



Association between nutritional status and prognosis in patients undergoing palliative care

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Abstract

This study aimed to investigate the association between nutritional status, laboratory parameters, and mortality among patients admitted to the palliative care unit (PCU) of the emergency department (ED). A total of 130 patients transferred from the ED to the PCU between March 2017 and June 2020 were retrospectively analyzed. Demographic characteristics, nutritional patterns, laboratory values, and mortality data were evaluated. The length of stay was significantly longer among patients who were unable to receive oral nutrition (10.52 ± 9.19 days vs. 6.04 ± 5.69 days; $p < 0.05$). No significant association was observed between enteral/parenteral nutrition and mortality ($p > 0.05$). The findings suggest that white blood cell count (WBC), aspartate aminotransferase (AST), and albumin levels are potential predictors of mortality in this patient population. However, enteral/parenteral nutritional support did not significantly affect survival. The observed associations between inflammatory and nutritional parameters and mortality underscore the importance of individualized therapeutic strategies in palliative care settings.

Keywords: Palliative care, nutritional status, mortality, emergency department, and malnutrition

Introduction

Palliative care (PC) can be broadly defined as active care provided to patients with life-limiting illnesses, aiming to improve quality of life by alleviating distressing symptoms [1]. The emergency department (ED) is a frequently visited setting for patients in need of PC [1]. Patients identified in the ED as requiring palliative support may be referred to PC units (PCUs) for continued management [2]. For those requiring hospitalization, admission to a PCU can be arranged following appropriate consultation.

Common symptoms observed in PC patients include pain, nausea, vomiting, dyspnea, bleeding, acute anxiety, delirium, and seizures [3-4]. Additionally, conditions such as pressure ulcers, dehydration, and cachexia are frequently encountered. Effective symptom management begins by addressing potential issues before they progress to clinical complications. One of the

most critical challenges in this patient population is nutritional impairment [5]. These issues often arise from the underlying illness, treatment administered, and coexisting comorbidities [6]. Nutritional difficulties not only affect the patient but also contribute to increased emotional distress among family members [7].

Patients receiving PC should be closely monitored for signs of malnutrition. Anthropometric measurements (e.g., body mass index, fat percentage), daily physical activity, and metabolic status should be assessed, while dietary intake, eating habits, food preferences, and tolerances must be individually evaluated. Physical and psychological symptoms, as well as gastrointestinal dysfunctions that may affect nutritional status, should be identified and addressed accordingly [8].

In this study, we aimed to investigate the relationship between nutritional patterns (oral, enteral, or parenteral nutrition), selected

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laboratory parameters (white blood cell count [WBC], aspartate aminotransferase [AST], and albumin), and mortality in patients admitted to PC from the ED. The findings of this study may help fill the gap in the literature regarding the prognostic impact of malnutrition and the predictive role of inflammatory markers. Furthermore, the results may provide valuable insight into optimizing nutritional support and clinical follow-up strategies for PC patients.

Material and Methods

Study Design

This retrospective study included all patients who presented to the ED of Gaziosmanpaşa University Health Research and Application Center between March 30, 2017, and June 1, 2020, and were subsequently admitted to the PCU. Patients with incomplete data, those referred to surgical or other specialties after PCU admission, those who stayed in the PCU for less than 24 hours, and those who died within 48 hours were excluded from the study.

Data Collection

Patient information was obtained from the hospital’s information system. Demographic data such as age and sex, patients’ diagnoses, presenting complaints, length of stay in the PCU, treatments administered, nutritional status (oral, enteral, etc.), and final outcomes (e.g., death or discharge) were recorded. Laboratory parameters at the time of ED admission—including complete blood count and biochemical tests such as hemoglobin, WBC, platelet count, blood urea nitrogen (BUN), C-reactive protein (CRP), aspartate aminotransferase (AST), lactate dehydrogenase (LDH), and albumin levels—were documented. The relationship between these laboratory parameters and mortality was analyzed. Additionally, the associations between nutritional status, prognosis, and mortality were examined.

Statistical Analysis

Descriptive analyses were performed to present the general characteristics of the patients. Categorical variables are expressed as numbers and percentages (n%), whereas continuous variables are presented as mean ± standard deviation (SD). Quantitative differences between groups were analyzed using the Independent Samples T-Test or One-Way Analysis of Variance (ANOVA), while qualitative differences were assessed using the Chi-Square Test. A p-value of less than 0.05 was considered statistically significant. Statistical analyses were conducted using IBM SPSS Statistics 19 (SPSS Inc., an IBM Company, Somers, NY, USA).

Ethical Approval

The study design was approved by the Yalova University Faculty of Medicine (approval number: 2025/282 this research is in accordance with the principles of the Declaration of Helsinki. During the writing phase, AI-based language models (e.g., DeepL, GPT) were employed to assist with English translation and grammatical refinement. Final decisions on terminology

and stylistic choices were made by the authors to align with disciplinary standards.

Results

A total of 130 patients who presented to the ED and were subsequently admitted to the Palliative Care Unit (PCU) were included in the study. Among the included patients, 59(45.4%) were female and 71(54.6%) were male. During hospitalization, 43 patients (33.1%) died, 78(60.0%) were discharged in stable condition, and 9(6.92%) were transferred to the intensive care unit.

When evaluating repeated admissions to the PCU following initial ED visits, it was found that 116 patients (89.2%) were admitted once, 12 patients (9.2%) were admitted twice, and 2 patients (1.5%) were admitted three times. Regarding the patients’ diagnoses, the most common conditions were: malignant neoplasm of the lung in 32 patients (24.6%), malignant neoplasm of the colon in 20 patients (15.4%), malignant neoplasm of the stomach in 19 patients (14.6%), malignant neoplasm of the pancreas in 12 patients (9.2%), and malignant neoplasm of the ovary in 6 patients (4.6%) (Figure 1).

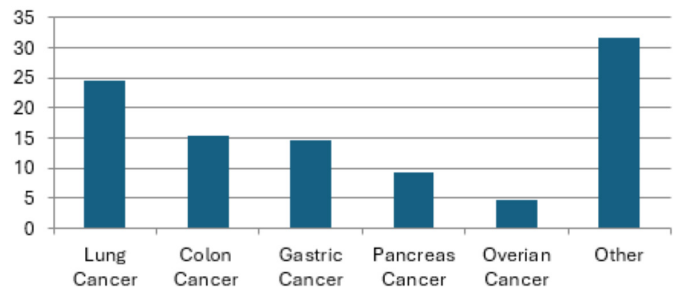


Figure 1. Analysis of diagnoses of patients admitted to the PCU

An analysis of the presenting complaints of patients admitted to the ED prior to PCU hospitalization revealed that 28 patients (21.5%) presented with dyspnea, 25(19.2%) with pain, 25(19.2%) with general deterioration, 24(18.5%) with feeding problems, 9 (6.9%) with fever, 8(6.2%) with bleeding, and 5(3.8%) with abdominal distention.

Physical examination findings showed that 56 patients (43.1%) had signs of infection, 13(10.0%) had pressure ulcers, and 3 patients (2.3%) presented with clinical signs of delirium.

When the treatments administered to the PCU were evaluated, the most common interventions included supportive therapy due to poor general condition in 30 patients (23.3%), nutritional support in 24(18.6%), antibiotic therapy in 24(18.6%), pain palliation in 21(16.3%), and inhaler therapy in 14 patients (10.9%). A total of 94 patients (72.3%) received opioid treatment.

There was no statistically significant association between opioid use and discharge outcome (p>0.05), nor was there a significant relationship between opioid use and length of hospital stay (p>0.05).

Of the patients hospitalized in the PCU, 43(33.1%) died, 78 (60.0%) were discharged with clinical improvement, and 9 (6.92%) were transferred to the intensive care unit.

After evaluating the nutritional status of patients admitted from the ED to the PCU was evaluated, 69 patients (53.1%) were able to receive oral nutrition. Enteral nutritional support was required in 45 patients (34.6%), and 24 patients (18.5%) required total parenteral nutrition. In 126 patients (96.9%), percutaneous endoscopic gastrostomy (PEG) was present.

No statistically significant association was found between nutritional route (enteral, parenteral, or PEG feeding) and discharge outcomes ($p>0.05$).

However, when the relationship between nutritional route and length of stay was analyzed, patients who were able to take oral nutrition had a significantly shorter length of stay (6.04 ± 5.69 days) than those who could not take oral nutrition (10.52 ± 9.19 days) ($p<0.05$).

Table 1. Distribution of qualitative variables according to hospital stay length

Variable	Category (Yes/No)	Length of Stay (Days, Mean $\pm$ SD)	P-value
PEG	No	7.80 $\pm$ 7.12	0.360
	Yes	18.25 $\pm$ 19.38	
Oral Nutrition	No	10.52 $\pm$ 9.19	0.002*
	Yes	6.04 $\pm$ 5.69	
Enteral Nutrition Support	No	7.50 $\pm$ 8.02	0.217
	Yes	9.29 $\pm$ 7.38	
Total Parenteral Nutrition	No	7.32 $\pm$ 6.66	0.076
	Yes	11.83 $\pm$ 11.25	

PEG: Percutaneous endoscopic gastrostomy; ENS: Enteral nutrition support; TPN: Total Parenteral Nutrition; * $p < 0.05$ indicates statistical significance

There was no significant association between enteral and parenteral feeding and length of hospital stay (Table 1).

WBC count, platelet count, CRP, BUN, AST, albumin, LDH, and hemoglobin levels were examined for research purposes, and comparisons were made between deceased patients and those who were discharged. The mean WBC level was 14.11 ± 8.15 in deceased patients and 10.46 ± 7.71 in discharged patients, with a statistically significant difference between the two groups ($p<0.05$); WBC levels were higher in deceased patients. The mean AST level was 146.99 ± 226.89 in deceased patients and 40.98 ± 57.76 in discharged patients, and the association between elevated AST levels and mortality was statistically significant ($p<0.05$). Albumin levels were 2.24 ± 0.57 in deceased patients and 2.74 ± 0.59 in those discharged, with lower albumin levels also showing a statistically significant association with mortality ($p<0.05$). No statistically significant relationship was found between mortality and the other laboratory parameters analyzed ($p>0.05$) (Table 2).

Table 2. Distribution of quantitative variables according to discharge status

Clinical and Laboratory Variable	Deceased (n=43)	Survived (n=78)	p-value
Age (years)	68.47 $\pm$ 12.25	63.97 $\pm$ 13.45	0.067
WBC ($10^3/\mu\text{L}$)	14.11 $\pm$ 8.15	10.46 $\pm$ 7.71	0.014*
Platelet ($10^3/\mu\text{L}$)	268.77 $\pm$ 188.65	282.22 $\pm$ 171.47	0.685
CRP (mg/L)	126.93 $\pm$ 86.7	109.79 $\pm$ 91.19	0.307
BUN (mg/dL)	39.78 $\pm$ 21.88	30.99 $\pm$ 48.88	0.263
AST (U/L)	146.99 $\pm$ 226.89	40.98 $\pm$ 57.76	0.004*
Albumin (g/dL)	2.24 $\pm$ 0.57	2.74 $\pm$ 0.59	0.001*
LDH (U/L)	547 $\pm$ 280.01	400.33 $\pm$ 168.02	0.504
Hemoglobin (g/dL)	10.33 $\pm$ 1.91	10.36 $\pm$ 2.11	0.928
Length of Stay (days)	7.53 $\pm$ 8.44	8.42 $\pm$ 7.52	0.547

WBC: White blood cell; CRP: C-reactive protein; BUN: Blood urea nitrogen; AST: Aspartate aminotransferase; LDH: Lactate dehydrogenase; * Statistically significant at $p < 0.05$

When the relationship between age and discharge status was analyzed, the mean age of patients who died (exitus) was 68.47 ± 12.25 years, whereas the mean age of discharged patients was 63.97 ± 13.45 years. However, no significant association was found between age and mortality ($p > 0.05$).

Discussion

Nutritional status and biochemical parameters may play critical roles in predicting mortality in PC patients. Our study suggests that inadequate oral intake significantly prolongs the length of hospital stay. Elevated WBC and AST levels, along with decreased albumin levels, were associated with an increased risk of mortality. However, despite the relatively small sample size, the lack of a significant impact of enteral/parenteral nutritional support on mortality suggests the need to reevaluate nutritional strategies in the PC population.

Malnutrition and cachexia are common in PC and significantly affect clinical outcomes. In our study, patients without oral intake had significantly longer hospital stays, supporting the notion that insufficient oral nutrition negatively influences the clinical course. Previous studies and international guidelines have shown that malnutrition adversely affects prognosis and increases hospital stay, and adequate nutrition can reduce complications and healthcare costs [9-11]. Furthermore, poor performance status alone may pose a risk for decreased oral intake. Considering this as a cascade process, intervening at an early stage to break this cycle may be a clinical goal. Decreased oral intake can lead to muscle wasting due to energy and protein deficiency, impaired immune function, and increased susceptibility to infections, all of which may prolong hospitalization.

In our study, elevated WBC ($p=0.014$), elevated AST ($p=0.004$), and low albumin levels ($p=0.001$) were significantly associated with mortality. Elevated WBC counts may indicate infection or systemic inflammation, elevated AST levels may reflect liver damage or increased tumor burden, and low albumin levels may reflect malnutrition and chronic inflammation. These findings underscore the importance of inflammatory markers, liver damage indicators, and nutritional status in predicting mortality. Elevated WBC counts may reflect paraneoplastic inflammation or sepsis, both of which are associated with poor outcomes. Our findings are consistent with those of previous studies reporting an association between high WBC counts and increased mortality [12-14].

Increased AST levels in deceased patients may indicate hepatic metastasis, hypoxia, or drug-induced hepatocellular damage. Tsai et al. reported that an AST level above 80 IU/L was associated with a 2.1-fold increase in 3-month mortality [15]. Similarly, Lin et al. found that AST elevation in cancer patients with hepatic metastases was significantly associated with increased mortality [16]. The higher AST levels in our study compared with the literature may reflect the advanced disease stage and comorbidities of our patient population.

Significantly lower albumin levels in deceased patients reflect the negative impact of malnutrition and chronic inflammation on mortality. Tang et al. reported that in PC patients with albumin levels below 2.5 g/dL, the 28-day mortality rate was tripled [17]. According to ESPEN guidelines, albumin levels below 3.0 g/dL are considered a critical threshold requiring nutritional intervention [9]. The low albumin levels in our study suggest either severe malnutrition or advanced liver dysfunction in our patient cohort.

No significant difference in mortality was observed between patients receiving enteral and parenteral nutrition. Similarly, the literature lacks consistent evidence supporting the superiority of one method over another regarding mortality. A prospective study by Bazetti et al. found that the median survival of patients receiving parenteral nutrition was 120 days, but mortality was higher in patients with poor performance scores, regardless of the nutritional method [18]. Likewise, Chermesh et al. reported a mean survival of 140 days in patients with advanced malignancies receiving parenteral nutrition, but mortality remained high despite nutritional support [19]. In contrast, Meier et al. found no significant difference in survival between fed and non-fed patients with advanced dementia [20]. Current evidence does not provide high-quality support that enteral or parenteral nutrition extends survival; existing studies are limited by methodological issues and conflicting results. Our findings are consistent with those of the literature, suggesting no significant impact of either method on mortality.

This study has several limitations. The retrospective design and heterogeneity of the study population (including various primary tumors such as lung, colon, and gastric cancer, and comorbidities) may have confounded the effects of nutritional parameters. The small sample size in the PEG ($n=4$) and TPN ($n=24$) groups limits statistical power. Furthermore, the absence of standardized protocols for nutritional support and the individualized nature of treatment decisions complicate group comparisons. Finally, the lack of long-term survival analysis limits the assessment of clinical outcomes. Moreover, a formal a priori power analysis was not performed due to the retrospective nature of the study. Additionally, the study has limitations due to including a heterogeneous group of patients with varying diagnoses and performance status who were admitted from the ED to the PCU, and the lack of detailed recording of concomitant treatment data.

Conclusion

Our study demonstrates that WBC, AST, and albumin levels may serve as potential predictors of mortality in PC patients. The observed lack of a significant association between enteral/parenteral nutritional support and mortality highlights the need for individualized nutritional strategies in this population. These findings are hypothesis-generating and should not be interpreted as definitive clinical recommendations. Future prospective research is warranted to validate these associations, develop

standardized nutritional protocols, and assess long-term survival outcomes to provide stronger evidence for clinical practice.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The Yalova University Faculty of Medicine (approval number: 2025/282 this research is in accordance with the principles of the Declaration of Helsinki.

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