

The investigation of malnutrition and life quality's relation with mortality in the patients who are 65 years old and above and are hospitalized at the palliative care service

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ABSTRACT

Aims: Our study aims to determine the impact of malnutrition on the quality of life of elderly patients receiving palliative care and identify the factors influencing quality of life.

Methods: The study included patients aged 65 and older who were admitted to the Kırıkkale University Medical Faculty Hospital Palliative Care Service between November 2019 and February 2020. Patients with a history of active malignancy, hospitalization within the past 3 months, severe dementia precluding obtaining written consent, and patients under 65 years of age were excluded. Scores obtained from the Mini Nutritional Assessment-Short Form (MNA-SF) were recorded, with scores of 12 or higher considered as normal nutrition. Those with scores below 12 were reevaluated for malnutrition according to the Global Leadership Initiative on Malnutrition (GLIM) criteria, and those meeting any of the phenotypic and etiological criteria were considered malnourished. Malnutrition severity was reclassified according to the GLIM criteria. The 13-item OPQOL-brief questionnaire was used to evaluate their quality of life. The questionnaire was published in Turkish by Çalışkan et al. Each question was rated on a scale of 1-5, with "Strongly Disagree" scored as 1, "Disagree" as 2, "Undecided" as 3, "Agree" as 4, and "Strongly Agree" as 5.

Results: The mean total MNA score was found to be statistically lower in patients classified as mild and severe malnutrition according to the GLIM classification compared to those without malnutrition ($p < 0.001$). The rate of MNA scores between 12 and 14 in patients without malnutrition was higher than that of patients with mild and severe malnutrition, while the rate of scores between 8 and 11 was higher in patients with severe malnutrition. The rate of scores between 0 and 7 was higher in patients with mild and severe malnutrition ($p < 0.001$). The mean total MNA ($p < 0.001$) and QOL ($p = 0.021$) scores were statistically lower in patients with malnutrition compared to those without malnutrition. The rate of MNA scores between 12 and 14 and between 8 and 11 was higher in patients without malnutrition, while the percentage of MNA scores between 0 and 7 was higher in patients with malnutrition.

Conclusion: In the geriatric patient group, we believe that the GLIM criteria used in our study are more comprehensive and sensitive in detecting malnutrition in terms of phenotypic and etiological aspects through patient questioning.

Keywords: Palliative care, malnutrition, older age, life quality, mortality, GLIM criteria

INTRODUCTION

The field of geriatrics was established with the aim of preserving and treating the health of individuals aged 65 and above. It is crucial for ensuring an active and healthy lifestyle during old age. The goal in geriatrics is to improve the quality of life for elderly individuals.¹ The elderly population is steadily increasing worldwide. While there were 605 million elderly individuals in the world in 2002, it is expected to surpass 1.2 billion people by 2025.² A similar trend can be observed in Turkey as well. According to the Address-Based Population Registration System results by the Turkish Statistical Institute

(TÜİK), in 2007, the elderly population accounted for 7.1% of the total population, which is approximately 5 million people. However, by 2020, this ratio increased to 9.5%, corresponding to around 7,954,000 individuals.³

As the society ages, an increased number of deaths due to chronic diseases is anticipated.⁴ A significant portion of patients receiving palliative care consists of individuals hospitalized due to chronic illnesses.⁵ One of the goals of palliative care is to improve the quality of life, which aligns with the objectives of geriatrics in enhancing the quality of life for the elderly.¹



Patients receiving palliative care are hospitalized for various reasons. In palliative care, the evaluation and management of the patient's pain and other symptoms by experts in the field, as well as assessing and supporting the needs of the patient's family and caregivers, serve as the starting point. Palliative care deals with the physical, functional, psychological, practical, and spiritual aspects arising from a serious illness. It represents a patient- and family-centered approach that helps individuals with serious illnesses alleviate their symptoms and stress. Providing palliative care in severe illnesses improves the quality of life for the patient and their family through early adaptation to this type of care.⁶⁻⁸ Among these reasons, malnutrition holds an important place. Malnutrition has a negative impact on individuals' quality of life and mortality rates.⁹⁻¹¹ In the study, we aimed to reveal the relationship between malnutrition and quality of life in the elderly population, especially due to the aging population, and to draw attention to malnutrition that significantly reduces the quality of life.

METHODS

Ethics

The study was approved by the Kırıkkale University Medical Faculty Non-interventional Clinical Researches Ethics Committee (Date: 25.03.2021, Decision No: 2021.03.07). The participation in the study was based on voluntarism, and informed consent forms were obtained from each patient. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Patient Selection

This study was conducted at the Kırıkkale University Medical Faculty Hospital Palliative Care Service. Patients aged 65 years and older who were admitted to the palliative care service between November 2019 and February 2020 were included in the study.

Exclusion criteria were patients with a history of active malignancy, hospitalization within the past 3 months, severe dementia impairing the ability to provide written consent, and patients under the age of 65.

Methods

The quality of life questionnaire was completed by the patients themselves. For illiterate patients, the questionnaire was administered with the assistance of their first-degree relatives. The case report form, created by the researchers, was completed by the same individuals. The case report form included information such as gender, age, medical history, nutritional status, reason for hospitalization, presence of infectious disease, presence of oncological disease, MNA-SF score, height, weight, BMI, forearm circumference, calf circumference, weight loss, albumin, CRP, vitamin D, length of hospital stay, presence of pressure ulcers, and mortality status. Nutritional route options were recorded as normal nutrition, parenteral nutrition, oral nutritional support (ONS), nasogastric tube feeding (NG), Regime 1+2 (R1+R2), and ONS+parenteral nutrition. The form recorded the nutritional state during hospitalization. CRP, vitamin D levels, and albumin values were recorded. Blood samples were not collected from patients for the purpose of this study. Routine laboratory tests were used.

Scores obtained from the MNA-SF form were recorded: a total score of 12 or higher was considered as normal nutrition.

Those with a score lower than 12 were re-evaluated for malnutrition according to GLIM criteria, and those who met any of the phenotypic and etiologic criteria were considered malnourished. Malnutrition status was reclassified according to the severity of malnutrition based on GLIM criteria.

The 13-item OPQOL-brief questionnaire was administered to assess their quality of life. The Turkish version of this questionnaire was published by Çalışkan et al.¹² Each item was evaluated on a scale of 1-5. The evaluations were made as follows: 'Strongly disagree' 1 point, 'Disagree' 2 points, 'Undecided' 3 points, 'Agree' 4 points, 'Strongly agree' 5 points.

Statistical Analysis

The analyses were performed using IBM SPSS 23.0 software package (IBM Corp., Armonk, NY). Descriptive statistics were presented as n (%) and mean±standard deviation (min-max) or median (min-max) values. The relationships between categorical variables were analyzed using the Pearson chi-square test and Fisher's exact test, and Bonferroni correction was applied for pairwise comparisons. The Shapiro-Wilk test was used to assess the normality assumption. In cases where the measurement values between two groups did not follow a normal distribution, the Mann-Whitney U test was used; in cases where it did follow a normal distribution, Student's t-test was employed. For nonparametric comparison of measurements among three or more groups, the Kruskal-Wallis test was used, and for significant results, the Bonferroni-Dunn test was employed as a post-hoc test. When the normal distribution assumption was met and variance homogeneity was ensured for comparisons among three or more groups, the ANOVA test was used, and for pairwise comparisons, the Tukey HSD test was applied if homogeneity of variances was achieved, and the Dunnett T3 test was used otherwise. In the univariate analysis, multivariate logistic regression analysis was used to independently examine the effects of statistically significant study parameters on three-month and six-month mortality. The results were presented as odds ratios (OR) with a 95% confidence interval. p-values less than 0.05 were considered statistically significant.

Table 1. Demographic and clinical characteristics of the patients that are hospitalized in the palliative care service

	nn:68
Age (Year)	75.81±8.33 (65-97)
Gender	
Male	42 (61.8)
Female	26 (38.2)
Length (m)	1.64±0.09 (1.4-1.85)
Weight (kg)	71.3±14.81 (40-115)
BMI (kg/m ²)	26.65±5.14 (17.31-0.58)
Arm circumference (cm)	26.26±4.04 (17-37)
Calf circumference (cm)	32.87±5.7 (21-53)
Phenotypic criterion	42 (61.8)
Etiological criterion	56 (82.4)
Decubitus ulcer	9 (13.2)
Infection presence	34 (50)
CRP (mg/L)	37 (0.58-337.21)
Albumin (g/dl)	3.37±0.57 (1.98-4.83)
Vitamin D (ng/ml)	10.68 (3-60.6)
Indications are shown with n (%), average±SS (min-max) or median (min-max). Abbreviations: BMI: Body mass index, CRP: C-reactive protein	

RESULTS

When the 68 patients in the study were examined, the comorbidities were as follows: coronary artery disease in 34 patients (50%), hypertension in 49 patients (72.1%), diabetes mellitus (DM) in 21 patients (30.9%), heart failure in 17 patients (25%), pulmonary thromboembolism (PTE) in 5 patients (7.4%), cerebrovascular accident (stroke) (CVA) in 8 patients (11.8%), benign prostatic hyperplasia (BPH) in 11 patients (28.9%), and chronic kidney disease (CKD) in 8 patients (11.8%). Among these 68 patients, 45.6% had oncological diseases, including lung cancer in 22.6%, rectal cancer in 3.2%, prostate cancer in 9.7%, colon cancer in 9.7%, pancreatic cancer in 3.2%, ovarian cancer in 3.2%, stomach cancer in 6.5%, hepatocellular carcinoma in 12.9%, bladder cancer in 3.2%, renal cell carcinoma in 3.2%, myelodysplastic syndrome (MDS) in 3.2%, breast cancer in 3.2%, aplastic anemia in 3.2%, and unknown primary cancer in 12.9%. Looking at the distribution of other diagnoses among the patients, 16.2% had pleural effusion, 5.4% had depression, 13.5% had hypothyroidism, 35.1% had chronic obstructive pulmonary disease (COPD), 13.5% had schizophrenia, 5.4% had cirrhosis, 8.1% had Parkinson's disease, and 2.7% had Alzheimer's disease.

The hospitalization duration, reasons for admission, nutrition methods, and mortality rates of the patients are presented in **Table 2**.

Table 2. Length of hospitalization, reasons for hospitalization, diet and mortality rates of the patients	
Hospitalization time (n:68): day (min-max)	14 (1-96)
Hospitalization reason	n (%)
Pain palliation	15 (22.1)
Oral intake disorder	30 (44.1)
Hipernatremia	2 (2.9)
Hipervolemia	4 (5.9)
Respiratory failure	7 (10.3)
Pressure ulcer	1 (1.5)
Urinary tract infection	6 (8.8)
Hepatic encephalopathy	1 (1.5)
Cellulitis	1 (1.5)
Cholangitis	1 (1.5)
Feeding method	
Normal feeding	31 (45.6)
ONS	28 (41.2)
Parenteral nutrition	2 (2.9)
R1+R2	3 (4.4)
NG	1 (1.5)
ONS+parenteral	2 (2.9)
Low purine diet	1 (1.5)
Zeroth month mortality	7 (10.3)
First month mortality	11 (16.2)
Third month mortality	14 (20.6)
Sixth month mortality	17 (25)

The results are presented as n(%) or median (min-max)
Abbreviations: ONS: Oral nutrition supplement, R1: Regime 1, R2: Regime 2, NG: Nasogastric,

The general characteristics of the patients according to the malnutrition status determined by GLIM criteria are compared in **Table 3**.

Table 3. Comparison of general characteristics according to patients malnutrition status			
	Absent (n:29)	Present (n:39)	P
Age (year)	75.55±7.32 (65-94)	76±9.1 (65-97)	0.828
Gender			0.048
Male	14 (48.3)	28 (71.8)	
Female	15 (51.7)	11 (28.2)	
Length (m)	1.62±0.1 (1.5-1.85)	1.65±0.09 (1.4-1.79)	0.223
Weight (kg)	76.63±14.56 (52-115)	67.33±13.89 (40-109)	0.009
BMI	29.11±4.24 (22.5-38.86)	24.83±5.03 (17.31-40.58)	<0.001
Arm circumference (cm)	27.9±4.09 (19-37)	25.04±3.58 (17-32)	0.003
Calf circumference (cm)	33 (27-53)	31 (21-42)	0.078
Phenotypic criterion	3 (10.3)	39 (100)	<0.001
Ethiological criterion	17 (58.6)	39 (100)	<0.001
Pressure ulcer	2 (6.9)	7 (17.9)	0.282
Infection status	15 (51.7)	19 (48.7)	0.806
CRP (mg/L)	38 (0.58-275)	36 (1-337.21)	0.472
Albumin (g/dl)	3.52±0.61 (2.25-4.83)	3.25±0.53 (1.98-4.31)	0.049
Vitamin D (ng/ml)	17.72 (3-60.6)	10.46 (3.39-35.27)	0.999
Coexisting diseases			
Coronary artery diseases	16 (55.2)	18 (46.2)	0.462
Hypertension	23 (79.3)	26 (66.7)	0.250
DM	11 (37.9)	10 (25.6)	0.278
Heart failure	5 (17.2)	12 (30.8)	0.203
PTE	3 (10.3)	2 (5.1)	0.644
CVA	5 (17.2)	3 (7.7)	0.272
BPH	4 (30.8)	7 (28)	0.999
Oncological disease	9 (31)	22 (56.4)	0.038
Chronic kidney disease	4 (13.8)	4 (10.3)	0.715
Hospitalization time (day)	14 (1-42)	14 (3-96)	0.761
Feeding method			0.021
Normal feeding	19 (65.5)a	12 (30.8)b	
ONS	8 (27.6)a	20 (51.3)b	
Parenteral nutrition	0 (0)a	2 (5.1)a	
R1+R2	1 (3.4)a	2 (5.1)a	
NG	0 (0)a	1 (2.6)a	
ONS+parenteral	0 (0)a	2 (5.1)a	
Low purine diet	1 (3.4)a	0 (0)a	
Zeroth month mortality	1 (3.4)	6 (15.4)	0.225
First month mortality	2 (6.9)	9 (23.1)	0.100
Third month mortality	2 (6.9)	12 (30.8)	0.016
Sixth month mortality	4 (13.8)	13 (33.3)	0.066

The results are presented as n (%), mean±SD (min-max), or median (min-max). Statistical analysis was performed using Student's t-test, Mann-Whitney U test, Pearson chi-square test, and Fisher's exact test. Statistically significant differences between groups were observed. Abbreviations: DM: Diabetes mellitus, PTE: Pulmonary thromboembolism, CVA: Cerebrovascular accident (stroke), BPH: Benign prostate hypertrophy, R1: Regime 1, R2: Regime 2, NG: Nasogastric, ONS: Oral nutrition supplement

Depending on the malnutrition status, patients MNA and quality of life (QOL) scores are compared in **Table 4**.

Table 4. Comparison of MNA and QOL scores of patients according to their malnutrition status			
	Absent (n:29)	Present (n:39)	p
MNA total score	10.17±2.22 (6-14)	7.03±2.37 (2-11)	<0.001
MNA classification			<0.001
12-14	8 (27.6)a	0 (0)b	
8-11	19 (65.5)a	15 (38.5)b	
0-7	2 (6.9)a	24 (61.5)b	
QOL total score	52.72±7.3 (33-63)	47.77±9.41 (19-64)	0.021
The results are presented as n (%) or mean±SD (min-max). Statistical analysis was conducted using Student's t-test and Pearson chi-square test. Statistically significant differences between groups are indicated by different superscript lowercase letters. Abbreviations: MNA: Mini nutrition assessment, QOL: Quality of life			

Patients with malnutrition had statistically lower mean scores in MNA ($p<0.001$) and QOL ($p=0.021$) compared to patients without malnutrition. Among patients without malnutrition, the MNA score was found to be between 12-14 and 8-11 points, while among patients with malnutrition, the percentage of MNA scores between 0-7 points was higher.

There were no statistically significant differences in age ($p=0.767$), gender ($p=0.134$), height ($p=0.367$), calf circumference ($p=0.184$), pressure ulcer ($p=0.467$), infection status ($p=0.713$), CRP ($p=0.665$), albumin level ($p=0.073$), vitamin D levels ($p=0.300$), and hospital length of stay ($p=0.277$) according to the GLIM classification. The weight ($p=0.029$), BMI ($p=0.001$), and arm circumference ($p=0.001$) measurements of severely malnourished patients were lower compared to patients without malnutrition. Phenotypic and etiologic criteria were observed in all patients with mild and severe malnutrition ($p<0.001$). Regarding the distribution of comorbidities according to the GLIM classification, there were no statistically significant differences in coronary artery disease ($p=0.229$), hypertension ($p=0.249$), diabetes mellitus ($p=0.554$), pulmonary thromboembolism ($p=0.842$), CVD ($p=0.388$), and chronic kidney disease ($p=0.715$). The rate of heart failure was higher in patients with mild malnutrition compared to those with severe malnutrition and without malnutrition ($p=0.040$). BPH (benign prostatic hyperplasia) was not observed in severely malnourished patients, while it had the highest percentage in patients with mild malnutrition ($p=0.019$). The rate of oncological diseases was higher in severely malnourished patients compared to those without malnutrition ($p=0.049$). The percentage of normal nutrition was higher in patients without malnutrition compared to severely malnourished patients ($p=0.039$). There were no differences in terms of zero ($p=0.234$), one ($p=0.073$), and six-month mortality rates ($p=0.111$) according to the GLIM classification. However, the three-month mortality rate was higher in patients with mild malnutrition compared to those without malnutrition ($p=0.038$).

According to the GLIM classification, the mean total scores of MNA were statistically lower in patients with mild and severe malnutrition compared to those without malnutrition ($p<0.001$). The rate of MNA scores between 12-14 points was higher in patients without malnutrition compared to those with mild and severe malnutrition, while the rate of MNA scores between 0-7 points was higher in patients with mild and severe malnutrition ($p<0.001$). Although the mean

total score of QOL was lower in patients with mild and severe malnutrition compared to those without malnutrition, this difference was not statistically significant ($p=0.072$).

According to zero and one-month mortality, there were no significant differences in MNA and QOL scores among patients. There were no statistically significant differences in age, gender, weight, BMI, arm circumference, calf circumference, phenotypic criteria, etiologic criteria, pressure ulcer, infection status, CRP, albumin, vitamin D levels, and hospital length of stay among patients with one and three-month mortality. The average height of deceased patients was higher than that of survivors ($p=0.017$). There were no significant differences in the distribution of comorbidities among patients based on mortality. Among patients who died within one month, the percentages of diet 1 and diet 2 were higher, while the percentage of normal nutrition was lower compared to survivors ($p=0.037$). In patients who died within three months, the percentage of male patients was statistically higher than in survivors ($p=0.039$).

According to one and three-month mortality, there were no significant differences in MNA and QOL scores among patients.

When comparing patients' characteristics based on three-month mortality, there were no statistically significant differences in age, weight, BMI, arm circumference, calf circumference, etiologic criteria, pressure ulcer, infection status, CRP, albumin, vitamin D levels, and hospital length of stay ($p>0.05$). The percentage of male patients was statistically higher among those who died within three months compared to survivors ($p=0.039$). The average height of deceased patients was higher than that of survivors ($p=0.003$). The percentage of phenotypic criteria was higher among deceased patients compared to survivors ($p=0.039$). There were no significant differences in the distribution of comorbidities among patients based on three-month mortality, except for higher percentages of PTE ($p=0.044$) and oncological diseases ($p=0.029$) among those who died within three months. The percentage of diet 1, diet 2, and ONS+parenteral nutrition was higher, while the percentage of normal nutrition was lower among patients who died within three months compared to survivors ($p=0.004$).

Similarly, when comparing patients' characteristics based on six-month mortality, there were no statistically significant differences in age, weight, BMI, arm circumference, calf circumference, etiologic criteria, pressure ulcer, infection status, CRP, albumin, vitamin D levels, and hospital length of stay ($p>0.05$). The percentage of male patients was statistically higher among those who died within six months compared to survivors ($p=0.010$). The average height of deceased patients was higher than that of survivors ($p<0.001$). The percentage of phenotypic criteria was higher among deceased patients compared to survivors ($p=0.044$). There were no significant differences in the distribution of comorbidities among patients based on six-month mortality, except for a higher percentage of oncological diseases ($p=0.003$) and a lower percentage of DM ($p=0.049$) among those who died within six months. The percentage of ONS+parenteral nutrition was higher, while the percentage of normal nutrition was lower among patients who died within six months compared to survivors ($p=0.027$).

When comparing the MNA (Mini Nutritional Assessment) total scores ($p=0.304$), MNA classification rates ($p=0.558$), and QOL (Quality of Life) total scores ($p=0.286$) according to six-month mortality, no statistically significant difference was observed.

Figure 1 presents the results of the correlation analysis between MNA score and QOL score. There was no statistically significant correlation observed between MNA score and QOL score ($p=0.219$).

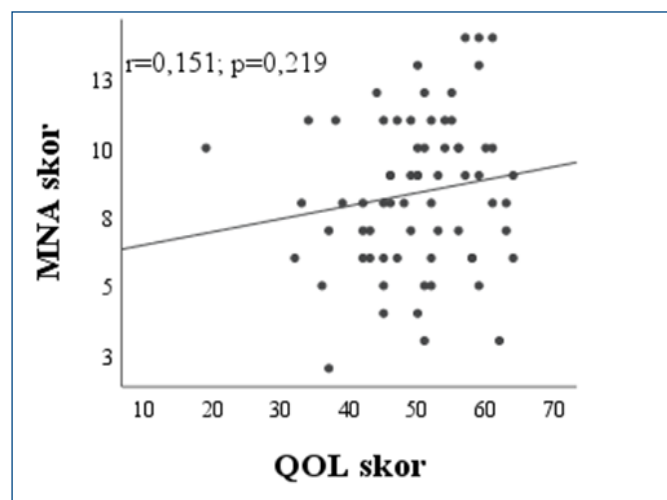


Figure 1. The correlation analysis between MNA score and QOL score

Although no statistically significant difference was found, those who died during hospitalization and in the first month had the lowest quality of life (QOL) scores, while those who died in the 3rd and 6th months had higher QOL scores. Among the survivors, the highest quality of life was observed during hospitalization, and it was found that the quality of life gradually decreased as the follow-up period progressed. According to these findings, individuals who lived longer (i.e., those who died later, in the 3rd and 6th months) had the highest quality of life.

Figure 2 presents the correlation analysis between GLIM classification and QOL score. A statistically significant weak negative correlation was found between GLIM classification and QOL score ($r = -0.286$; $p=0.018$)

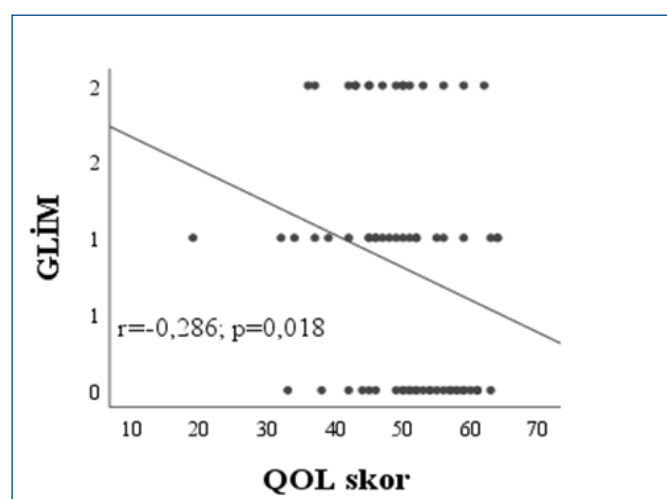


Figure 2. The correlation analysis between GLIM classification and QOL score

DISCUSSION

In the study conducted by Miniksar et al.¹³ on palliative care, the reasons for hospitalization were reported as follows: inadequate oral intake 58.3%, care education 14.3%, pain palliation 12.8%, pressure ulcer care 7.5%, and other

reasons 7.2%. However, Çınar et al.¹⁴ identified the reasons as follows: 33.3% Alzheimer's disease, 16.7% CVA, 5.6% chronic kidney failure, 13% heart failure and coronary artery disease, 3.7% COPD and asthma, 1.9% cerebral palsy, 3.7% psychiatric diseases, 18.5% malignancies, and 3.7% femoral neck fracture. In our study, the top five reasons were determined as follows: 44.1% oral intake disorder, 22.1% pain palliation, 10.3% respiratory failure, 8.8% urinary tract infection, and 5.9% hypervolemia.

The study by Miniksar et al.¹³ showed similar rates of oral intake disorder and pain palliation. The differences in findings between our study and the study by Turgut et al.¹⁵ were attributed to the distinction made based on disease groups. It was also noted that the differences between our study and the study by Çınar et al.¹⁴ might be due to the inclusion of both home and hospital palliative care patients in their study.

In the study conducted by Ülger et al.¹⁶ on patients admitted to a geriatric clinic, they found that malnourished patients had the following rates: 27.6% diabetes mellitus (DM), 27.6% hypertension, 28.9% coronary artery disease, 32.5% CVA, 35.5% congestive heart failure, 27.2% chronic obstructive pulmonary disease (COPD), and 54.2% pressure ulcers. In the study by Döğler et al.¹⁷ conducted at Ankara Ulus Palliative Care Hospital between January 2013 and October 2015, they found the following rates: neurological diseases 42.3%, cancer 23.4%, chronic systemic conditions (chronic lung, heart, and kidney diseases, and DM) 41.4%, infections 10.8%, and pressure ulcers 40.5%.

In our study, we identified the following rates: 50% coronary artery disease, 72.1% hypertension, 30.9% DM, 25% heart failure, 7.4% pulmonary thromboembolism (PTE), 11.8% cerebrovascular accident (stroke), 28.9% benign prostatic hyperplasia (BPH), 45.6% oncological disease, 13.5% hypothyroidism, 35.1% COPD, 13.5% schizophrenia, 8.1% Parkinson's disease, and 2.7% Alzheimer's disease. The differences in rates compared to other studies were attributed to the smaller sample size in our study.

In the study conducted by Miniksar et al.¹³, malignancy was detected in 43.3% of the patients, with lung cancer accounting for 13.1%, colon cancer for 2.8%, breast cancer for 1.2%, bladder cancer for 1.2%, prostate cancer for 3.7%, stomach cancer for 5.3%, pancreatic cancer for 3.1%, and other malignancies for 12.8%. In the study by Şenel et al.¹⁸ conducted between January and December 2014 in palliative care, the rates of malignancy were as follows: gastrointestinal system 21%, lung 19%, genitourinary system 15%, head/neck 12%, pancreas 11%, breast 10%, hepatobiliary 3%, other 5%, and unknown primary 4%. In our study, malignancy was detected in 45.6% of the patients, with the following distribution: 22.6% lung cancer, 3.2% rectal cancer, 9.7% prostate cancer, 9.7% colon cancer, 3.2% pancreatic cancer, 3.2% ovarian cancer, 6.5% stomach cancer, 12.9% hepatocellular carcinoma, 12.9% unknown primary malignancy, 3.2% bladder cancer, 3.2% renal cell carcinoma, 3.2% myelodysplastic syndrome, 3.2% breast cancer, and 3.2% aplastic anemia.

In the study by Turgut et al.¹⁴, the distribution of nutrition was found to be 50.3% oral, 27.5% enteral, and 22.2% parenteral. In the study by Yürüyen et al.¹⁹ conducted between August 2015 and July 2017 in palliative care, the distribution of nutrition status was found to be 72% enteral

(76% oral, 12% nasogastric tube, and 12% percutaneous endoscopic gastrostomy) and 28% parenteral. In our study, 45.6% of the patients received normal nutrition, 41.2% received oral nutritional support, 4.4% followed diet regimens 1 and 2, 2.9% received parenteral nutritional support, 2.9% received oral+parenteral nutritional support, and 1.5% received purine-restricted nutritional support. The different patterns of nutrition may be due to the patients' co-existing medical conditions, decreased oral intake, and variations in the reasons for hospitalization compared to other patients.

In the study conducted by Maier et al.²⁰ at a geriatric center, according to the GLIM criteria, mild malnutrition was found in 36% of the patients, while severe malnutrition was found in 16%, resulting in a prevalence of malnutrition of 52.0%. In the study by Maeda et al.²¹, malnutrition according to the GLIM criteria was found to be 25.7% in patients aged 70 and above, with 13% classified as mild malnutrition and 12.6% as severe malnutrition. In our study, based on the GLIM criteria, mild malnutrition was found in 33.8% of the patients, while severe malnutrition was found in 23.5%. The variation in the prevalence of malnutrition compared to other studies may be attributed to differences in the criteria used to define study groups and variations in the number of participants.

In a study conducted by Matsumo et al.²² on elderly patients presenting to the emergency department, the percentages of the at-risk group, malnourished group, and non-malnourished group according to the MNA short form were reported as 34%, 18%, and 48%, respectively. In a study by Abd-El-Gawad et al.²³ conducted at a geriatric center on individuals aged 60 and above using the MNA short form, they found that 46% of the individuals were at risk of malnutrition. In our study, the percentages were as follows: normal nutrition group 11.8%, at-risk group for malnutrition 50%, and malnourished group 38.2%. The differences between our study and these studies may be due to variations in the inclusion criteria and the number of participants.

Gartner et al.²⁴ conducted a study at a geriatric center where the average length of hospital stay was found to be 11 days, while Balci et al.²⁵ reported a duration of 10.5 days in their study, which is similar to the 14-day hospital stay in our study.

In the study by Sousa-Santos²⁶, women were found to be at higher risk in terms of malnutrition ($p=0.002$). In the study by Ülger et al.¹⁶, 68% of those identified with malnutrition were women, and the risk of malnutrition was significantly higher in women (32%) compared to men ($p=0.005$). In our study, in contrast to these studies, the prevalence of malnutrition was found to be significantly higher in men ($p=0.048$). This discrepancy may be attributed to the use of the MNA short form for defining malnutrition in other studies, while our study used the GLIM criteria.

In the retrospective study conducted by Balci et al.²⁵, significant differences were found in weight and BMI between patients with and without malnutrition according to the GLIM criteria ($p<0.001$). Similar results were found in the study by Kootaka et al.²⁷ based on the GLIM criteria ($p<0.001$). In our study, similarly, body weight and BMI were significantly lower in individuals with malnutrition. Since the same criteria were used to define malnutrition in our study, similar results were obtained as in other studies.

Shimizu et al.²⁸ reported the presence of phenotypic and etiological criteria in patients with malnutrition ($p<0.001$) in their study. Similar results were obtained in our study.

In three separate studies conducted by Shimizu et al., Balci et al.²⁵, and Yin et al.²⁹ based on the GLIM criteria, significantly lower mid-arm circumference and albumin levels were found in individuals with malnutrition ($p<0.001$). Similarly, in our study, mid-arm circumference ($p=0.038$) and albumin ($p=0.0049$) were significantly lower in patients with malnutrition. In Yin et al.'s study, based on the GLIM criteria, significantly lower calf circumference ($p<0.001$) was found in individuals with malnutrition. However, there was no statistically significant difference in calf circumference in our study. This may be due to peripheral edema secondary to low albumin levels related to underlying comorbidities in our palliative care patients, which could have affected the measurement of calf circumference.

In the study by Kootaka et al.²⁷, the rate of oncological diseases was found to be higher in individuals with malnutrition compared to other diseases ($p<0.001$). Sanchez-Rodriguez et al.³⁰ also reported a significantly higher prevalence of malignancies in individuals with malnutrition based on the GLIM criteria ($p<0.001$). Similarly, in our study, using similar criteria, a significant association was found between malnutrition and oncological diseases ($p=0.038$).

Yin et al.²⁹ reported a higher prevalence of enteral nutrition ($p=0.010$) and parenteral nutrition ($p<0.001$) in patients with malnutrition. In the study by Kootaka et al.²⁷ based on the GLIM criteria, a higher prevalence of comorbidities such as COPD, heart failure, and dyslipidemia was observed in individuals with malnutrition ($p<0.001$). In our study, the rate of normal nutrition was lower in individuals with malnutrition, while the rate of oral nutritional supplementation (ONS) was higher compared to those without malnutrition ($p=0.021$). This result may be attributed to the decrease in normal nutrition in patients with malnutrition and subsequent initiation of oral nutritional support therapy.

Efendioğlu et al.³¹ conducted a study in a geriatric center over a one-year period and found the mean vitamin D level to be 12.64 ± 11.12 . Similarly, in our study, the vitamin D level was found to be $10.68 (3-60.6)$, which may be due to the selection of geriatric patients in these studies.

In the study by Abd-El-Gawad et al.²³, conducted in individuals aged 65 and above, there was no statistically significant difference in 3-month ($p=0.124$) and 6-month ($p=0.330$) mortality rates based on the MNA short form criteria for diagnosing malnutrition. However, in our study, individuals with malnutrition based on the GLIM criteria had a higher 3-month mortality rate ($p=0.016$). This difference in results could be attributed to the use of different criteria for defining malnutrition in these patients.

In the study by Sanchez-Rodriguez et al.³⁰, conducted in the elderly population between 2013 and 2019, individuals with malnutrition based on the GLIM criteria had significantly lower MNA scores ($p<0.001$). Additionally, in this study, quality of life scores were assessed using SF-36 and EUROQOL, and only SF-36 scores were significantly lower ($p<0.001$) in individuals with malnutrition. Rasheed et al.³² demonstrated an association between MNA short form scores and quality of life scores (SF-36, EUROQOL) in elderly individuals. In our study, individuals with malnutrition had significantly lower MNA scores and QOL scores. The different results in terms of quality of life may be attributed to the use of different tests for assessing quality of life.

In the study by Matsumoto et al.²², measurements of weight, BMI, and arm circumference were significantly lower ($p < 0.001$) in severely malnourished patients compared to non-malnourished patients. Similarly, in our study, weight, BMI, and arm circumference measurements were lower in severely malnourished patients compared to non-malnourished patients. The similarity in results can be attributed to the use of similar patient groups and the same criteria.

Balcı et al.²⁵ examined the distribution of comorbidities in patients according to the GLIM classification and found no statistically significant difference in terms of coronary artery disease, hypertension, diabetes mellitus, and chronic kidney disease (CKD) rates. In our study, when patients' comorbidities were analyzed based on the GLIM criteria, there was no statistically significant difference in terms of coronary artery disease, hypertension, diabetes mellitus, and CKD rates. The similarity in results may be attributed to the use of similar patient groups and the same criteria.

In the study by Kootaka et al.²⁷, heart failure diagnosis was found to be significantly higher in individuals with malnutrition according to the GLIM criteria compared to those without malnutrition. In our study, the rate of heart failure was higher in individuals with mild malnutrition compared to those with severe malnutrition and those without malnutrition. This result may be due to the small sample size and the selected patient group.

In the study by Sanchez-Rodriguez et al.³⁰, the 5-year mortality rate in individuals with malnutrition according to the GLIM criteria was found to be 26.8%. In the study by Kootaka et al.²⁷, which had an average follow-up period of 2.3 years, the mortality rate in individuals with malnutrition according to the GLIM criteria was determined to be 37.9%. Both studies showed a statistically significant difference ($p < 0.001$) compared to individuals without malnutrition. In the study by Yılmaz et al.³³, a 1-year follow-up study conducted on individuals with hematological diseases according to the GLIM criteria, mortality was found to be significantly different in individuals with malnutrition. In our study, according to the regression analyses conducted, malnutrition was not found to be a risk factor for mortality. This may be due to the short follow-up period and small sample size compared to other studies.

In the study by Kruger et al.³⁴, which primarily focused on data from individuals aged 70 and above, including the United States and five other countries, male gender was found to be associated with mortality. However, in our study, male gender was not found to be a factor influencing mortality. This could be attributed to the small number of individuals in the study.

According to the study by Huang et al.³⁵, which involved a 10-year follow-up of older adults, diabetes mellitus (DM) and its complications were associated with mortality. However, in our study, DM was not found to be a risk factor for six-month mortality. This could be attributed to the short duration of our study.

In the study by Gentile et al.³⁶, which conducted a 3-month follow-up study on 924 elderly patients, the presence of malnutrition was found to be associated with increased mortality. However, in our study, this association was not found to be statistically significant. This could be due to both the smaller sample size in our study and the difference in malnutrition assessment. While other studies used the Mini Nutritional Assessment Short Form (MNA-SF) for

malnutrition assessment, our study used the GLIM criteria, which might have led to different results.

Karaman et al.³⁷ conducted a study on elderly residents in a nursing home and found a correlation between MNA-SF scores and quality of life. However, in our study, no correlation was found. This could be attributed to the use of different questionnaires for assessing quality of life. The previous study utilized the WHOQOL questionnaire, while we used the OPQOL-bref questionnaire.

In patients with a history of hospitalization in palliative care centers, especially in the geriatric age group, it has been shown that quality of life deteriorates over time. This may be due to the lack of potential for complete recovery in palliative care patients, their continuous need for close care, and often inadequate nutritional status. Additionally, the progressive exhaustion experienced by the caregivers of these patients who have no chance of recovery and require close attention could contribute to the decrease in patients' quality of life. When comparing patients who were discharged or deceased during the hospitalization period with those who were discharged or deceased at 1, 3, and 6 months, it was observed that those with higher QOL scores had higher mortality rates, contrary to our expectations. This could be attributed to the fact that caregivers of patients with worse overall conditions and lower life expectancy tend to provide more care.

In geriatric patients requiring palliative care, quality of life decreases over time, and mortality rates increase. The fact that individuals with higher quality of life tend to die earlier suggests that the increased attention provided by caregivers to patients with poorer overall conditions may improve their quality of life. Palliative care involves a holistic approach that includes the patient, their caregivers, auxiliary healthcare personnel, and the medical team, necessitating teamwork. Improving the patient's quality of life depends not only on caring for the patient but also on enhancing the quality of life of other members of the team.

Study limitations: It is a retrospective, small number of patients and a single center.

CONCLUSION

Geriatric palliative care patients often have multiple comorbidities, which worsen their overall condition and increase the prevalence and severity of malnutrition. The addition of malnutrition in this patient group is associated with decreased quality of life and increased mortality. Palliative care management is a holistic approach that involves the patient, their caregivers, auxiliary healthcare personnel, and the medical team, requiring teamwork. Improving the patient's quality of life depends not only on caring for the patient but also on enhancing the quality of life of other members of the team. In this patient group, we believe that the GLIM criteria used in our study are more comprehensive and sensitive in assessing malnutrition in terms of both phenotypic and etiological aspects of patient evaluation. Considering the increasing number of elderly individuals and the growing demand for palliative care, we believe that more extensive studies involving a larger number of patients should be conducted in this field.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was initiated with the approval by the Kırıkkale University Medical Faculty Non-interventional Clinical Researches Ethics Committee (Date: 25.03.2021, Decision No: 2021.03.07).

Informed Consent: Written consent was obtained from the patient participating in this study.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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