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Evaluation of Nutritional Status and Associated Factors in Patients Receiving Nutritional Support in Home Health Care Units

Evde Sağlık Biriminde Nütrisyon Desteği Alan Hastaların Nütrisyonel Durum ve İlişkili Faktörlerinin Değerlendirilmesi

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ABSTRACT

Objective: To identify the socio-demographic characteristics, clinical parameters, and factors influencing the nutritional status of patients receiving nutritional support under the supervision of a home health care unit.

Material and Methods: A retrospective cross-sectional study was conducted among patients followed by the Home Health Care Unit of University of Health Sciences Türkiye, Adana City Training and Research Hospital, in 2022. Demographic data, mini nutritional assessment (MNA) scores, Braden scale results, and clinical and laboratory findings were recorded. Normality was evaluated using skewness and kurtosis coefficients. Statistical analyses included parametric and non-parametric tests, correlation analyses, and multiple linear regression. Statistical significance was defined as $p<0.05$.

Results: A total of 189 patients were included; 60.9% were female, with a mean age of 71.32±22.37 years. Hypertension was the most prevalent comorbidity (56.1%), followed by dementia/depression (54.5%). The mean MNA score was 13.9±4.12, and 91.5% of patients were orally fed. A statistically significant positive correlation was observed between triglyceride levels and MNA score ($r=0.20$, $p=0.012$). Female patients exhibited significantly higher MNA scores than male patients ($p=0.019$). No significant correlation was identified between MNA score and caloric intake or between MNA score and other biochemical parameters.

Conclusion: Among patients receiving nutritional support under the supervision of a home health care unit, psychological disturbances, nasogastric tube feeding, and fall risk were associated with malnutrition. The observed positive correlation between triglyceride levels and MNA score indicates that lipid metabolism may serve as a marker of nutritional status in this population. Regular monitoring of nutritional status by family physicians and home health care units is recommended.

Keywords: Malnutrition, nutritional support, home care services

ÖZ

Giriş: Bu çalışmada, evde sağlık birimi tarafından takip edilen ve nütrisyon desteği alan hastaların sosyo-demografik özellikleri, klinik parametreleri ve nütrisyonla durumlarını etkileyen faktörlerin belirlenmesi amaçlanmıştır.

Gereç ve Yöntemler: Çalışma, Sağlık Bilimleri Üniversitesi, Adana Şehir Eğitim ve Araştırma Hastanesi Evde Sağlık Birimi tarafından 2022 yılında takip edilen hastalar üzerinde retrospektif ve kesitsel tasarımda gerçekleştirilmiştir. Hastaların demografik verileri, mini nütrisyon değerlendirmesi (MNA) skoru, Braden skalası, klinik ve laboratuvar bulguları kayıt altına alınmıştır. Verilerin istatistiksel analizinde normallik değerlendirmesi çarpıklık-basıklık katsayılarıyla yapılmış; parametrik ve parametrik olmayan testler, korelasyon analizleri ve çoklu doğrusal regresyon analizi kullanılmıştır. İstatistiksel anlamlılık sınırı $p<0,05$ olarak belirlenmiştir.

Bulgular: Çalışmaya 189 hasta dahil edilmiş olup hastaların %60,9'u kadın, yaş ortalaması 71,32±22,37 yıldır. En sık gözlenen komorbidite hipertansiyon (%56,1) olurken, bunu demans/depresyon (%54,5) izlemiştir. Hastaların ortalama MNA skoru 13,9±4,12 olarak saptanmış olup hastaların %91,5'i oral yolla beslenmekteydi. Trigliserid düzeyi ile MNA skoru arasında anlamlı pozitif korelasyon saptanmıştır ($r=0,20$, $p=0,012$). Kadın hastaların MNA skoru erkeklere göre anlamlı düzeyde yüksek bulunmuştur ($p=0,019$). Kalori alımı ve diğer biyokimyasal parametreler ile MNA skoru arasında anlamlı bir ilişki saptanmamıştır.

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ÖZ

Sonuç: Evde sağlık birimi tarafından takip edilen nütrisyon desteği alan hastalarda psikolojik bozukluk, nazogastrik tüp ile beslenme ve düşme riski varlığının malnütrisyon ile ilişkili olduğu saptanmıştır. Trigliserid düzeyinin MNA skoru ile pozitif korelasyon göstermesi, bu hasta grubunda lipid metabolizmasının nütrisyonla durumun bir yansıması olabileceğine işaret etmektedir. Evde bakım hastalarının nütrisyonla durumlarının aile hekimi ve evde sağlık birimi tarafından düzenli olarak izlenmesi ve gerektiğinde müdahale edilmesi önerilmektedir.
Anahtar Kelimeler: Malnütrisyon, nütrisyon desteği, evde sağlık hizmetleri

INTRODUCTION

Malnutrition is a clinical syndrome characterized by impaired body composition, decline in physical and mental functions, and increased morbidity and mortality due to inadequate or unbalanced nutrition as well as increased catabolic processes (1). Elderly individuals, those with chronic diseases, those with immobility problems, and patients requiring high levels of care are at high risk for malnutrition (2,3).

According to data from many studies, malnutrition is detected in approximately 30-50% of hospitalized adults worldwide, and this rate is even higher in patients receiving home care services (4,5). Malnutrition prolongs hospital stays, increases the risk of infection, delays wound healing, and significantly reduces overall quality of life (2-5).

In Türkiye, nutritional products constitute a significant portion of total drug expenditures (6). Nutritional supplements are among the most frequently prescribed medications by number of boxes, and these products are quite expensive (6). To use health resources effectively and in a balanced manner, family physicians and home health care units should exercise caution and selectivity when prescribing nutritional support. To prevent unnecessary or inadequate use of nutritional support, it is crucial to evaluate patients' nutritional status using accurate, objective methods. In primary care settings, lifestyle interventions led by family physicians have been shown to improve nutritional status and health outcomes in individuals (7).

Home health care units are an important health service model that provide care for patients who need follow-up care in their homes due to chronic diseases, advanced age, immobility, or cognitive impairment. In this patient population, the risk of malnutrition is elevated by several factors, including dysphagia, decreased appetite, polypharmacy, depression, dementia, immobility, and social isolation (8). However, retrospective or prospective studies that systematically evaluate nutritional status and that identify the demographic and clinical characteristics of patients receiving home health care and nutritional support in our country are limited. In the literature, the prevalence of malnutrition or risk of malnutrition in home care patients ranges from 20-70%, and low levels of hemoglobin, iron, vitamin B12, and folate are frequently observed (9,10).

In this study, we aimed to evaluate, using the mini nutritional assessment (MNA) score, the nutritional status of patients receiving nutritional support from a home health care unit and to identify the demographic, clinical, and laboratory factors associated with malnutrition in this population.

MATERIALS and METHODS

This study was designed as a retrospective cross-sectional study. The study was initiated after receiving ethical approval from the Ethics Committee of University of Health Sciences Türkiye, Adana City Training and Research Hospital (decision number: 2365, dated: 12.01.2023). The study population consisted of 343 patients who were followed up by the Home Health Care Unit of University of Health Sciences Türkiye, Adana City Training and Research Hospital and who received nutritional support in 2022. Informed consent was not required because the study used only aggregated institutional data and did not involve direct patient contact or identifiable information. The sample size was calculated to be 181 using the Epi-Info statistical program, with a 95% confidence interval, a 5% margin of error, and 80% power. However, after considering data integrity and accessibility, 189 patients were included in the study. There were no age or gender restrictions.

Inclusion Criteria

• Patients followed up by the Home Health Care Unit of University of Health Sciences Türkiye, Adana City Training and Research Hospital in 2022,

• Patients who had been receiving nutritional support (oral, enteral, or parenteral) for at least one month.

Exclusion Criteria

• Patients followed up outside of 2022,

• Patients with missing or inaccessible records in the data form.

Demographic characteristics (age, gender, marital status, education level), comorbidities (hypertension, diabetes, dementia, etc.), feeding method [oral, nasogastric (NG) tube, a percutaneous endoscopic gastrostomy (PEG), parenteral], MNA score, Braden score (bedsore risk assessment), anthropometric measurements (height, weight, body mass index), and laboratory parameters (hemogram, biochemistry, lipid profile, etc.) were recorded by the researcher from the patients' files using a standard data collection form.

The MNA scale (11), used to evaluate the nutritional status of patients, is a valid and reliable screening tool consisting of 18 questions and evaluated out of a total of 30 points, and a short form is also available (≤17 points → Malnutrition, 17-23.5 points → Risk of malnutrition, ≥24 points → Normal nutritional status).

The risk of developing bedsores (pressure ulcers) was assessed using the Braden score. The Braden score is a risk assessment tool with high validity and reliability, developed

by Bergstrom et al. (12). The Turkish validity and reliability of the Braden scale was established by Pınar and Oğuz (13), and it has been widely used in Turkish clinical settings since then. The score consists of 6 sub-parameters. Each parameter is evaluated on a scale of 1 to 4 points. The total score ranges from 6 to 23 (≤18 points → Risk of bedsores, ≤16 points → Moderate-high risk, ≤12 points → Very high risk).

Statistical Analysis

Statistical analysis of the data was performed using SPSS 23.0 (Statistical Package for the Social Sciences). Continuous variables are presented as mean ± standard deviation or median (minimum-maximum), and categorical variables are presented as numbers (percentages). The Student's t-test, Mann-Whitney U test, chi-square test, and Fisher's exact test were used for intergroup comparisons. Pearson or Spearman correlation tests were used to assess correlations, and multiple linear regression was applied to determine the effects of independent variables on the MNA score. Statistical significance was set at $p<0.05$. Because some laboratory parameters and assessment scores were unavailable for some patients due to the retrospective nature of the study, analyses were performed using the available data for each variable. The number of patients included in each analysis is specified in the relevant tables.

RESULTS

In this study, 189 patients who were followed by the home health care unit and who received nutritional support were evaluated. 60.8% (n=115) of the patients were female, and 39.2% (n=74) were male, with an average age of 71.32±22.37 years (Table 1). The majority of patients (91.5%) were fed orally, while the remainder were fed via a NG tube or via a PEG tube.

When the distribution of comorbidities among patients was examined, hypertension was the most frequent comorbidity (56.1%). This was followed by dementia or depression (54.5%), musculoskeletal diseases (42.3%), coronary artery disease (39.2%), diabetes mellitus (37%), and cerebrovascular events (36%). When the patients' biochemical and hematological parameters were examined, the mean hemoglobin level was 11.8±2.1 g/dL, and the mean albumin level was 3.6±0.6 g/dL. Prealbumin level was 18.4±7.2 mg/dL, and C-reactive protein, an indicator of inflammation, was found to be 12.6±18.4 mg/L on average.

Table 1. Clinical characteristics of the participants

Characteristics				n	%
Psychological status					
Normal				18	9.5
Apathetic				97	51.3
Sad				52	27.5
Anxious/tense				22	11.6
Feeding route					
Self-feeding				173	91.5
Fully dependent (nasogastric tube)				12	6.3
Fully dependent (PEG)				4	2.2
Edema					
Absent				159	84.1
Present				30	15.9
Fall risk				164	86.8
Pressure ulcer				29	15.3
Level of nutritional support					
Balanced				127	67.2
High energy				62	32.8
Special nutritional formula					
Diabetes-specific				38	20.1
Severe metabolic stress				11	5.8
Parameter	**n**	**Minimum**	**Maximum**	**Mean**	**SD**
MNA score	169	3	25	13.9	4.12
Braden scale	153	6	22	15.78	3.2

MNA: Mini nutritional assessment, SD: Standard deviation, PEG: Percutaneous endoscopic gastrostomy

When metabolic parameters were evaluated, the mean glucose level was 118.5±42.3 mg/dL, blood urea nitrogen (BUN) was 28.4±14.7 mg/dL, and creatinine was 1.12±0.68 mg/dL. When the lipid profile was examined, triglyceride (TG) levels were 148.7±72.5 mg/dL, total cholesterol 168.4±45.2 mg/dL, and LDL cholesterol 98.6±32.1 mg/dL. The mean white blood cell count was found to be 7.8±3.1×10³/μL. Overall, mild anemia and moderate inflammation were observed in the patient group, and the nutritional indicators albumin and prealbumin were borderline (Table 2).

The nutritional status of the patients was assessed using the mini nutrition assessment (MNA) score, with an average MNA score of 13.9±4.12. Female patients had significantly higher MNA scores than male patients. Significantly lower MNA scores were found in patients with restlessness or anxiety, patients fed via NG tube, and patients at risk of falls.

When the relationship between laboratory parameters and nutritional status was evaluated, a significant positive correlation was found between TG levels and the MNA score. In contrast, no significant relationship was found between calorie intake and other biochemical parameters, including albumin, hemoglobin, BUN, and creatinine. The risk of pressure ulcers was assessed using the Braden score, with an average score of 15.78±3.2. Among patients, 15.3% had pressure ulcers. Furthermore, psychological disorders, insomnia, and nutritional dependency were observed more frequently in patients with a high risk of malnutrition.

Multiple linear regression analysis revealed no statistically significant independent predictors of MNA score among the variables examined (Table 3).

Table 2. Distribution of biochemical and hematological parameters of the participants

Parameter	n	Mean ± SD	Median (min-max)
Hemoglobin (g/dL)	189	11.8±2.1	11.9 (7.2-16.4)
Albumin (g/dL)	178	3.6±0.6	3.7 (2.1-4.8)
Prealbumin (mg/dL)	112	18.4±7.2	17.5 (6.0-38.0)
CRP (mg/L)	165	12.6±18.4	6.5 (0.5-112.0)
Glucose (mg/dL)	189	118.5±42.3	106 (62-312)
BUN (mg/dL)	185	28.4±14.7	24.0 (8-92)
Creatinine (mg/dL)	185	1.12±0.68	0.95 (0.4-4.8)
Triglyceride (mg/dL)	172	148.7±72.5	132 (45-456)
Total cholesterol (mg/dL)	172	168.4±45.2	165 (78-298)
LDL cholesterol (mg/dL)	165	98.6±32.1	95 (32-198)
WBC (×10³/μL)	189	7.8±3.1	7.2 (3.1-19.4)

SD: Standard deviation, CRP: C-reactive protein, BUN: Blood urea nitrogen, LDL: Low-density lipoprotein, WBC: White blood cell

Table 3. Multiple linear regression analysis of factors associated with MNA score

Variable	β	SD	95% CI	p-value
Gender	-0.753	0.713	-2.162 to 0.655	0.293
Hypertension	1.469	0.853	-0.215 to 3.155	0.087
Diabetes mellitus	-0.501	0.849	-2.178 to 1.177	0.556
Chronic kidney disease	-1.388	1.209	-3.776 to 0.999	0.253
Coronary artery disease	-0.188	0.700	-1.571 to 1.194	0.788
Malignancy	-0.754	1.398	-3.516 to 2.009	0.591
Cerebrovascular disease	0.484	0.661	-0.821 to 1.790	0.465
Chronic pulmonary disease	-1.876	1.219	-4.284 to 0.533	0.126
Musculoskeletal disease	-1.115	0.638	-2.376 to 0.146	0.083
Dementia/depression	-1.256	0.655	-2.550 to 0.037	0.057
Major surgery history	-1.355	0.806	-2.948 to 0.238	0.095
Smoking	1.391	0.949	-0.483 to 3.265	0.145
Alcohol	1.145	1.763	-2.338 to 4.628	0.517

β: Unstandardized regression coefficient, SD: Standard deviation, CI: Confidence interval, MNA: Mini nutritional assessment

DISCUSSION

In this study, the majority of patients receiving nutritional support from a home health care unit were female (60.9%), with a mean age of 71.32±22.37 years. This demographic profile is consistent with the literature, as several studies have reported that women constitute the majority of home care service users, which may be attributed to women's longer life expectancy and the higher prevalence of functional dependency in older female populations (14).

The most common comorbidity was hypertension (56.1%), followed by dementia/depression (54.5%). This comorbidity profile is in line with previous studies conducted in home care settings, which have consistently identified hypertension and neurocognitive disorders as the leading chronic conditions in this population (15,16).

The high prevalence of dementia/depression in our cohort is particularly noteworthy, as neurocognitive disorders are known to impair eating behavior, reduce appetite, and increase nutritional dependency, thereby elevating the risk of malnutrition (17,18).

The mean MNA score of the patients was 13.9±4.12, indicating that the majority of the study population was either malnourished or at risk of malnutrition. This finding is consistent with previous studies conducted in home care settings, which have reported mean MNA scores ranging from 8.1 to 13.5 in similar patient populations (19-22).

Psychological status, feeding route, and fall risk were significantly associated with MNA scores in our study. Patients with anxious or restless psychological states had significantly lower MNA scores than those with normal psychological states ($p<0.001$). This is consistent with the well-established relationship between depression, anxiety, and malnutrition in elderly patients, as psychological disorders reduce appetite, impair food intake, and lead to functional decline (17,18).

Patients fed via NG tube had significantly lower MNA scores compared to orally fed patients (10.64±4.14 vs. 13.64±4.05; $p=0.009$), reflecting the more severe clinical condition and nutritional dependency of tube-fed patients (1). Similarly, patients at risk of falls had significantly lower MNA scores (13.05±3.95 vs. 15.81±4.63; $p=0.004$), which is in line with the known association between malnutrition, muscle weakness, and fall risk in elderly populations (23,24).

A significant positive correlation was found between TG levels and MNA score ($r=0.20$, $p=0.012$), which is one of the most notable findings of this study. This suggests that patients with better nutritional status tend to have higher TG levels, reflecting adequate energy intake and lipid metabolism. In malnourished individuals, reduced caloric intake leads to decreased hepatic TG synthesis and impaired lipid transport, resulting in lower circulating TG levels. Conversely, adequate nutritional intake supports lipid metabolism and is reflected in relatively higher TG levels (25,26).

In contrast, no significant correlations were found between the MNA score and albumin, hemoglobin, or other biochemical parameters. In current approaches, albumin levels are accepted to reflect inflammation and disease severity rather than nutritional status perse (27,28). Similarly, studies conducted in geriatric populations have demonstrated that clinical parameters, such as anemia, are associated with patient outcomes (29).

The absence of a significant relationship between caloric intake and MNA score is also noteworthy. This may be partly attributable to the study's retrospective design, in which caloric intake data were derived from prescribed nutritional support records rather than from actual consumption, potentially leading to an overestimation of intake. Furthermore, the MNA score encompasses multiple dimensions of nutritional status beyond caloric intake, including mobility, psychological status, and anthropometric measurements, which may explain why caloric intake alone did not emerge as a significant predictor in our analysis.

The Braden score-assessed risk of pressure ulcers and current pressure ulcer rates indicate that a significant proportion of patients are at high risk for immobility and dependence on care. Malnutrition is known to be a significant risk factor for pressure ulcer development, and the coexistence of nutritional deficiencies and functional dependency further increases this risk (30,31).

In our study, female patients had significantly higher MNA scores than male patients. Although older women are traditionally considered vulnerable to malnutrition due to social and physiological factors, previous studies in frail elderly individuals and home-care populations have reported poorer nutritional status among men. This difference may be explained by the higher burden of comorbid diseases, greater functional dependency, and more advanced clinical frailty frequently observed in male home care patients (21,32).

Study Limitations

This study has several limitations that should be considered when interpreting the findings. First, the retrospective, single-center design of the study limits the generalizability of the results to other home care settings and populations. Second, missing data for some variables, including MNA score (n=169), Braden scale (n=153), and certain laboratory parameters, may have introduced selection bias and reduced the statistical power of some analyses. Third, caloric intake data were obtained from prescribed nutritional support records rather than actual dietary intake assessments, and these records may not accurately reflect patients' true nutritional intake. Fourth, the cross-sectional nature of the study precludes any causal inferences regarding the observed associations.

CONCLUSION

This study's findings have important implications for caring for home care patients who need nutritional support. Malnutrition in these patients is complex and cannot be fully understood by looking only at lab results. A thorough nutritional assessment should also consider psychological health, physical abilities, feeding method, their risk of falling, and laboratory data. The MNA is a reliable and comprehensive screening tool and should be used routinely in home health care to detect malnutrition early and enable prompt intervention. Family doctors and home health care workers play a key role in managing nutrition for these patients, as they are often the primary point of contact for people who cannot readily access specialized care. Particular attention should be given to patients with mental health issues, those receiving NG tube feeding, and those at risk of falling, because these factors were associated with lower MNA scores in this study. The positive link between TG levels and MNA scores also suggests that assessing lipid levels can add useful information for monitoring nutritional status. Home health care should adopt a team-based, comprehensive approach to nutrition, and regular screening should be a standard component of home health care.

Ethics

Ethics Committee Approval: The study was initiated after receiving ethical approval from the Ethics Committee of University of Health Sciences Türkiye, Adana City Training and Research Hospital (decision number: 2365, dated: 12.01.2023).

Informed Consent: Informed consent was not required because the study used only aggregated institutional data and did not involve direct patient contact or identifiable information.

Footnotes

This article was prepared based on the thesis study titled "Evaluation of nutritional status and characteristics of patients receiving nutritional support in home health unit" with thesis number 805863.

Authorship Contributions

Surgical and Medical Practices: T.E.K., C.G.Ç., Concept: T.E.K., M.T., Design: T.E.K., M.T., C.G.Ç., Data Collection or Processing: T.E.K., Analysis or Interpretation: T.E.K., M.T., C.G.Ç., Literature Search: T.E.K., M.T., C.G.Ç., Writing: T.E.K., M.T.

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