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Evaluation of malnutrition frequency and related factors of geriatric patients in need of home healthcare

Merve Nur Serçe Özkoç[1*], Cüneyt Ardıç[2]

SUMMARY

OBJECTIVE: The nutritional status of frail elderly people receiving home health services should be evaluated. This study aimed to determine the nutritional status of patients aged ≥65 years registered in the Home Healthcare Services unit and investigate the factors that may be associated with malnutrition.

METHODS: This cross-sectional descriptive study was conducted during routine visits to patients and their caregivers. A total of 161 patients were asked to fill in surveys asking about sociodemographic characteristics, patient history, and clinical status. Anthropometric measurements were taken from all patients. The Mini Nutritional Assessment Short Form was applied to the patients for screening purposes. Patients who scored ≤11 on the Mini Nutritional Assessment Short Form were then asked to complete the full Mini Nutritional Assessment form.

RESULTS: According to the Mini Nutritional Assessment Short Form and Mini Nutritional Assessment tests, almost half of the elderly patients included in the study (49.7%, n=161) were malnourished or at risk of malnutrition. Analyses showed that those who had COVID-19 [odds ratio (OR): 9.423, 95%CI 2.448–36.273) and those diagnosed with dementia/depression (OR: 8.688, 95%CI 3.246–23.255) were more likely to be malnourished, whereas those with diabetes (OR: 0.235, 95%CI 0.084–0.657) were less likely to have malnutrition. Strikingly, those who were fed by caregivers (OR: 15.061, 95%CI 3.617–62.710) were also more likely to be malnourished than those with self-feeding ability.

CONCLUSION: Malnutrition or the risk of malnutrition is common in elderly patients receiving home care services. Many factors can have an impact on malnutrition.

KEYWORDS: Home care agencies. Malnutrition. Aged. Nutrition assessment.

INTRODUCTION

With the increase in human life span and the decrease in fertility, the number of elderly people in the total population is increasing. In 2020, the number of elderly people aged ≥65 years was 727 million worldwide, which is estimated to exceed 1.5 billion by 2050[1]. In Turkey, in 2015, the ratio of the elderly population to the total population was 8.2%, which rose to 9.5% in 2020 and is expected to continue rising[2].

Malnutrition is more common in elderly patients than in younger adults, with a greater impact on many outcomes, such as physical function, healthcare use, length of hospital stay, length of postoperative hospital stay, and healthcare expenditures[3-7]. Therefore, determining the factors causing malnutrition in the elderly people will facilitate taking preventive measures and providing relevant treatment plans, which will reduce cost.

Most of the studies on malnutrition so far have collected data from outpatient clinics, inpatient services, and nursing homes[3,5,7-9]. Yet, receiving home health services has also been identified as a risk factor for malnutrition[10]. Home health service is a care system established in Turkey to strengthen and support the primary healthcare system by providing preventive, therapeutic, and rehabilitative care in the home environment[11]. There are only a few studies in the literature on malnutrition and related factors in home healthcare units[12,13]. Besides, these studies generally excluded frail elderly people who are bedridden, have mental status disorders, and are at major risk of malnutrition. Furthermore, these studies often neglected the effects on the caregiver.

This is one of the most comprehensive studies conducted during the pandemic in a developing country where the elderly population is rapidly increasing. This study aims to determine the nutritional status of elderly patients aged ≥65 years registered in the Home Healthcare Services unit and investigate the factors that may be associated with malnutrition.

METHODS

Study design and pilot implementation

This study uses a cross-sectional and descriptive research design to examine the malnutrition status and related factors of patients aged ≥65 years registered in the home health unit.

[1]Sinop Atatürk State Hospital, Family Medicine, Sinop, Turkey.
[2]Recep Tayyip Erdoğan Üniversitesi, Faculty of Medicine, Department of Family Medicine – Rize, Turkey.
*Corresponding author: mervenurserce@gmail.com

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Before starting the research, a pilot study was conducted with five elderly patients who received home care services in November 2020. Participants in the pilot implementation were excluded from the study.

During the routine visits, questionnaires and nutritional scales were administered to participants meeting the study criteria, and anthropometric measurement of each patient was recorded.

Participants' characteristics

The study included elderly people aged ≥65 years who were registered in the Home Healthcare Unit and agreed to participate in the study. Those who used tube-feeding methods, such as nasogastric tube, percutaneous endoscopic gastrostomy, percutaneous endoscopic jejunostomy, and those with bilateral limb amputation and elephantiasis were excluded from the study.

Nutritional status screening and evaluation

First, the Mini Nutritional Assessment Short Form (MNA-SF) was applied to screen the nutritional status of the patients. MNA-SF is an initial screening scale consisting of a total of six questions on food intake, weight loss status, mobility, acute illness/stress, neuropsychological status, and body mass index (BMI). An MNA-SF score of 14–12 indicates a normal nutritional status, 11–8 suggests a risk of malnutrition, and 0–7 reveals malnutrition. If the screening score is ≤11 points, completing the full evaluation scale is recommended to obtain the malnutrition indicator score. The Mini Nutritional Assessment (MNA) evaluation scale consists of 12 questions concerning dependency, medication usage, pressure sores, food and drink intake, number of meals, nutritional autonomy, self-perception of health and nutrition, and arm and calf circumference. The total MNA-SF and MNA evaluation scores determine the allocation of the subjects into the following groups: 30–24 normal nutritional status, 23.5–17 risk of malnutrition, and <17 as malnourished[14].

Data survey forms

The surveys were completed by the researcher during the face-to-face interview with the participant. First, a sociodemographic data questionnaire consisting of nine questions on the patient's age, gender, place of residence, marital status, educational status, perceived income level, and habits, and a questionnaire consisting of 10 questions on the patient's past or chronic diseases, history, and clinical status were obtained from the patient. Information was obtained from the caregivers of patients who could not communicate verbally. To determine the effects of the caregivers and their numbers on the patient's nutritional status, a questionnaire comprising six questions about the number of caregivers, their relation to the patient, age, gender, education level, and duration of care service was applied to the caregivers.

Anthropometric measurements

After completing the questionnaire forms, the patients' height (cm), weight (kg), and calf and arm circumferences (cm) were measured based on the measurement principles. Height measurements of wheelchair-bound or immobile patients were taken while lying flat. In weight measurements, the last known weight values were recorded. The BMI value (kg/m^2) was calculated by dividing the patient's weight (kg) to the square of the patient's height in meters (m^2).

Ethical approvals

Necessary written approvals were obtained from the local ethics committee (dated January 21, 2021, decision number 2021/11). Informed consent forms providing all details of the study were given to the patients, their relatives were informed in detail about the study, and their written consent was obtained.

Statistical analysis

Data were analyzed using the SPSS 25.0 (SPSS Inc., Chicago, IL, USA) statistical software package. Findings were presented as numerical values, percentages, median, quartile ranges, arithmetic mean, and standard deviation. The conformity of the numerical variables to the normal distribution was examined using the Shapiro-Wilk test. Categorical variables were compared using χ^2 and Fisher's exact tests when necessary. Numerical variables were compared using the Mann-Whitney U test or Kruskal-Wallis test. Correlations between numerical variables were examined with the Spearman's correlation test. Logistic regression models were used to examine the relationships between the nutritional categories of the patients and the various variables in the study. For this purpose, a two-category nutrition-dependent variable was created by combining the risky MNA-SF nutritional category group with the malnourished group. $p<0.05$ was considered statistically significant.

RESULTS

Participants

A total of 161 people, 111 (68.9%) women and 50 (31.1%) men, participated in the study. The mean age of the patients was 80.7 years (±7.7). The youngest patient was 65 years old, and the oldest patient was 102 years old. Of the patients, 59.1% were illiterate, 75.2% were living in the city, and 57.1% had

lost their spouses. Most of the caregivers were female (71.4%), and first-degree relatives/spouses (68.3%), and the majority were literate (87%).

Examination of the participants' disease status revealed that the most common diseases were hypertension (77%) and cardiovascular disease (55.3%). Also, dementia/depression (44.7%) and diabetes mellitus (34.8%) were prevalent. Of the patients, 23% were hospitalized in the last 3 months, 17.4% had a history of COVID-19, and 13% had a decubitus ulcer.

Distribution of patients' nutritional status

The mean MNA-SF score of 161 patients who took the MNA-SF test was 9.9 (±3.2), and the median value was 11. The full MNA evaluation test was applied to 91 patients who scored ≤11 on the MNA-SF. The mean MNA evaluation total score of these patients was 17.3 (±5.5), and the median value was 18.5. The initial MNA-SF screening test determined that 43.5% of 161 patients had normal nutritional status. Of the 91 patients who could not pass the MNA-SF test and underwent the MNA evaluation test, 49.4% were at risk of malnutrition and 38.5% were malnourished. Collectively, the MNA-SF and MNA evaluation tests determined that 21.7% of 161 patients were malnourished, 28% were at risk of malnutrition, and 50.3% had normal nutrition.

Bivariate comparisons

Mini Nutritional Assessment Short Form scores of male patients were significantly lower than female patients (p=0.001). Likewise, categorization of nutritional status showed that the MNA-SF categories were associated with gender (p=0.018).

The mean BMI and calf and arm circumferences were 31.4 kg/m^2, 34.6 cm, and 28.3 cm, respectively. According to MNA-SF nutrition categories, the measurements of BMI (p<0.001), calf circumference (p<0.001), and arm circumference (p<0.001) of the patients were significantly lower in the malnourished group than those in the other groups.

According to MNA-SF, patients' nutritional categories were associated with having COVID-19 (p<0.001), hypertension (p=0.003), diabetes mellitus (p=0.014), decubitus sores (p=0.006), dementia/depression (p=0.001), history of hospitalization in the last 3 months (p=0.013), dietary patterns (self-feeding/with the caregiver's intermittent assistance/continuously by the caregiver) (p=0.001), presence of mouth/dental problems (p=0.016), and being bedridden (p=0.001) (Table 1).

Multivariate comparisons

The logistic regression model created to examine the association of the MNA-SF nutritional categories with the patients' age, gender, and anthropometric characteristics revealed that the probability of being malnourished increased with age and decreased with increasing calf circumference (Table 2).

In addition, the model created to examine the association of MNA-SF nutritional categories with patients' comorbidities determined the variables of having COVID-19, diabetes mellitus, decubitus sores, dementia/depression, and hospitalization in the last 3 months to be significant. Also, patients fed with intermittent caregiver assistance and patients constantly fed by caregivers were also more likely to be malnourished than self-feeding patients (p<0.001) (Table 3).

DISCUSSION

Malnutrition is multifactorial, and many studies have shown that chronic diseases are one among them[8,10,15]. This study determined that decubitus sores, dementia/depression, hospitalization in the previous 3 months, and COVID-19 infection were associated with poor nutritional status in the elderly people.

The probability of malnutrition was found to be higher in the elderly people with a history of COVID-19. Other studies have also reported malnutrition and the risk of malnutrition to be higher in elderly patients with COVID-19 infection[9]. In addition to respiratory tract symptoms, gastrointestinal symptoms such as diarrhea, mild abdominal pain, nausea, vomiting, loss of appetite, and loss of taste and smell are also common in elderly patients with COVID-19. These symptoms may be more severe in frail elderly people. Besides, inflammation indicators such as C-reactive protein, ferritin, TNF-alpha, and interleukin family factors increase in response to the acute inflammatory state that occurs during COVID-19 infection. The increase in these acute-phase proteins accelerates the destruction of albumin and proteins in the muscles[16]. All these factors increase malnutrition and the risk of malnutrition in patients with COVID-19.

This study revealed that the incidence of malnutrition was lower in patients with diabetes (p=0.006). However, a case-control study by Turnbull and Sinclair determined that the MNA scores of elderly individuals aged ≥65 years with diabetes were significantly lower than those without diabetes[15]. Similarly, Li et al. determined diabetes mellitus as a risk factor for malnutrition[9]. In addition to the increased adipose tissue and inactivity in the elderly constituting risk factors for diabetes, oral antidiabetic drugs and insulins used may also be factors for obesity. Indeed, some oral antidiabetic drugs have side effects that cause edema (such as thiazolidinediones) and weight gain (such as sulfonylureas). Again, since insulin is an anabolic hormone, patients with type 1 and type 2 diabetes who use insulin may start to gain weight later. Moreover, hypoglycemia experienced in insulin users may be another reason for weight gain.

It was determined that patients diagnosed with dementia/depression have a higher risk of malnutrition as dementia in the elderly people is a significant factor of dependence regarding daily living activities and nutrition. Depression is not just an emotional breakdown. At the same time, it can have physical consequences such as sleep and appetite impairment. These factors can lead to weight loss and malnutrition in the elderly people. Saka et al. determined that the elderly people

Table 1. The relationship of patients' Mini Nutritional Assessment Short Form nutritional categories and accompanying/past diseases with nutritional and caregiver status distributions.

Variable		MNA-SF category			Test statistic	p
		Normal nutritional status, n(%)	At risk of malnutrition, n(%)	Malnourished, n(%)		
Having COVID-19	No	65(92.8)[a]	47(83,9)[a]	21(60)[b]	17.638*	**<0.001**
	Yes	5 (7.2)[a]	9(16.1)[a]	14(40)[b]		
Hypertension Table 1 (HT)	No	8(11.4)[a]	15(26.8)[a,b]	14(40)[b]	11.464	**0.003**
	Yes	62(88.6)[a]	41(73.2)[a,b]	21(60)[b]		
Diabetes mellitus (DM)	No	37(52.8)[a]	41(73.2)[a,b]	27(77.1)[b]	8.487	**0.014**
	Yes	33(47.2)[a]	15(26.8)[a,b]	8(22.9)[b]		
Cardiovascular disease (CVD)	No	28(40)[a]	28(50)[a]	16(45.7)[a]	1.276	0.528
	Yes	42(60)[a]	28(50)[a]	19(54.3)[a]		
Malignancy	No	60(85.7)[a]	47(83.9)[a]	27(77.1)[a]	1.258	0.533
	Yes	10(14.3)[a]	9(16.1)[a]	8(22.9)[a]		
Decubitus ulcer	No	66(94.3)[a]	49(87.5)[a,b]	25(71.4)[b]	10.770	**0.006**
	Yes	4(5.7)[a]	7(12.5)[a,b]	10(28.6)[b]		
Dementia/depression	No	54(77.1)[a]	20(35.7)[b]	15(42.9)[b]	24.391	**<0.001**
	Yes	16(22.9)[a]	36(64.3)[b]	20(57.1)[b]		
Other chronic diseases	No	25(35.7)[a]	28(50)[a]	19(54.3)[a]	4.223	0.121
	Yes	45(64.3)[a]	28(50)[a]	16(45.7)[a]		
History of hospitalization in intensive care	No	53(75.7)[a]	33(58.9)[a]	23(65.7)[a]	4.090	0.129
	Yes	17(24.3)[a]	23(41.1)[a]	12(34.3)[a]		
History of hospitalization in the last 3 months	No	60(85.7)[a]	43(76.8)[a,b]	21(60)[b]	8.719	**0.013**
	Yes	10(14.3)[a]	13(23.2)[a,b]	14(40)[b]		
Nutrition	Self	61(87.1)[a]	23(41.1)[b]	10(28.6)[b]	47.022*	**<0.001**
	Intermittent assistance	5(7.2)[a]	15(26.8)[b]	7(20)[a,b]		
	Total caregiver dependence	4(5.7)[a]	18(32.1)[b]	18(51.4)[b]		
Mouth or dental problem	No	52(74.3)[a]	36(64.3)[a,b]	16(45.7)[b]	8.332*	**0.016**
	Yes	18(25.7)[a]	20(35.7)[a,b]	19(54.3)[b]		
Live bedridden	No	60(85.7)[a]	34(60.7)[b]	14(40)[b]	23.658*	**<0.001**
	Yes	10(14.3)[a]	22(39.3)[b]	21(60)[b]		
Number of people caring for the patient	1 caregiver	30(42.8)[a]	19(33.9)[a]	15(42.8)[a]	3.655*	0.727
	2 caregivers	30(42.8)[a]	23(41.1)[a]	14(40)[a]		
	3 caregivers	7(10)[a]	12(21.4)[a]	5(14.3)[a]		
	4 and over caregivers	3(4.3)[a]	2(3.6)[a]	1(2.9)[a]		
Caregiver intimacy	First-degree relative/spouse	46(65.7)[a]	37(66.1)[a]	27(77.1)[a]	2.416*	0.653
	Second-degree relative	4(5.7)[a]	2(3.6)[a]	2(5.7)[a]		
	Three-degree relative/not a relative	20(28.6)[a]	17(30.3)[a]	6(17.1)[a]		
Gender of the caregiver	Female	46(65.7)[a]	45(80.4)[a]	24(68.6)[a]	3.448*	0.178
	Male	24(34.3)[a]	11(19.6)[a]	11(31.4)[a]		
Educational status of the caregiver	Illiterate	7(10)[a]	9(16.1)[a]	5(14.3)[a]	5.335*	0.493
	Primary school graduate	50(71.4)[a]	30(53.6)[a]	23(65.7)[a]		
	High school graduate	8(11.4)[a]	8(14.2)[a]	38(8.6)[a]		
	Graduated from a university	5(7.1)[a]	9(16.1)[a]	4(11.4)[a]		

*χ^2 test statistical value. The presence of the same superscript letters in a row indicates that there is no statistical difference between the cells. Bold indicates statistically significant p-values.

Table 2. Logistic regression model including anthropometric features affecting the Mini Nutritional Assessment Short Form nutritional category.

	OR	95%CI		p
Gender (male to female)	1.411	0.292	1.720	0.446
Age (years)	1.057	1.006	1.111	**0.029**
BMI (kg/m^2)	0.975	0.893	1.065	0.578
Calf circumference (cm)	0.818	0.737	0.909	**<0.001**
Mid–upper arm circumference (cm)	1.044	0.955	1.141	0.344

Dependent variable: MNA-SF category (normal nutritional status/malnourished). OR: odds ratio; CI: confidence interval. Bold indicates statistically significant p-values.

with dementia and depression, as well as fecal incontinence, insomnia, and neurological diseases, had a higher risk of malnutrition, and those with poor nutritional status needed more caregivers[8]. The individuals themselves can best understand their bodily needs, such as hunger and thirst. However, the elderly people experiencing problems such as dementia, weakness, and illness need the care and guidance of their caregivers. In this study, the elderly people who were fed with caregiver assistance were more likely to have malnutrition than the elderly people with self-feeding ability. Therefore, the influence of the caregiver should not be ignored in the elderly people, who often need the support of a caregiver.

Table 3. Logistic regression model including comorbid/previous disease, and nutritional and caregiver status variables affecting the Mini Nutritional Assessment Short Form nutritional category.

	OR	95%CI		p
Having had COVID-19	9.423	2.448	36.273	**0.001**
Being diagnosed with HT	0.345	0.107	1.118	0.076
Being diagnosed with DM	0.235	0.084	0.657	**0.006**
Being diagnosed with CVD	0.682	0.251	1.851	0.452
Being diagnosed with malignancy	1.342	0.392	4.595	0.639
Having a decubitus ulcer	5.852	1.096	31.251	**0.039**
Being diagnosed with dementia/depression	8.688	3.246	23.255	**<0.001**
Other diseases	0.331	0.131	0.836	0.019
Having a history of hospitalization in intensive care	3.050	0.813	11.447	0.098
History of hospitalization in the last 3 months	4.452	1.063	18.644	**0.041**
Nutrition (rc: *self*)				**<0.001**
Nutrition (*intermittent assistance*)	11.889	3.186	44.368	**<0.001**
Nutrition (*total caregiver dependence*)	15.061	3.617	62.710	**<0.001**
Having a mouth or dental problem	1.557	0.631	3.845	0.337
Live bedridden	1.131	0.261	4.907	0.869
Number of people caring for the patient (rc: 1 person)				0.789
Number of people caring for the patient (2 persons)	0.651	0.250	1.696	0.380
Number of people caring for the patient (3 persons)	1.101	0.306	3.965	0.883
Number of people caring for the patient (>3 persons)	0.980	0.127	7.540	0.984
Caregiver intimacy (rc: First-degree relative/spouse)				0.972
Caregiver intimacy (Second-degree relative)	1.268	0.150	10.725	0.827
The caregiver is male	0.290	0.102	0.821	0.020
Educational status of the caregiver (rc: illiterate)				0.286
Educational status of the caregiver (primary school)	0.966	0.245	3.811	0.961
Educational status of the caregiver (high school)	1.399	0.225	8.677	0.719
Educational status of the caregiver (university)	4.116	0.616	27.516	0.144

Dependent category: MNA-SF nutrition category. HT: hypertension; DM: diabetes mellitus; CVD: coronary vascular disease; rc: reference category. Bold indicates statistically significant p-values.

This study is a comprehensive research that examines many factors that may be related to malnutrition in Home Healthcare Units in a city. The strengths of this study include a pilot study implementation before the study, face-to-face interviews in the person's living environment, and the measurements made by a single researcher. However, it also has some limitations. First, this study was conducted in a single center and cannot be generalized to the entire population. Appropriate conditions for weight and height measurements could not be provided as some of the elderly patients were immobilized or had difficulty standing. Another limitation of the study is the inclusion of the caregivers' answers to the questions about the patient's nutrition and health perception in the MNA evaluation test instead of the patients who could not be contacted.

CONCLUSION

In this study, it was determined that malnutrition and the risk of malnutrition are high in elderly patients receiving home healthcare services. In addition, factors such as age, COVID-19, DM, decubitus, dementia/depression, hospitalization history in the last 3 months, calf circumference, and eating with the help of a caregiver were found to have a (negative) impact on the nutritional deficiency. Studies with a larger patient population should be conducted on patients receiving services from home healthcare units who are at high risk of malnutrition.

ETHICS COMMITTEE APPROVAL

Ethics committee approval for this study was taken from the Ethics Committee of Recep Tayyip Erdoğan University Faculty of Medicine with protocol number 2021/11. Date: **January 21, 2021.** Number: 2021/11.

AUTHORS' CONTRIBUTIONS

MNSÖ: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft. **CA:** Conceptualization, Formal Analysis, Methodology, Supervision, Writing – review & editing.

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