Adıyaman Üniversitesi Sağlık Bilimleri Dergisi, 2024;10(2):163-169
doi:10.30569.adiyamansaglik.1426866

E-ISSN: 2458-9176

ADIYAMAN ÜNİVERSİTESİ SAĞLIK BİLİMLERİ DERGİSİ
JOURNAL OF HEALTH SCIENCES OF ADIYAMAN UNIVERSITY

Research Article/Özgün Araştırma

Investigation of situation for development of infection, nutritional and length of hospital stay in elderly hospitalized in a palliative clinic

Palyatif klinikte yatan yaşlılarda enfeksiyon gelişimi, beslenme durumu ve hastanede kalış süresinin araştırılması

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Atıf gösterme/Cite this article as: Balcıoğlu İ, Korkut Kurtoğlu Y. Investigation of situation for development of infection, nutritional and length of hospital stay in elderly hospitalized in a palliative clinic. *ADYÜ Sağlık Bilimleri Derg*. 2024;10(2):163-169. doi:10.30569.adiyamansaglik.1426866

Abstract

Aim: In our study, we aimed to evaluate patients' nutritional status, compare frequently used nutritional scales with each other and with the duration of hospitalization, and measure the effect of nutritional status on infection and mortality who are in the elderly.

Materials and Methods: Nutritional Risk Screening-2002, Mini Nutritional Assessment, and Geriatric Nutritional Risk Index were used. Patients were monitored for infection and mortality throughout the hospitalization period.

Results: The prevalence of malnutrition was found 98.6% with Mini Nutritional Assessment, 97.3% with Nutritional Risk Screening-2002, and 87.1% with Geriatric Nutritional Risk Index. A high correlation was found between the Geriatric Nutritional Risk Index and albumin, body mass index, arm, and calf circumference.

Conclusion: The malnutrition rate is quite high in patients who need palliative care. The Geriatric Nutritional Risk Index, compared to Nutritional Risk Screening-2002 and Mini Nutritional Assessment, is an effective and user-friendly scale that contains objective variables in bed-dependent patients for nutrition.

Keywords: Infection; Malnutrition; Elderly; Palliative care.

Öz

Amaç: Çalışmamızda, palyatif bakım ünitesinde takip edilen yaşlı hastaların beslenme durumlarını değerlendirmeyi, sık kullanılan nutrisyon ölçeklerini birbirleriyle ve hastanede yatış süresiyle karşılaştırmayı, nutrisyonel durumun enfeksiyon ve mortalite üzerindeki etkisini ölçmeyi amaçladık.

Gereç ve Yöntem: Nutrisyonel Risk Taraması-2002, Mini Nutrisyonel Değerlendirme ve Geriatrik Nutrisyonel Risk İndeksi kullanıldı. Yatış süresi boyunca hastalar enfeksiyon ve mortalite açısından takip edildi.

Bulgular: Malnutrisyon sıklığı Mini Nutrisyonel Değerlendirme ile %98,6, Nutrisyonel Risk Taraması-2002 ile %97,3 ve Geriatrik Nutrisyonel Risk İndeksi ile %87,1 olarak bulundu. Geriatrik Nutrisyonel Risk İndeksi ile albumin, vücut kitle indeksi, kol çevresi ve baldır çevresi arasında yüksek düzeyde korelasyon mevcuttu.

Sonuç: Palyatif bakıma ihtiyaç duyan hastalarda malnütrisyon oranı oldukça yüksektir. Geriatrik Beslenme Risk İndeksi, Beslenme Risk Taraması-2002 ve Mini Nutrisyonel Değerlendirme ölçeği ile karşılaştırıldığında, yatağa bağımlı yaşlı hastalarda beslenme açısından objektif değişkenler içeren etkili ve kullanıcı dostu bir ölçektir.

Anahtar Kelimeler: Enfeksiyon; Malnutrisyon; Yaşlılık; Palyatif bakım.

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Geliş Tarihi/Received:28.01.2024 **Kabul Tarihi/Accepted:**10.06.2024 **Yayım Tarihi/Published online:**30.08.2024

Introduction

Palliative care is a discipline that aims to improve the quality of life of end-stage patients with limited treatment options, including cancer, and their relatives. By providing support for physical, social, psychological, and spiritual aspects.[1] In the palliative care unit, besides infections, pressure sores, organ failures, neurological diseases, and malignancies, malnutrition is one of the important problems.[2] Malnutrition is a nutritional status in which systemic, metabolic, and mental functional disorders are seen as a result of taking macronutrients and micronutrients either more or less than needed. Although the term malnutrition includes the concepts of over-nutrition (obesity) and undernutrition, it is used synonymously with undernutrition.[3] Malnutrition starts to develop as a result of the intake of nutrients as low as it cannot continue the body functions (anorexia, malabsorption, etc.) or failure of food intake to satisfy the increasing need due to illness, trauma, and infection. It is also seen as a combination of these two mechanisms.[4] In a study conducted in Turkey, patients evaluated in hospitalization period, with a Subjective Global Assessment (SGA) of 30%, with a Nutrition Risk Index (NRI) of 36% of malnutrition identified. Prevalence of malnutrition varies between 20-50%. according to the place and shape of the application. [5]

There is no single examination finding, laboratory test and scale for the diagnosis of malnutrition. In the evaluation of the patient comprehensive research is required involving; anamnesis, physical examination, anthropometric and functional measurements, hematological and biochemical markers, and imaging methods.[6] Versatile scales have been developed to screen and evaluate malnutrition. Among the most commonly used are Mini Nutritional Assessment (MNA) for the geriatric population, Nutritional Risk Screening (NRS-2002) for hospitalized patients, and Geriatric Nutritional Risk Index (GNRI) for nutritionally-related risk calculation over 65 years of age.[7,8] Albumin, prealbumin, transferrin, retinol-binding protein, and lymphocytes are frequently used in laboratory assessment of nutritional assessment.[9,10]

Nutrition methods are divided into two subgroups; enteral and parenteral. Enteral feeding can be done orally or by utilizing a tube. Oral nutrition, if possible, is the method of first choice. If the daily energy requirement cannot be met orally, enteral nutrition should be provided either by nasogastric and nasoduodenal catheterization, gastrostomy, or jejunostomy. Parenteral nutrition can be done as peripheral and central. It is not a permanent method except in special cases, It is preferred until enteral feeding is provided or to support enteral feeding.[11,12]

In our study it was aimed to evaluate the patients who are in the palliative care unit for malnutrition, to compare used nutritional scales, ways of feeding, infections, hospitalization time, and mortality.

Materials and Methods

This study was designed as a sectional. It included 70 patients aged 65 years and over having at least one chronic disease (diabetes mellitus, hypertension, etc.) and those who had been followed up in the palliative care unit for at least three days between April - September 2018. Patients with amputation and musculoskeletal deformity in the extremities were excluded from the study.

The sociodemographic and clinical data forms created by the researchers were filled. Sociodemographic data included gender, age, educational status, occupation, marital status, and income level. Clinical data from included medical history, nutrition type, infection, culture results, NRS-2002, GNRI, MNA, height, body weight, body mass index (BMI), knee height (KH), arm circumference (AC), calf circumference (CC), hemoglobin, thrombocyte, neutrophil, lymphocyte, leukocyte, high-density lipoprotein (HDL), monocyte, ferritin, albumin, c-reactive protein (CRP), hospitalization time and outcome. The nutrition type was recorded as oral or percutaneous endoscopic gastrostomy (PEG). The predominant nutrition type in the last month was taken as the basis.

In a supine position, while the femur and knee flexed 90 degrees, KH and CC were measured with non-elastic tape. While the patient is sitting and the front arm is at supination, AC was measured with non-elastic tape from the midpoint of acromion and olecranon. Body weight, height, BMI were calculated by the following formulas:

- Height:
  - Man: (KHx2.08)+59.01
  - Woman: (KHx1.91)-(Ax0.17)+75
- Body weight:
  - Man: (KHx1.10)+(ACx3.07)-75.81
  - Woman: (KHx1.09)+(ACx2.68)-65,51
- Body mass index (kg/m^2):
  - Body weight (kg)/height (m)xheight(m)
- KH: Knee Height A: Age AC: Arm Circumference

The NRS-2002 and MNA scales were applied by the researchers. The GNRI score was calculated by the following formula:

- GNRI = [1.489x Albumin (g/L)]+[41.7x(patient body weight/ideal body weight)]
- Body weight calculated using the formulas above
- Ideal Weight: Body Mass Index was calculated in a way to be 22
- If the body weight is greater than the ideal body weight patient's body weight/ideal body weight ratio was taken 1

The patient was followed up for infections during the period of hospitalization. The duration of hospitalization was calculated in days. Mortality was accepted as death within the period of hospitalization in the palliative care unit.

Statistics

Data were analyzed with the SPSS 25 computer statistics program. Data were presented in number, percentage, mean and standard deviation (SD), median, and 95% confidence interval (CI). Normality distribution of numerical data by Kolmogorov-Smirnov test reviewed. Chi-square test was used to analyze categorical data. The Kruskal-Wallis test followed by Dunn's post hoc test was used (with Bonferroni correction). The statistical significance level was taken as $p<0.05$.

Ethics committee approval

The present study was performed in line with the principles of the Declaration of Helsinki. Ethics committee approval for our study was received from Kutahya Dumlupinar University Faculty of Medicine Non-invasive Clinical Research Ethics Committee (dated 28.03.2018, decision No. 2018/5-4)

Results

A total of 70 patients with a mean age of 80.29±6.98 (65-96) years were included in the study. 57.1% (n=40) of the patients were female, 47.1% (n=33) were primary school graduates, 30% (n=21) were illiterate, 57.1% (n=40) of the patients were housewives and 42.9% (n=30) were retired.

51.4% (n=36) of the patients were married and 95.7% (n=67) were in the low-income class. 68.6% percent (n=48) of the patients were fed orally and 31.4% (n=22) of them were fed via PEG. According to their medical history, it was found that the three most common diseases were cerebrovascular disease (28.6%), Alzheimer's Disease (AH) (25.7%), and coronary artery disease (20%). In patients, it was revealed that urinary tract infection (UTI) was 37.1% (n=26), wound infection was 34.3% (n=24), and lower respiratory tract infection (LRTI) was 28.6% (n=20). The mean and normal values of the patient's laboratory tests are given in Table 1.

The mean BMI of the patients was found 21.40±6.50 kg/m2, the mean of AC was 24.24±5.13 cm and the mean of CC was 27.75±5.03 cm. The mean NRS-2002 score of the patients was 4.06±0.89, the GNRI score was 79.88±15.48, and the MNA score was 8.55±5.48. According to the NRS-2002 grouping, 97.1% (n=68) of the patients had high and 2.9% (n=2) had low nutritional risk. According to the MNA grouping, 90% of the patients had malnutrition (n=63), 8.6% (n=6) of them had malnutrition risk and 1.4% (n=1) normal nutritional status was detected.

According to the GNRI grouping, 55.7% (n=39) of the patients had high nutritional risk, 22.6% (n=16) of them had moderate, and 8.6% (n=6), and 12.9% of them had no risk was found.

Table 1. Mean and normal values of patient's laboratory tests

Laboratory Test	Mean Value (±SD)	Normal Value
Hemoglobin (g/dL)	11,60±1,91	11,5-16,5
Thrombocyte (10^3cells/mm^3)	275,14±111,58	130-400
Leukocyte (10^3cells/mm^3)	10,90±5,15	5,2-12,4
Neutrophil (10^3cells/mm^3)	8,54±4.96	0,9-6
Lymphocyte (10^3cells/mm^3)	1,54±0,86	0,9-5,2
Monocyte (10^3cells/mm^3)	0,58±0,33	0,3-0,9
Ferritin (ng/dl)	276,92±280,50	11-306,8
Albumin (g/dL)	2,74±0,51	3,5-5,2
CRP (mg/L)	54,10±47,29	<5

SD: Standart Deviation, CRP: C-Reactif Protein

There was a high correlation between GNRI and BMI, and arm and calf circumference. A moderate correlation was found between BMI and arm circumference and a weak correlation was detected with calf circumference according to NRS-2002. A moderate correlation was detected between MNA and anthropometric measurements (Table 2).

Table 2. Correlation between nutritional scales and anthropometric measurements of palliative care unit patients

	NRS	GNRI	MNA	BMI	AC	CC
NRS	Mean:4.06	r=-0.355**	r=-0.534**	r=-0.454**	r=-0.464**	r=-0.293*
	SD:0.89	*p*=0.003	*p*=0.000	*p*=0.000	*p*=0.000	*p*=0.015
GNRI	r=-0.355**	Mean:79.88	r=0.468**	**r=0.813****	**r=0.801****	**r=0.676****
	p=0.003	SD:15.48	*p*=0.000	***p*=0.000**	***p*=0.000**	***p*=0.000**
MNA	r=-0.534**	r=0.468**	Mean:8.55	r=0.550**	r=0.554**	r=0.501**
	p=0.000	*p*=0.000	SD:5.48	*p*=0.000	*p*=0.000	*p*=0.000
BMI	r=-0.454**	r=0.813**	r=0.550**	Mean:21.40	r=0.972**	r=0.811**
	p=0.000	*p*=0.000	*p*=0.000	SD:5.13	*p*=0.000	*p*=0.000
AC	r=-0.464**	r=0.801**	r=0.554**	r=0.972**	Mean:24.24	r=0.825**
	p=0.000	*p*=0.000	*p*=0.000	*p*=0.000	SD:5.13	*p*=0.000
CC	r=-0.293*	r=0.676**	r=0.501**	r=0.811**	r=0.825**	Mean:27.75
	p=0.015	*p*=0.000	*p*=0.000	*p*=0.000	*p*=0.000	SD:5.03

NRS: Nutritional Risk Screening-2002, GNRI: Geriatric Nutritional Risk Index, MNA: Mini Nutritional Assessment, BMI: Body Mass Index, AC: Arm Circumference, CC: Calf Circumference, Mean: Mean, SD: Standard Deviation
Pearson Correlation Test, Spearman Correlation Test, p <0.05 *, p <0.01 **

A high correlation was detected between albumin and GNRI and a weak correlation with the MNA score. A correlation was found between HDL/monocyte and GNRI, MNA, BMI, AC, and CC (Table 3).

Table 3. Correlation of biochemical markers of patients hospitalized in palliative care unit with nutritional scales and anthropometric measurements

	NRS	GNRI	MNA	BMI	AC	CC
Lymphocyte	**r=-0.254***	r=0.090	r=0.197	r=0.170	r=0.204	r=0.077
	***p*=0.034**	*p*=0,457	*p*=0,102	*p*=0.159	*p*=0.090	*p*=0,528
Albumin	**r=-0.318***	**r=0.671****	**r=0.359****	**r=0.342****	**r=0.348****	**r=0.298***
	***p*=0.007**	***p*=0.000**	***p*=0.002**	***p*=0.004**	***p*=0.003**	***p*=0.013**
CRP	r=0.177	r=-0.194	r=-0.071	r=-0.062	r=-0.062	r=-0.023
	p=0.142	*p*=0.108	*p*=0.559	*p*=0.610	*p*=0.610	*p*=0.854
Ferritin	**r=0.285***	r=-0.186	**r=0.324****	**r=-0.262***	r=-0.226	**r=-0.328****
	***p*=0.022**	*p*=0.141	***p*=0.009**	***p*=0.037**	*p*=0.073	***p*=0.009**
HDL/ monocytes	r=0.159	**r=-0.308****	**r=-0.266***	**r=-0.347****	**r=-0.422****	**r=-0.362****
	p=0.188	***p*=0.010**	***p*=0.026**	***p*=0.003**	***p*=0.000**	***p*=0.002**

The mean length of hospitalization was 13.69±9.13 days. The final status of the patients was as; 72.9% (n=51) was discharged, 15.7% (n=11) had ICU (Intensive Care Unit) transfer, and 11.4% mortality (n=8).

There was no statistically significant difference between NRS-2002, GNRI, and MNA groups according to the nutrition type. There was no statistically significant difference between the duration of hospitalization in NRS-2002, GNRI, and MNA groups. There was no statistically significant difference in NRS-2002, GNRI, and MNA groups in terms of mortality. The median duration of hospitalization was 10 days in oral feeding patients while it was 13.5 days in PEG-fed patients. The difference between the duration of feeding and length of stay was not found statistically significant.

Discussion

Nutritional problems are among the most important problems in the community, elderly care institutions, and hospitals in various services, especially in palliative care units. Nutritional disorders may cause problems such as increased infection, prolonged recovery, increased morbidity and mortality, and prolonged hospitalization. Although there is no consensus on how to diagnose, there is consensus on performing a comprehensive nutritional assessment of each patient, especially those at risk with screening, to make necessary interventions if the risk of malnutrition/malnutrition is detected and to follow up on the results.[12-15] Nutritional risk was found to be 32.6% in a study conducted on 5051 patients in 26 different departments in 12 countries in Europe and the Middle East. In the study, the highest risk rate although ranged from 93-100%, was found in ICUs.[16] In a study by Cereda et al. conducted on 177 patients who applied to long-term care centers, the frequency of nutritional risk was found 51.5% with GNRI and 55.8% with NRI.[17] In a multicenter study conducted by Korfalı, organized by the Clinical Enteral Parenteral Nutritional Association (KEPAN), 29139 patients from 34 hospitals in 19 cities were screened for nutritional risk at admission with the NRS-2002 scale. While nutritional risk prevalence was 15%, the highest rate was 52% in ICU patients; it was found the lowest in ear-nose-throat patients with a rate of 3.9%. In the same study, the prevalence of nutritional risk under 60 years was found to be 9.3%, while it increased to 25% above 60 years of age.[18] The frequency of malnutrition in our study was found to be quite high compared to many other studies in which prevalence was evaluated. We think that this difference originates from the chosen population. Most of the studies have an adult population as well as the elderly population. Only patients aged 65 years or older were included in our study. The frequency of malnutrition (93%-100%) found by Sorensen in ICUs is similar to the frequency of malnutrition we find.

In a study conducted by Portero, 170 elderly inpatients were examined and a positive correlation was found between AC, CC, and BMI values. Its use was recommended for nutritional status follow-up.[19] In a study Bonnefoy conducted on 911 elderly patients hospitalized in the geriatric unit, the use of CC in nutritional status assessment. The correlation of the CC with BMI and AC was found to be significant.[20] In the study of Vellas et al., the correlation between MNA score and AC and CC was found to be significant.[21] The results we found are consistent with the study of Portero and Bonnefoy. In palliative care patients, a significant proportion is bed-dependent, in most cases, height and body weight cannot be measured. As such AC and CC be used instead of BMI and body weight for nutritional assessment.

Cereda et al. in a study GNRI and NRI were compared, and a significant correlation was found between albumin and lymphocyte count.[17] In our study, a moderate correlation was found between albumin and GNRI. There was a weak correlation between albumin and NRS-2002, MNA, BMI, AC, and CC. Lymphocyte count correlated poorly with NRS-2002. No correlation was detected between lymphocyte count and GNRI, MNA, BMI, and CC. In the study of Alert, MNA and GNRI were moderately correlated with albumin; but no correlation was found with CRP and ferritin.[22] In our study, there was a correlation between albumin and GNRI, while there was no correlation between albumin and MNA (NRS-2002: 4.06, GNRI:79.88, MNA:8.55). In a study by Sungurtekin, SGA and NRI correlated with albumin, lymphocyte count, and total cholesterol.[5]

In our study, between HDL/monocyte ratios, GNRI, MNA, BMI, CC negative, weak; between the AC a moderate correlation was found in a negative direction.

In the study of Sorensen, the mean length of hospital stay in patients with a high risk of malnutrition was 9 days, while the mean length of hospitalization in patients with a low risk was 6 days.[16] In the study of Kyle et al., 995 patients were evaluated with SGA, NRS-2002, Malnutrition Universal Screening Tool (MUST), and NRI. The NRI scores of the patients who were hospitalized for eleven days or more were found to be higher.[23] The duration of hospitalization was longer in patients with malnutrition.[5,24,25] In the study of Correia et al., the mean length of hospital stay was 16.7 days for patients with malnutrition detected with SGA, and the mean length of hospitalization for those who had no malnutrition was found to be 10.1 days.[14] It has been shown that malnutrition is an independent risk factor for longer hospitalization. Patients with malnutrition with SGA had an average hospitalization of 6.9 days, while those without malnutrition had an average hospitalization of 4.6 days.[13] In a study on 173 patients by Chima et al., the mean length of hospital stay was 6 days in patients with malnutrition risk and four days in patients without malnutrition.[26] Two separate studies conducted by Sorensen and Kyle found similar results of an average length of hospitalization to those found in patients with a risk of malnutrition. Compared to the results found by Correia lower hospitalization time was found in our study.

In a multicentral study conducted by Sorenson with 5051 patients in Europe and the Middle East, the mortality rate was 12% in patients with a risk of malnutrition and 1% in non-risk patients.[16] In a study by Correia, evaluating 709 inpatients with SGA, one-year mortality in patients with malnutrition was found to be 12.4% and in patients without malnutrition was found to be 4.7%.[14] In Singapore, in a fourth-step hospital, patients were evaluated with SGA. In the non-malnutrition group, the mortality rate during hospitalization was 0.3%. The mortality rate was 4.3% in the patients with malnutrition. The difference in mortality between properly nourished and malnourished patients was statistically significant.[13]The mortality rate was 11.4% in our study. Similar results were found in our study regarding mortality in the studies of Sorensen and Correia. According to Lim, the mortality rate in our study was found to be high.

In our study, there is no relationship between nutrition method and length of hospital stay. There are different results in studies in the literature.[5,6,11,13,14]

Limitations

There are some limitations to the study. First, the sample of the present study consisted of the elderly. Our study is cross-sectional and single-centered. The main limitation of our article is the smaller population than other studies in the literature. Finally, the number of patients can be increased. Similar multicenter studies are needed.

Conclusion

The risk of malnutrition or malnutrition was found to be high with the three scales applied. Nutritional status should certainly be evaluated in patients who need palliative care. When nutritional scales are compared among themselves, they appear to be compatible with their results. Although NRS-2002 and MNA are used more frequently than GNRI, it may be difficult to obtain information about nutrition and background information during bedtime from bed-dependent patients, who have limited orientation and cooperation. We think that the use of GNRI in a patient in these circumstances is a more effective way. Height and body weight measurement and BMI calculation are important problems in bed-dependent patients. Therefore it could often be neglected. We think that AC and CC are important anthropometric measurements that can be used instead of height, body weight, and BMI. The three scales used in our study appear to be consistent with each other as well as with some of the anthropometric measurements and biochemical markers. Among these scales, we recommend the use of GNRI because it is easy to apply, especially effective in bed-dependent elderly patients, and contains objective variables.

Ethics Committee Approval

The present study was performed in line with the principles of the Declaration of Helsinki. Ethics committee approval for our study was received from Kutahya Dumlupinar University Faculty of Medicine Non-invasive Clinical Research Ethics Committee (dated 28.03.2018, decision No. 2018/5-4)

Informed Consent

Data concerning the study were collected with the permission of the Kütahya Health Sciences University Medical Faculty Evliya Çelebi Training and Research Hospital.

Author Contribution

All of the authors contributed at every stage of the study

Conflict of Interests

There is no conflict of interest to declare.

Financial Disclosure

No person/organization is supporting this study financially.

Statements

These research results have yet to be presented anywhere previously. Data related to the study is available on request.

Peer-review

Externally peer-reviewed.

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