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Original Article

Nutritional Status of the Community-dwelling Elderly in Tabriz, Iran

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A B S T R A C T

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Introduction: Nutrition is an important determinant of health in the elderly. Older people are more susceptible to malnutrition that leaves adverse effects on their health. This study aimed to evaluate the nutritional status of the community-dwelling elderly in Tabriz City.

Methods: This cross-sectional study was conducted among non- institutionalized older people in Tabriz, Iran. A total of 1041 older adults (506 men and 535 women) were randomly selected based on Probability Proportional to Size sampling method. Data collection and evaluation of nutritional status using Mini Nutritional Assessment Short-Form, were conducted in the participants' households.

Results: Of all participants, 2.5% (CI 95%; 1.7-3.6) suffered from malnutrition, 26.7% (CI 95%; 24.1%-29.5%) were at risk of malnutrition, and 70.8% (CI 95%; 68.0%-73.5%) had normal nutritional status. Malnutrition and risk of malnutrition were more prevalent in elderly women than men (malnutrition: 2.6% vs. 2.4%, risk of malnutrition: 30.3% vs. 22.9%, $p = 0.024$) and in single than married elderly (3.9% vs. 2.0%, $p < 0.001$). Moreover, it had an upward trend with increasing age and decreasing educational level.

Conclusion: Although most of the elderly people were nutritionally in normal status, a significant proportion were at risk of malnutrition that strengthens the need for designing and implementing appropriate interventions to improve lifestyle and prevent malnutrition in the elderly people.

Keywords: Elderly, Nutritional Status, MNA-SF, Community-dwelling, Iran

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Introduction

Being a global challenge, the elderly population in Iran is also increasing. In recent years, elderly population in Iran has grown rapidly and demographic trends suggest that Iran will experience a more rapid growth of older adults in the coming decades (1).

The older people are considered as a vulnerable group to malnutrition (2-4), a condition that arises when the body does not get required amounts of nutrients needed to preserve tissues and organs functions (5, 6). Various studies have shown that malnutrition has a strong correlation with high mortality in older people (7). Those elderly who suffer from malnutrition have longer disease periods and hospital stay, high incidence of complications, infections and iatrogenic diseases, low quality of life, and poor healing of wounds; resulting in high mortality rates (8, 9).

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Diagnosis of the nutritional problems is emphasized as part of the elderly comprehensive assessment in population screening (10). Rapid growth of elderly population, vulnerability to malnutrition, and rather high prevalence of malnutrition in the elderly highlights the importance of nutritional screening of these people (11). Studies conducted on the nutritional status and feeding patterns of the Iranian elderly, often took place on the elderly living at the nursing homes and less researches are done on community-dwelling elderly (12). Therefore, there is little information about the nutritional status of these people in Iran (2, 13). So, the present study aimed to determine the nutritional status of elderly people in Tabriz (the largest city in northwest of Iran) in 2015.

Methods

Study design and participants

Details on this descriptive cross-sectional study and sampling method have been described elsewhere (14). Statistical populations briefly included all people aging 60 years and older who lived in the community. A community-based sample of 1067 elderly individuals was randomly selected using Probability Proportional to Size sampling method from Tabriz. Of total 1067 cases in the original study, anthropometric measurements were available in 1041 cases (506 men and 535 women). Data collection and anthropometric measurements (weight, height, waist circumference (WC), and hip circumference (HC)) were conducted in participants' households by trained nutritionists from June 2015 to August 2015.

Measures

Data gathering instrument was a demographic information questionnaire, as well as the Mini Nutritional Assessment Short-Form (MNA-SF) questionnaire, a validated tool used solely for nutritional screening (15). The instrument consisted of 6 questions, including two anthropometric parameters (Body Mass Index (BMI) and recent weight loss), a diet parameter (food intake), a general assessment parameter (mobility) and two health assessment items (psychological stress or acute diseases and neuropsychological problems) (11, 16). Maximum score of MNA-SF is 14 (15, 17) and based on its total points, the nutritional status of the population was classified into three categories. Scores of 12-14 indicate normal nutritional status, scores of 8-11 show risk of malnutrition and scores of 0-7 indicate malnutrition status (malnourished) (5, 11, 15). Based on an evaluation carried out in Iran, MNA-SF has remarkable agreement with the full MNA and seems to be an appropriate screening instrument for rapid detection of malnutrition or risk of malnutrition in community-dwelling elderly (18).

Anthropometric instruments and conditions

The used instruments included Seca portable digital scale (Seca, Hamburg, Germany) with precision of 100g and Seca inelastic measuring tape and stadiometer with precision of 0.5 cm, by which the weight (kg), WC, HC, and height in centimeter (cm) were measured. The participants were weighed wearing light clothes and without shoes. Measuring the WC was performed at the point recommended by World Health Organization, i.e. the midpoint between the last rib and the iliac crest (the smallest WC) (19). Hip circumference at the most protuberant area (the highest HC value) was measured by a measuring tape. These anthropometric measurements were performed in participants' living places. Body mass index and waist-to-hip ratio (WHR) were calculated by dividing the values of weight (kg) by square of height (m2) and dividing the WC by HC, respectively.

Ethical Consideration

This study was reviewed and approved by committee of ethics, Tabriz University of Medical Science (Ethical ID: IR.TBZMED.REC.1392.243). Informed consent was obtained from all participants and they were assured about confidentiality of personal information.

Data analysis

To analyze obtained data, SPSS 16 statistical software (Chicago, IL, USA) was used. Categorical variables were expressed as frequencies and percentages and were compared utilizing chi-square test between groups. Continuous variables were described as mean ± standard deviation (SD) and were compared between groups using independent t-test. P-value less than 0.05 was considered as statistically significant.

Results

In the present study, 1041 participants (506 male & 535 female) with a mean age of 69.96±8.1 years (71.1 ± 8.3 in male & 68.9 ± 7.9 in female) participated in the study. Table 1 represents age and gender composition and the anthropometric information of the subjects. Participants were categorized in three main age groups including 60-69, 70-79, and 80 years and older with sexually the same proportion (48.60% men and 51.40% women). The average BMI was greater in women than men (29.9 ± 6.0 vs. 26.8 ± 4.2, $p \leq 0.001$).

Table 2 shows the nutritional status of the studied elderly. Based on the findings of the study, one third of the people were malnourished or at risk of malnutrition.

The prevalence of malnutrition status by sex, age, marital status and education are given in Table 3. Women and older subjects were more prone to malnutrition and at greater risk than male and younger subjects, respectively ($p = 0.024$, $p < 0.001$). Moreover, there was a reverse correlation between the risk of malnutrition and education level ($p < 0.001$).

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....Table 4 shows nutritional status based on age and anthropometric data. Mean age of elderly had a significant difference in three groups ($p < 0.001$); it was higher in malnourished than those at risk of malnutrition and higher in the elderly with risk of malnutrition than those with normal nutritional status. The mean anthropometric measurements (weight, height, BMI, WC, HC and WHR) had significant differences in three groups; highest in elderly with normal nutritional status and lowest in malnourished ($p = 0.007$). Table 5 presents the MNA-SF items and the scores of studied people for each question.

Table 1. Demographic characteristics of community-dwelling elderly

Variable	Gender		
	Male	**Female**	**Total**
Gender (n (%))	506 (48.60)	535 (51.40)	1041
Age(year) (mean ± SD)	71.1 ± 8.3	68.9±7.9	69.96 ± 8.1
Weight (kg) (mean ± SD)	73.9 ± 12.6	69.7±14.4	71.7 ± 13.7
Height (cm) (mean ± SD)	165.9 ± 7.7	152.6±7.5	159.0 ± 10.1
BMI (kg/m2) (mean ± SD)	26.8 ± 4.2	29.9±6.0	28.4 ± 5.4
WC (cm) (mean ± SD)	99.7 ± 13.6	102.3±14.3	101.0 ± 14.0
HC (cm) (mean ± SD)	101.6 ± 10.7	107.7±13.4	104.8 ± 12.6
WHR (mean ± SD)	0.98 ± 0.08	0.95 ± 0.07	0.97 ± 0.08
MNA-SF score (mean ± SD)	12.43 ± 1.94	12.09 ± 2.00	12.25 ± 1.98

BMI: Body Mass Index, WC: Waist circumference, HC: Hip Circumference WHR: Waist to Hip Ratio, MNA-SF: Mini Nutritional Assessment-Short Form

Table 2. Prevalence of different levels of nutritional status in community-dwelling elderly

Nutritional status	Frequency	Percent	95% CI
Normal	737	70.8	68.0-73.5
At risk	278	26.7	24.1-29.5
Malnourished	26	2.5	1.7-3.6
Total	1041	100.0	

CI: Confidence Interval

Table 3. Demographic variables among community-dwelling elderly according to their nutritional status

Variable	Nutritional status			P- value[1]
	Malnourished N (%)	**At risk N (%)**	**Normal N (%)**	
Gender				
Male	12(2.4)	116(22.9)	378(74.7)	0.024
Female	14(2.6)	162(30.3)	359(67.1)	
Age				
60-69	9(1.7)	114(21.2)	415(77.1)	< 0.001
70-79	7(2.0)	102(29.7)	235(68.3)	
>=80	10(6.3)	62(39.0)	87(54.7)	
Marital Status				
Single	11(3.9)	89(31.4)	183(64.7)	0.015
Married	15(2.0)	189(24.9)	554(73.1)	
Education				
Illiterate	19(3.4)	182(32.6)	357(64.0)	< 0.001
Primary	4(1.4)	68(23.9)	213(74.7)	
Secondary	3(2.3)	22(16.9)	105(80.8)	
Higher education	0(0.0)	6(8.8)	62(91.2)	

Nutritional status was assessed using MNA-SF (Mini Nutritional Assessment Short Form)
[1.] Chi-square test

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Table 4. Anthropometric measurements among community-dwelling elderly according to their nutritional status

Variable	Nutritional status			P-value[1]
	Malnourished	At risk	Normal	
Age (year)(mean ± SD)	74.12 ± 9.06	72.14 ± 9.21	69.02 ± 7.47	< 0.001
Weight (kg)(mean ± SD)	58.32 ± 19.56	68.20 ± 14.91	73.48 ± 12.52	< 0.001
Height (cm)(mean ± SD)	156.16 ± 10.11	157.02 ± 9.80	159.88 ± 10.10	< 0.001
BMI (kg/m2)(mean ±SD)	23.64 ± 6.42	27.72 ± 5.95	28.85 ± 5.05	< 0.001
WC (cm)(mean ± SD)	92.17 ± 14.85	99.21 ± 14.29	101.00 ± 13.97	< 0.001
HC (cm)(mean ± SD)	99.08 ± 12.63	103.86 ± 12.47	105.27 ± 12.54	0.007
WHR (mean ± SD)	0.93 ± 0.05	0.96 ± 0.08	0.97 ± 0.08	0.003

BMI: Body Mass Index, WC: Waist circumference, HC: Hip Circumference, WHR: Waist to Hip Ratio
Nutritional status was assessed using MNA-SF (Mini Nutritional Assessment Short Form)
[1.] Analysis of Variance (One-way ANOVA)

Table 5. Distribution of MNA-SF items according to nutritional categories

MNA-SF Items	Malnourished (N = 25)		At risk for malnutrition (N = 273)		Normal nutritional status (N = 743)		P-value[1]
	N	%	N	%	N	%	
Food intake declined over the past 3 months?							<0.001
Severe reduction in food intake	10	40.0	18	6.6	2	0.3	
Moderate reduction in food intake	10	40.0	103	37.7	49	6.6	
Normal food intake	5	20.0	152	55.7	692	93.1	
Involuntary weight loss during the last 3 months?							<0.001
Weight loss >3kg	11	44.0	40	14.7	0	0.0	
Does not know	13	52.0	141	51.6	83	11.2	
Weight loss between1 and 3 kg	1	4.0	38	13.9	62	8.3	
No weight loss	0	0.0	54	19.8	598	80.5	
Mobility							<0.001
Bed or chair bound	2	8.0	5	1.8	2	0.3	
Able to get out of bed/chair but does not go out	10	40.0	56	20.5	28	3.7	
Goes out	13	52.0	212	77.7	713	96.0	
Psychological stress in the past 3 months?							<0.001
Yes	17	68.0	103	37.7	7	0.9	
No	8	32.0	170	62.3	736	99.1	
Neuropsychological problems?							<0.001
Severe dementia or depression	4	16.0	12	4.4	3	0.4	
Mild dementia or depression	14	56.0	102	37.4	54	7.3	
No psychological problems	7	28.0	159	58.2	686	92.3	
Body Mass Index (weight in kg/height in m^2)							<0.001
BMI < 19	5	20.0	10	3.7	0	0.0	
19 ≤ BMI < 21	5	20.0	26	9.5	23	3.1	
21 ≤ BMI < 23	7	28.0	35	12.8	46	6.2	
BMI ≥ 23	8	32.0	202	74.0	674	90.7	

[1.] Chi-square test

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Discussion

Nutritional status is one of the main aspects of the elderly health (7). According to the findings, only a very small number of participants (2.5 percent) were malnourished and about a quarter were at risk of malnutrition, while the majority of the elderly (over two thirds) had normal nutritional status.

In different studies, different levels of malnutrition have been reported in the elderly in Iran, some of which are similar to the result of the present study. In a study, for example, conducted in retired people in Rasht, 3.9% of the elderly had malnutrition, 13.5% were at risk of malnutrition and 86.5% had normal nutrition profile (7). Although the prevalence of malnutrition was similar to our study, however the prevalence of risk of malnutrition was lower than the present study (7). The reason might be the characteristics of the subjects, who in total have better health status in comparison with the general elderly population. In another Iranian study on non-institutionalized older people in Gorgan, 4.8% of the elderly had malnutrition and 44.7% were at risk of malnutrition (2, 13). According to the classification of Iranian provinces in terms of food security situation, and the placement of East Azerbaijan province (Tabriz is the capital city of East Azerbaijan province) in secure class and Golestan province (Gorgan is its capital city) in relatively secure class (20), the difference seems justifiable and expected. In a survey conducted about nutritional status of the older people in Isfahan 3% of the elderly had malnutrition and 37% were at risk of malnutrition, similar to that of the present study, although the percentage of people exposed to risk of malnutrition was more than the present study (8). In Aliabadi et al study (2008) in a study in Khorasan-e-Razavi province carried out based on MNA, 42.7% of the free-living elderly had normal nutritional status, 45.3% were at risk of malnutrition and 12.0% suffered from malnutrition (21). It seems that the reason of higher statistical risk of malnutrition and malnutrition in Khorasan-e-Razavi compared to the current study, was that the samples Khorasan-e-Razavi study were selected from villagers, since prevalence of malnutrition were more expected in rural areas (21). The prevalence of malnutrition in the present study was less than the previous studies conducted on elderly people in nursing homes in Iran including nursing homes in Markazi Province (22), and Tehran and Shemiranat (23). Similar studies in other countries also show that the elderly living nursing homes are more vulnerable in terms of nutritional disorders (24-26).

In the present study, the prevalence of malnutrition in women was slightly more than men, as well as a higher percentage of women were at risk of malnutrition, and consequently percent of those with normal nutritional status was greater among men. As well, more women suffered from malnutrition or were at risk of malnutrition than men in Khorasan-e-Razavi (21). In Gorgan, a significant relationship was observed between gender and nutritional status and malnutrition was more frequent in women (13). In a study, the prevalence of malnutrition in elderly women was more in Qazvin (9). According to various studies, it can be stated compared to men, aged women had more inappropriate education and financial situation in most societies, so they are more likely to be at risk of malnutrition (2).

In the present study, both the percentage of people with malnutrition and of elderly people at risk of malnutrition increased and consequently the percentage of elderly people with normal nutritional status decreased by increase in age (from the age group of 60-69 to 70-79 and from 79-70 to 80 and older).

Also, according to Table 4, the average age of the elderly with malnutrition was more than that of the elderly who were at risk of malnutrition, and more in at risk group than the group of elderly with normal nutritional status. According to the previous studies, the prevalence of malnutrition increases by increasing age, especially in people aged above 65 years (27). Also, according to Gorgan study which used MNA-SF sum of malnutrition and risk of malnutrition have increased along with reaching older age groups (2). In elderly patients in Qazvin, there was a significant relationship between age and nutritional status, which means malnutrition and its risk was higher in older elderly as other studies shows (9). Increase in malnutrition and risk of malnutrition by age can be related to increase in chewing and dental problems, and possibly hormonal changes and digestive disorders. Changes in endocrine system regulate hunger, appetite and satiety. These can decrease appetite and food intake which results in weight loss. For instance, cholecystokinin increases with aging and makes older people are more sensitive to the satiating effects of this hormone (28).

In the present study, evaluation of the relationship between nutritional status and marital status showed that malnutrition or being at risk of malnutrition was more prevalent in single elderly; and consequently the percentage of normal nutritional status was more in married elderly. In a study, the possibility of malnutrition in widows and married elderly was 16% and 14.3%, respectively, but there was no significant relationship between marital status and nutritional status (7). In Gorgan, as well as in Khorasan-e-Razavi province, malnutrition was more prevalent in elderly people living alone (13, 21). Loneliness and social isolation makes people to not feel the need to food in large amounts and withdraw cooking a variety of foods. Loneliness also leads to loss of appetite and unwillingness to eat food, and this can exacerbate the decline in receiving food and increase and complicate the risk of malnutrition in the elderly. Thus one of the potential risks of this group is nutritional status (7).

In the current study, both the percentage of elderly people with malnutrition and those at risk of malnutrition reduced by increase in level of education (from illiterate to primary education, secondary and university education), consequently, the percentage of elderly with normal nutritional status increased. So that the elderly with academic education had more normal feeding and had the lowest risk of malnutrition

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and had not malnutrition. Such a situation was also observed in elderly people in Rasht (7), in Gorgan and in Khorasan-e-Razavi, malnutrition and its risk was higher among the illiterate elderly. It seems that higher education is associated with higher income and a better lifestyle that leads to a better nutritional status in the elderly (7). Moreover, subjects with higher education have more nutritional information and higher health literacy. These factors result in a better nutritional status in the elderly.

Conclusion

Generally, results of the present study showed a low prevalence of malnutrition in the elderly, but a large percentage of elderly people were at risk of malnutrition. So, to prevention of malnutrition in the people at risk of malnutrition, it seems necessary to design and implement appropriate interventions including education, lifestyle modification, and nutritional, social and economic support.

Study limitations

The study was carried out in a large sample size and according to the sampling method, the studied samples were representative samples, so the results can be generalized to the whole elderly of Tabriz. Considering the cultural and religious atmosphere of Tabriz city and the importance of gender-matching of interviewers with participants as well as to respect the participants' beliefs and social norms, it was decided to undertake data collecting and anthropometric measurements done by trained questioning team made up of a man and a woman. Due to the lack of field work studies among the elderly population, and despite coordination, some residents were resistant to answer and in wealthy parts the study was less welcomed when compared to the other parts. In the present study, MNA-SF, the validated and recommended tool, was used, but given that the use of the full form MNA provides more additional results on the nutritional status of the elderly, using full form MNA and comparing findings with the results of MNA-SF based studies are recommended.

Conflict of interest

Authors declare no conflict of interest in this study.

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Authors' contributions

All authors were involved in the conceptualization of the study, revising the manuscript and interpreting the results.

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