildiz et al. [20] described tumor stage as an independent predictor of PNI in gastric cancer. Furthermore, Wang et al. [22] reported that Stage IV patients experience more severe gastrointestinal symptoms. These results indicate that the higher tumor burden in advanced cancer simultaneously compromises nutritional status and exacerbates the gastrointestinal symptom burden.

An increasing number of studies indicate that a high PNI in patients with malignant tumors reflects an adequate nutritional status, whereas a low PNI is closely associated with malnutrition [16, 25]. In this study, patients with

Table 5. Multiple Regression Analyses Examining Factors Influencing PNI and GSRS Scale Scores

Model-1		Beta	SE	Sβ	t	p	%95 CI		VIF
	Constant Coefficient	47.584	5.56	-	8.558	0	36.636	58.533	-
PNI	Stage	-2.745	1.232	-0.137	-2.228	0.027	-5.171	-0.319	1.039
	Chemotherapy protocol	-1.304	0.41	-0.194	-3.179	0.002	-2.112	-0.496	1.023
	Age	0.09	0.064	0.085	1.396	0.164	-0.037	0.217	1.015
	CRP	-0.016	0.019	-0.053	-0.855	0.393	-0.053	0.021	1.044
	Durbin Watson: 1.377		R=0.262	$R^2_{adjusted}$=0.054	F(4,257)=4.741	p=0.001	Model: Enter		
Model-2		Beta	SE	Sβ	t	p	%95 CI		VIF
GSRS	Constant Coefficient	12.984	5.328	-	2.437	0.015	2.492	23.475	-
	Stage	5.494	1.18	0.279	4.654	0	3.169	7.818	1.039
	Chemotherapy protocol	0.911	0.393	0.138	2.316	0.021	0.136	1.685	1.023
	Age	0.039	0.062	0.037	0.63	0.529	-0.083	0.16	1.015
	CRP	0.01	0.018	0.035	0.575	0.566	-0.025	0.046	1.044
	Durbin Watson: 1.592		R=0.331	$R^2_{adjusted}$=0.096	F(4,257)=7.891	p=0.000	Model: Enter		

SE, Standard Error; Sβ, Standard Beta; CI, Confidence interval; VIF, Variance Inflation Factor

poor nutritional status had PNI scores below the 35.45 cutoff point. Previous research has also shown that low PNI is significantly associated with weight loss exceeding 10% during treatment [26]. Such weight loss, often a consequence of chemotherapy-induced gastrointestinal changes may be a clear indicator of nutritional deterioration and the subsequent decline in PNI levels.

Furthermore, the low- significant negative correlation found between PNI and GSRS scores ($r = -0.239$) demonstrates that adequate nutritional status is associated with milder gastrointestinal distress. Although statistically significant, the correlation reflects a weak association, indicating a small clinical effect size, and while patients with better nutritional status tend to report fewer symptoms, this relationship is not strong enough to suggest a direct or dominant influence. Therefore, gastrointestinal symptom burden should be viewed as a result of combined influences including tumor burden, treatment, and individual patient tolerance rather than a reflection of nutritional status in isolation.

Implication of Clinical Practice

This study is valuable for clinical practice in cancer because it provides clear guidance for assessing malnutrition and gastrointestinal symptom burden using simple, evidence-based indicators such as the PNI and GSRS. In the existing literature, the vast majority of studies utilize the PNI to predict clinical outcomes such as survival duration, mortality estimation, or surgical site infection. In this context, PNI is generally handled as a clinical marker for assessing the prognosis of the disease, with a primary focus on objective clinical outcomes . In contrast, this study brings a significant innovation to the literature by associating PNI with GI symptom severity, which directly affects patients' daily quality of life during the chemotherapy process. Specifically, linking PNI directly to patients' subjective experiences makes this study one of the pioneering research in this field. Furthermore, demonstrating the differentiation in PNI and GI symptom severity based on treatment protocols suggests that a low PNI during chemotherapy does not only impact survival but may also create a vicious cycle by exacerbating GI symptoms, which further impairs nutritional status. From this perspective, the study provides a valuable contribution to clinical practice by emphasizing that PNI is not only a prognostic marker but also a parameter that should be integrated into symptom management and care processes.

Limitations

The fact that this study was conducted in a research hospital in Türkiye using a descriptive design and included only patients with gastrointestinal cancer limits the generalizability of the findings to broader populations. The use of a median-based cutoff may limit comparability with other studies.

In conclusion, this study demonstrated a significant negative correlation between PNI and GSRS scores in patients with gastrointestinal cancer; low PNI values were accompanied by high GSRS scores, indicating that malnutrition may exacerbate gastrointestinal symptom burden. The findings highlight that the combined use of PNI and GSRS scores offers valuable insight into treatment tolerance, nutritional planning, and the management of gastrointestinal symptoms. The combined assessment of PNI and GSRS represents a complementary approach that integrates objective biochemical indicators with patient-reported symptom burden. While PNI reflects nutritional and immune status, GSRS shows patients' subjective gastrointestinal experience. These tools using together can enable a more comprehensive and patient-centered evaluation, supporting timely nutritional and symptom-focused care interventions. Accordingly, combined monitoring of PNI and GSRS in patients with gastrointestinal cancer is recommended as a key multidisciplinary approach to guide early nutritional interventions and symptom-management strategies. This integrated assessment may also help maintain patients' quality of life and enhance treatment adherence.

Author Contribution Statement

All authors contributed to the conception and design of the study, critically revised previous versions of the manuscript, and approved the final version for publication.

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None.

Approval

The study protocol was approved by the Ethics Committee of Atatürk University Faculty of Medicine, and the necessary institutional permission was obtained in writing from the relevant hospital (Approval Date: 02.05.2025, Number: 4/02).

Ethical Declaration

All participants were fully informed about the study and voluntarily signed the informed consent form. All procedures were conducted in accordance with the ethical principles of the relevant institutional and national research committees; ethical standards outlined in the 1964 Declaration of Helsinki.

Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

The authors have no conflicts of interest to disclose.

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