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Prevalence of Malnutrition among Hospitalized Elderly Patients in Hospitals Affiliated to Tehran University of Medical Sciences, Tehran, Iran

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ABSTRACT

Background: Following the improvement in health status and life expectancy in developing countries, the elderly population is increasing. Elderly malnutrition is common across healthcare services and is associated with high costs and adverse outcomes. This study assesses the prevalence of malnutrition among elderly patients in the selected hospitals affiliated to Tehran University of Medical Sciences. **Methods:** This cross-sectional study was conducted on elderly patients aged 65 years or older in 6 selected hospitals between June and September 2015. Using convenience sampling method, a total of 451 patients were included. Nutritional status was assessed using the Mini Nutritional Assessment (MNA) tool. **Results:** The mean age of the patients was 71.49 ± ٦.٦٠ year and 55.5% were female. The prevalence of malnutrition was 27.3%. A total of 30.8% were at risk of malnutrition, and 41.9% had a normal nutritional status. There were significant associations between nutritional status and chronic diseases, body mass index (BMI), mobility, psychological condition, mid-arm circumference (MAC), calf circumference, and more than three prescription drugs per day ($P < 0.001$). **Conclusion:** A satisfactory nutritional status was found among most hospitalized elderly. Future studies with follow-up during and after hospitalization are required.

Keywords: *Prevalence; Elderly; Malnutrition; Hospital*

Introduction

One of the achievements of this century is to seek medical, economic, and social advancements to extend the lifespan of humans, and subsequently, the aging population. These rapid demographic changes in aging raise important concerns in their healthcare (Shabat *et al.*, 2008). The World Health Organization (WHO) estimates that the population over the age of 60 will reach 2 billion by 2050 from 605 million in 2000 (Carney and Gray, 2015). In Iran, according to the general census of population and housing in 2011, the number of the elderly aged 60 years or older is

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about 6.6 million, i.e. the proportion of the elderly has increased from 3.3% of the total population in 1996 to 8.3%. The figure will reach more than 10% by 2021 (Statistical Centre of Iran, 2011).

Nutrition is one of the important and effective factors in the mortality rate, disability, and quality of life of the elderly. The results of large studies worldwide have shown that nutritional status has a prominent role in the health and illness of people over 65 years (Hacihasanoğlu *et al.*, 2012, Vanderwee *et al.*, 2010). Different diseases are necessarily dependent on the elderly, and medication can affect the nutritional status of the elderly (Lemaître *et al.*, 2020). Factors, such as oral health, inability to chew food, impaired perceptual emotional function, social isolation, multiple drug use, socioeconomic status, physical disability, sedentary lifestyle, depression and dementia, degenerative diseases, and loss of taste and smell are all predisposing factors for malnutrition in the elderly (Eshaghi *et al.*, 2007, Morley, 2012, Oliveira *et al.*, 2009, Phillips *et al.*, 2019).

Supporting the elderly to live a healthy life is a big challenge. Providing the elderly with health care depends on the extent to which we can overcome functional limitations, chronic illness, and malnutrition (Fakhar and Soleyman 2013). Since nutritional status affects people's health and ability, inadequate nutrition in old age, in addition to nutritional deficiencies, accelerates the emergence of many specific disorders in this period and requires more healthcare (McCormack, 2004, Nazemi *et al.*, 2015). Therefore, screening and dietary interventions can be cost-effective and reduce hospital stay, complications, and consequently, the cost of care and promote quality of life as the ultimate goal of nursing care. Although malnutrition is considered a common problem in the elderly, it is identifiable, preventive, and curative, and its early diagnosis allows timely intervention (Eshaghi *et al.*, 2007). Various studies in European countries estimate malnutrition in the elderly ranging from 32.9% to 56.2% (Vanderwee *et al.*, 2010). The overall prevalence of malnutrition among Iranian elderly aged over 60 was 12.2% and among the elderly residing in elderly homes was 21.6% (Abolghasem Gorji *et al.*, 2017). In Tehran, only a study reported the prevalence of malnutrition among the elderly residents of nursing homes (Nazemi *et al.*, 2015). However, there is no report for the elderly admitted to the hospitals. Given the importance of nutrition assessment in hospitalized patients and the related adverse outcomes (Ordoñez *et al.*, 2013), the present study aims to assess malnutrition among the hospitalized elderly patients in hospitals affiliated to Tehran University of Medical Sciences**.**

Materials and Methods

Study design and participants: The current cross-sectional descriptive study was conducted in 6 large hospitals of Tehran University of Medical Sciences (Sina, Baharloo, Imam Khomeini, Valiasr, Ziaiyan, and Shariati) between June and September 2015. In this study, 451 hospitalized elderly aged over 65 years were selected using the convenience sampling method. The participants aged over 65 years who could cooperate with physicians and nutritionists were included. The patients in intensive care units, re-admitted during the study, and those in the end stages of cancer or mental illness were excluded. Sample size calculation was carried out using information regarding the elderly population hospitalized in the selected hospitals and the confidence interval (97%). The researchers outlined the research objectives for the included patients. After measuring height and weight, patients were asked to complete a screening questionnaire. A follow-up questionnaire was completed if the total score was less than 11. The mid-arm circumference (MAC) and the back-leg muscle (CC) were measured with a tape measure.

Measurements: Demographic data, including age, sex, medical condition, and inpatient ward, were asked, and then a standard Mini Nutritional Assessment (MNA) questionnaire was used to screen malnutrition. MNA was previously validated for elderly populations living in a hospital or nursing home (Amirkalali *et al.*, 2010, Guigoz and Vellas, 1997). It is an 18-item questionnaire

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measuring anthropometric indices (body mass index (BMI), MAC, CC, and weight loss) and nutritional status (number of meals, dietary and fluid intake, and anorexia), as well as performing an overall assessment (lifestyle, medical history, physical activity, psychological stress, dementia, and depression).

The first part of the questionnaire consisted of 6 screening questions. It was interpreted based on total scores and the score of less than 7 was considered malnutrition, 8 to 11 was at risk of malnutrition, and 12 to 14 was considered adequate nutritional status. In addition, a follow-up questionnaire, including 12 measures along with measurements of the MAC and CC was considered for patients with scores less than 11. An MNA score of less than 17 identifies patients with malnutrition. Patients with scores between 17 and 23.5 are at risk of malnutrition, and a score of 24 or greater indicates a good nutritional status (McCormack, 2004).

Ethical considerations: The Ethics Committee of Tehran University of Medical Sciences approved the study with the code of ethics IR.TUMS.VCR.REC.1396.2049.

Data analysis: The data were analyzed using IBM SPSS version 18 and Microsoft Excel 2016. Quantitative data were reported as mean ± SD and qualitative data as frequency. Kolmogorov-Smirnov test was used to evaluate the normal distribution of data. The Chi-square *test* was applied to analyze the correlation in the agreement tables. The significance level of tests was considered 0.05.

Results

A total of 451 eligible elderly patients participated in the current study. The mean age of the elderly was 71.49 ± 6.60, and most of them were female (55.5%). Basic patient information are presented in **Table 1**. Less than half of the elderly (47.9%) had a normal BMI, and only 41.9% of the elderly are no malnutrition. In addition, the elderly patients had at least one underlying condition, and diabetes was the most prevalent (24.4%).

Table 2 shows the relationship between nutritional status with studied variables. As it shows, only sex had no significant association with nutritional status, but the others had the significant association.

Table 1. Demographic characteristics of the patients.

Variables	n	%
Gender		
Female	250	55.5
Male	201	44.5
Cardio-vascular disease	71	15.7
Diabetes mellitus	110	24.4
Hypertension	83	18.4
Respiratory disease	49	10.9
Gastrointestinal disease	72	16.0
Osteoporosis	1	0.2
Neurological disease	6	1.3
Renal disease	40	9.0
Rheumatoid arthritis	18	4.0
Others	1	0.2
Body mass index (kg/m^2)		
<18.5	21	4.7
18.5-24.9	216	47.9
25-29.9	154	34.1
>30	60	13.3
Nutritional status		
Well-nourished	189	41.9
At risk	139	30.8
Malnutrition	123	27.3

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Table 2. The relationship between nutritional status with studied variables.

Variables	Nutritional status			P-value[a]
	Well-nourished	At risk	Malnourished	
Gender				
Male	50 (40.6)[b]	59 (42.4)	92 (48.7)	0.32
Female	73 (59.3)	80 (57.6)	97 (51.3)	
Underlying disease type				
Cardio-vascular disease	19 (15.4)	21 (15.1)	31 (16.4)	0.02
Diabetes mellitus	18 (14.6)	33 (23.7)	59 (31.2)	
Hypertension	26 (21.1)	25 (17.9)	32 (17.0)	
Rheumatoid arthritis	2 (1.6)	4 (2.9)	12 (6.3)	
Respiratory disease	14 (11.4)	19 (13.7)	16 (8.5)	
Gastrointestinal disease	30 (24.4)	23 (16.5)	19 (10.0)	
Osteoporosis	0 (0.0)	1 (0.7)	0 (0.0)	
Neurological disease	1 (0.8)	3 (2.2)	2 (1.1)	
Renal disease	12 (9.8)	10 (7.2)	18 (9.5)	
Others	1 (0.8)	0 (0.0)	0 (0.0)	
Body mass index (kg/m^2)				
<18.5	17 (81.0)	3 (14.3)	1 (4.8)	0.001
18.5-24.9	74 (34.4)	74 (34.4)	67 (31.2)	
25-29.9	25 (16.3)	43 (28.1)	85 (55.6)	
>30	5 (8.3)	19 (31.7)	36 (60.0)	
Middle arm circumference (cm)				
< 21	20 (58.8)	14 (41.2)	0 (0.0)	0.001
21-22	44 (57.2)	40 (46.5)	2 (2.3)	
> 22	57 (23.1)	85 (49.4)	30 (17.4)	
Back leg muscle (cm)				
< 31	97 (59.5)	63 (38.7)	3 (1.8)	0-001
> 31	24 (18.6)	76 (58.9)	29 (22.5)	
Mobility				
Sitting on bed or chair	40 (64.5)	16 (25.8)	6 (9.7)	0.001
Sitting down but cannot get out	50 (42.0)	49 (41.2)	20 (16.8)	
Ability to walk	33 (12.2)	74 (27.4)	163 (60.4)	
Mental stress				
Yes	96 (46.6)	76 (36.9)	34 (16.5)	0.001
No	27 (11.0)	63 (25.7)	155 (63.3)	
Neuropsychiatric problems				
Dementia or Severe depression	19 (59.4)	12 (37.5)	1 (3-1)	0.001
Mild Dementia	60 (47.6)	43 (34.1)	23 (18.3)	
No mental problems	44 (15.0)	84 (28.7)	165 (56.3)	
Three medication per day				
Yes	106 (53.0)	83 (41.5)	11 (5.5)	0.001
No	15 (16.3)	56 (60.9)	21 (22.8)	

[a]: Chi-esquire test, [b]: N (%)

Discussion

In the current study, 47.9% of the elderly had normal BMI and 41.9% had good nutritional status. A significant relationship was observed between malnutrition with disease type, BMI, MAC, and back-leg muscle. There was also a significant association between nutritional status with mental stress, neurobehavioral problems, and multiple drug use.

Evidence suggests that chronic diseases, such as cardiovascular disease, hypertension, and diabetes mellitus all affect the nutritional needs of the elderly (Mangels, 2018). The elderly had at least one underlying disease, and diabetes (24.4%) was the most prevalent. Previous studies have

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reported that 83% of the elderly had at least one underlying disease (Fakhar and Soleyman 2013).

In terms of malnutrition index, the results showed that 41.9% of the elderly had good nutritional status. In the study by Ismaili Fakhar *et al.* on 199 elderly people residing in 4 nursing homes in the central province, 27.1% of the elderly had adequate nutritional status, 53.3% were at risk of malnutrition, and 19.6% were malnourished (Fakhar and Soleyman 2013). In another study by Ghorbani *et al.* on 233 elderly hospitalized in two health centers in Qazvin province, Iran, 42.95% were at risk of malnutrition (Ghorbani *et al.*, 2013).The better nutritional status of the elderly in this study might be due to the larger sample size and the higher standard of living in the capital city. A study of 1350 Iranian elderly showed similar results, in which 53.2% of participants were well-nourished, 41.5% were at risk of malnutrition, and 5.5% were malnourished (Abolghasem Gorji *et al.*, 2017).

There was a significant relationship between BMI and nutritional status in the present study. Various studies have shown that malnutrition is associated with lower BMI. For example, in the study by Eshaghi *et al.*, BMI was reported as an important factor related to malnutrition (Eshaghi *et al.*, 2007). Moreover, a significant relationship was found between motor ability and malnutrition status, attributed to the difficulties in food purchase, preparation, and eating among the elderly (Mangels, 2018).

The study has several strengths, including a large study sample, completion of questionnaires by an expert medical team, and several stages to ensure the accuracy of the responses. However, the cross-sectional design of the current study may limit the causal relationship. Furthermore, the convenience sampling method was used, which is an available and inexpensive method, but may limit the generalization of the results.

Conclusions

Nutritional screening of the elderly population, particularly hospitalized patients, should be prioritized using appropriate tools for health providers. It is necessary to have timely dietary intervention in the treatment plan and at the time of admission of elderly patients. Although a relatively good nutritional status was found, the nutritional status of the hospitalized elderly cannot be determined by only referring to a single nutritional parameter. Therefore, future studies are required to consider biochemical parameters, such as albumin, hemoglobin, hemoglobin, and total lymphocyte count.

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Authors' contributions

Mirbazegh F and Abbassi N: Conceived and designed the study; Alipour S and Soltani-Kermanshhi M: Wrote the manuscript and performed the research; Ebrahimpour-Koujan S: contributed in data collection; Vaskooi-Eshkevari K: Analyzed the data; Hadavi S: had primary responsibility for the final content

Conflicts of interest

The authors declare that they have no conflict of interest.

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