

Malnutrition and associated risk factors in nursing home residents in Turkey

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ABSTRACT

Objective: Malnutrition is a common problem in nursing home residents. The aim of this study was to evaluate the prevalence of malnutrition and to determine the factors independently associated with malnutrition in this setting.

Methods: A cross-sectional, multi-center study was conducted in 21 nursing homes in Turkey. Nutritional status was assessed using the Mini Nutritional Assessment (MNA). Data on possible associated factors were collected using validated scales.

Results: The study included 1224 residents; 45.7% of the residents were at risk for malnutrition and 23.4% were malnourished. Cognitive impairment, dependence in activities of daily living, and dysphagia were significantly associated with malnutrition.

Conclusion: Malnutrition is a prevalent problem in nursing homes in Turkey. Systematic screening and well-defined tailored interventions should be further developed and evaluated in nursing home residents.

Keywords: Malnutrition, nursing home, residents

Introduction

With increased life expectancy among older adults, increased health-care spending, in particular for institutional care, has become an issue of concern in many countries (1). Malnutrition appears to occur frequently in older adults and has been associated with adverse health outcomes. The prevalence of malnutrition among older adults varies between 0% and 78%, and this variety is mainly due to the inclusion of different settings, age categories, underlying diseases, and screening instruments (2). The outcome of chronically poor nutritional status and unrecognized or untreated malnutrition is frequently associated with considerable dysfunction and disability, reduced quality of life, increased institutional-

ization, premature or increased morbidity and mortality, and increased health-care costs (3).

Screening for malnutrition among nursing home residents is a crucial first step for early affected older adults, and those at risk should be followed by comprehensive geriatric assessment and initiation of appropriate nutritional treatment (4, 5). Factors associated with malnutrition, such as immobility, frailty, dementia, depression, and difficulties in eating and swallowing, are also considered as risk factors for institutionalization. Thus, an institutionalized older adult is more predisposed to malnutrition compared to community-dwellers. Recovering nutritional status is difficult for the already malnourished older adults; therefore, it is important to evaluate the nutritional risk of nursing

home residents early to prevent malnutrition and improve their nutritional status.

There are numerous studies that have evaluated the prevalence of malnutrition among nursing home residents in Turkey (6, 7), but to the authors' knowledge extensive studies identifying the factors associated with malnutrition in Turkish nursing homes are missing. Thus, this study aimed to report on (i) the prevalence of malnutrition and (ii) the associated factors of malnutrition in older adults living in Turkish nursing homes.

Methods

Study design and setting

This cross-sectional, multi-center study was conducted in 21 nursing homes in 12 different cities. A stratified random sampling was performed based on geographical region, number of beds, and funding characteristics (government or privately funded) among 362 nursing homes in Turkey. In each participating nursing home, volunteer residents 65 years and older who were residing at that center for at least 6 months were included in the study. Residents with the following conditions were excluded: (1) unable to communicate with others, (2) hospitalization in the previous 6 months, (3) residents who were not suitable for bioelectrical impedance analysis, and (4) bed-ridden. All participants (or legal proxies for those who were unable to sign) signed the informed consent. The study protocol was approved by the Gazi University Ethics Committee.

Data collection

Data on residents' demographic characteristics, anthropometric measurements, nutritional status, dysphagia, cognitive state, and functional state were collected by the dietitians in March 2017. Dietitians were educated by the researchers before the study to optimize and standardize the data collection. During this course, information about the study, procedure, and methods for data collection was provided. Sample patient cases were used to support the training and increase the accuracy and reliability of data collection.

Demographic characteristics

Dietitians completed the questionnaire with the residents and/or the professional nursing home caregivers most familiar with the characteristics of the residents. The questionnaire included (1) demographic characteristics (age and sex), (2) medical records, and (3) nutritional status (eating habits, food intake status, and body weight changes).

Anthropometric measurements

Anthropometric measurements, including weight, height, calf circumference, and hand grip strength, were performed by the dietitians according to the standardized and recommended procedures and techniques. The residents weighed in light clothing and without shoes using a calibrated floor scale. Height was measured while the resident

was barefoot and standing in an upright position, standing against a wall, and looking forward using a tape measure and was recorded in centimeters. Body mass index (BMI) was calculated according to the equation: $BMI = \text{weight (kg)} / \text{height}^2 \text{ (m)}$. Calf circumference was measured twice while the patient was sitting, pressing the foot completely on the floor, and flexing the knee 90° using a measuring cylinder from the largest portion of the calf. Care was taken not to compress subcutaneous tissue. The arithmetic mean was recorded in centimeters with a sensitivity of 0.1 cm. Hand grip strength was measured using a digital dynamometer (TKK 5401 Grip-D; Takei, Niigata, Japan), and each device was calibrated before the initiation of data collection. Residents took the test while sitting on a bed or chair and their shoulder adducted and neutrally rotated, elbow flexed at 90°, and wrist neutrally positioned. The resident's dominant hand was used for the assessment. Each resident was given a demonstration before the measurement and then asked to complete a total of three maximal isometric contractions. The average readings showing on the display of the dynamometer were recorded, and the mean hand grip strength was calculated.

Nutritional status

The nutritional status of the residents was evaluated using the full Mini Nutritional Assessment (MNA[®]) tool. Full MNA[®] is an extensively validated instrument for grading the nutritional status of older persons and provides a multidimensional assessment of the patient (8). Its structure consists of 18 questions grouped into four categories (dietary habits, general status, anthropometry, and self-perceived health and nutrition states). Residents with a total score of <17 were considered as "malnourished". Residents with a score between 17 and 23.5 were considered as "at risk for malnutrition", whereas those with a score of 24 and above were considered as "well nourished" (8).

Dysphagia

For dysphagia screening, Eating Assessment Tool-10 (EAT-10) was used. EAT-10 is a functional health status questionnaire that measures the symptomatic severity of dysphagia from the patient's perspective (9) and requires the patient to rate several swallowing issues (e.g., coughing during meals, losing weight because of swallowing problems, and loss of pleasure during meals) on a five-point scale (0=no problem, 4=severe problem). Overall scores range from 0 to 40 points, and patients with a total score of 3 or more points were classified as "at risk for dysphagia".

Cognitive state

The Mini-Mental State Examination (MMSE) was used for cognitive evaluation. MMSE is a test that assesses cognitive ability by examining orientation, attention and calculation, registration, recall, language, and ability to follow simple commands (10). It has 11 items with a total score 0 to 30, and a low score is indicative of cognitive impairment.

Table 1. Characteristics of the elderly according to their nutritional status (MNA)

| | Well nourished (n=379) | At risk for malnutrition (n=559) | Malnourished (n=286) | p |
|------------------------|---------------------------|-------------------------------------|-------------------------|--------|
| Age | 77.3±7.7 | 78.9±8.2 | 80.8±9 | <0.001 |
| Gender, female | 163 (43%) | 297 (53.1%) | 186 (65%) | <0.001 |
| Weight, kg | 74.1±15 | 68.2±16 | 55.6±12.9 | <0.001 |
| Height, cm | 158±10.1 | 156±10 | 155±8.8 | 0.054 |
| BMI, kg/m ² | 28.7±5.5 | 24.9±6.4 | 21.3±5.3 | <0.001 |
| Calf circumference, cm | 36 (25–52) | 34 (19–54) | 28 (12–47) | <0.001 |
| Hand grip strength, kg | 20.8±9.6 | 15.3±9.5 | 8.4±8.1 | <0.001 |
| MNA score | 26±1.9 | 20.2±1.8 | 13.2±2.7 | <0.001 |
| MMSE score | 23.4±7.8 | 18.9±10.4 | 7.3±8.9 | <0.001 |
| Katz ADL score | 5.2±1.4 | 4.6±2.4 | 2.8±1.6 | <0.001 |
| EAT-10 score | 1.3±4.1 | 3.5±8.2 | 5.1±10.7 | <0.001 |

BMI: body mass index; MNA: mini nutritional assessment; MMSE: mini mental state examination; EAT: eating assessment tool; ADL: activities of daily living

Functional state

The functional state of the residents was assessed by Katz Index of Independence in Activities of Daily Living (ADL). The index ranks the adequacy of performance in six functions of bathing, dressing, toileting, transferring, continence, and feeding (11). Clients are scored yes/no for independence in each of the six functions, and a score of 6 indicates full function.

Statistical analyses

IBM Statistical Package for the Social Sciences (IBM SPSS Corp.; Armonk, NY, USA) 21.0 for Windows® was used for statistical analysis. Variables were examined using visual (histograms and probability plots) and analytical methods to determine whether or not they were normally distributed. Mean±standard deviation and median, minimum–maximum (min–max) values were defined for normally distributed variables and other quantitative variables, respectively. Number (percentage) was defined for qualitative variables. For the comparison of groups, Kruskal–Wallis test or one-way analysis of variance were used where appropriate. Correlation analyses between continuous variables were performed by Pearson or Spearman correlation analyses, where appropriate. Multivariate logistic regression model was created to identify the independent predictors of malnutrition. Hosmer–Lemeshow goodness-of-fit statistics were used to assess model fit. A 5% type I error level was used to infer statistical significance.

Results

A total of 1224 nursing home residents who fulfilled the inclusion criteria were enrolled in the study. The mean age of

the study population was 79.05±8.3 years, and 646 (52.8%) were female. The median (range) duration of stay in the current nursing home was 36 (9–74) months. In total, 1 in 4 of the residents (23.4%) were found to be malnourished, 45.7% were at risk for malnutrition, and 31% were well nourished. An overview of the general characteristics and the nutritional status of the residents according to the MNA are presented in Table 1. Malnourished older adults had lower weight, BMI, calf circumference, and hand grip strength than older adults at risk for malnutrition and those with normal nutritional status ($p<0.001$). Well-nourished nursing home residents had less cognitive deficits compared to residents at risk for malnutrition and those who are malnourished ($p<0.001$).

According to correlation analyses, the MNA score was positively correlated with the MMSE score ($r=0.595$, $p<0.001$), calf circumference ($r=0.550$, $p<0.001$), hand grip strength ($r=0.477$, $p<0.001$), and BMI ($r=0.226$, $p<0.001$) but negatively correlated with the EAT-10 score ($r=-0.139$, $p<0.001$) (Table 2).

The multivariate model (Table 3) showed that residents who had a lower cognitive status, dependence in ADL, and dysphagia were associated with a significantly higher prevalence of malnutrition.

Discussion

This is the first study in Turkey that evaluated a great number of institutionalized older adults from every region of the country. The study revealed that approximately 1 in 4 residents (23.4%) was malnourished and 1 in 2 residents (45.7%) were at risk for malnutrition. The participants of the present

Table 2. Correlations between MNA score and factors related to malnutrition

| | MNA score | |
|--------------------|-----------|--------|
| | r | p |
| Katz ADL score | 0.683 | <0.001 |
| MMSE score | 0.595 | <0.001 |
| Calf circumference | 0.550 | <0.001 |
| Hand grip strength | 0.477 | <0.001 |
| BMI | 0.226 | <0.001 |
| EAT-10 score | -0.139 | <0.001 |

MNA: mini nutritional assessment; ADL: activities of daily living; MMSE: mini mental state examination; BMI: body mass index; EAT: eating assessment tool

Table 3. Independent factors affecting malnutrition according to logistic regression analysis

| | Adjusted odds ratio (95% confidence interval) | p |
|------------------------------------|---|--------|
| Age, per year increase | 0.99 (0.97–1.01) | 0.7 |
| Gender, female | 0.75 (0.54–1.02) | 0.07 |
| Katz ADL score, per point increase | 0.62 (0.56–0.68) | <0.001 |
| MMSE score, per point increase | 0.94 (0.92–0.96) | <0.001 |
| EAT-10 score, per point increase | 1.06 (1.03–1.1) | <0.001 |

ADL: activities of daily living; MMSE: mini mental state examination; EAT: eating assessment tool

study were older, mostly female, and with high care needs and thereby representative of nursing home populations.

In 2013, a cross-sectional study was used to report the prevalence of malnutrition among nursing home residents in the capital city of Turkey. This study included 534 nursing home residents. The MNA-Short Form (SF) was used to assess the nutritional status of the residents, and the authors reported that 15.9% of the residents were malnourished, and 53.6% of those were considered at risk for malnutrition (7).

Cankurtaran et al. (6) conducted a cross-sectional study in 1797 residents in 14 nursing homes from three different cities of Turkey to (i) gain insight into the prevalence of malnutrition and (ii) identify the factors associated with malnutrition. The MNA-SF was used to assess the presence of malnutrition. The authors concluded that 11.9% of the residents were malnourished and 38.3% of those

were at risk for malnutrition. According to the regression analyses of the study, Get Up and Go Test, depression, hypertension, and functional impairment were found to be independently related to malnutrition.

These repeated cross-sectional studies allowed us to explore the change in the prevalence of malnutrition among institutionalized older people. The results of this study highlight that malnutrition and its risk are still widely present and that these problems are yet unsolved in Turkish nursing homes. Also, the alarming proportion of residents (45.7%) identified at nutritional risk during screening in this study indicates that the efforts undertaken in practice to reduce prevalence seem insufficient or are without success.

According to the above-mentioned multivariate logistic regression analysis, three major factors were found to be independently associated with malnutrition in nursing homes: a lower cognitive status of the resident, the level of dependence in ADL, and the presence of dysphagia.

The association between malnutrition and a lower cognitive status was also found in several other studies (12, 13). The relationship between cognitive impairment and nutritional risk is a complex and reciprocal problem. Anorexia, polypharmacy, and accompanying depression seen in dementia are some of the major risk factors for malnutrition in people with dementia (14). Cognitive impairment has several negative consequences on the health of older adults; it can influence the prognosis of various conditions, reduce the quality of life, and increase morbidity/mortality and hospital admissions. Good nutritional status is important in maintaining cognitive performance, and an altered nutritional status appears to predict the severity and progression of cognitive impairment. Given the high prevalence of dementia among nursing home residents and the vicious cycle of malnutrition and cognitive impairment, the nutritional status of the residents should be evaluated regularly from the beginning of their institutionalization.

An interdependence relationship between nutritional status and functional status was observed in a study that evaluated 240 patients older than 60 years who were recently hospitalized (15). Of those patients, 37.1% were classified as at risk for malnutrition, whereas 29.1% of the patients were classified as malnourished using the MNA. Similar to the present results, malnourished patients were more dependent in ADL than those with well-nourished patients.

Several previous studies have shown that dysphagia is an important risk factor of malnutrition in nursing homes (16-19). This was also the case in the present study. Underweight, previous weight loss, and malnutrition according to the subjective judgement of the nursing home staff were significantly related to dysphagia. Most likely, malnutrition was the consequence of dysphagia; thus, to prevent malnutrition,

dysphagia should be recognized at an early stage. Swallowing problems also increase the risk of inadequate fluid intake and can contribute to the development of malnutrition.

In this study, the nutritional status of the nursing home residents was captured by the MNA instrument, which is easy to perform and specifically developed for use in older adults and has been validated in different settings (8). The MNA items reflect the specific conditions relevant to older adults and are based on age-adapted thresholds for anthropometric measurements. The key benefit of the MNA is its capacity to detect the risk of malnutrition (8). This is important to assure tailored nutritional care to protect a resident's functional capacity and quality of life.

There are some limitations of this study that need to be addressed. The first limitation is the use of a cross-sectional design. This design did not allow to report on a causal relationship between malnutrition and causative factors for malnutrition. A longitudinal design is recommended to address this limitation. The second limitation is the voluntary participation in this study.

In conclusion, this study provides important information on the prevalence of malnutrition and its associated factors in a large multi-centered setting of nursing homes in Turkey. Considering the results of previous studies that evaluated malnutrition among nursing home residents in Turkey, this study demonstrates the "still" high prevalence of malnutrition and malnutrition risk in nursing homes. The authors believe that the data achieved by the study will be directive in planning screening and managing malnutrition in nursing homes and also be instructive for the policymakers in the cost-effectivity of screening and planning future directives.

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Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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