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Nutritional Status and the Affecting Factors in the Elderly In Gonbad Kavus, Iran

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Abstract

Background: The elderly population is projected to increase in Iran and the world. A large number of chronic diseases observed in the elderly could be prevented or treated by improving their lifestyle, including nutrition. The present study aimed to determine nutritional status and the affecting factors in the elderly in Gonbad Kavus, Iran.

Methods: This descriptive-analytical study was performed on 139 elderlies aged more than 60 years who resided in Gonbad (northeast of Iran) in 2013. The subjects were selected via two-stage cluster sampling, and each health center was considered as a cluster. Data were collected using a demographic questionnaire and mini nutritional assessment (MNA) questionnaire. Moreover, anthropometric indices (e.g., weight and height) were measured using a fabric meter, stadiometer, and Seca scale. Data was analyzed in SPSS version 11.5 using Chi-square and ordinal logistic regression model.

Results: In total, 36% of the elderlies had a normal nutritional status, whereas 59% and 5% were at the risk of malnutrition and malnourished, respectively. Among the subgroups, the female elderlies (78.6%) and single participants (87.1%) were at the risk of malnutrition or malnourished. Gender was the only independent variable affecting malnutrition. In addition, malnutritional status and marital status were the only variables affecting the body mass index even in the presence of other variables.

Conclusion: Based on the nutritional assessment of the elderly, special attention must be paid to elderly women with lower education levels and financial dependence. It is also recommended that periodic assessments be carried out in the elderly population using the MNA questionnaire.

Introduction

Recently, population aging has become a global phenomenon in the field of health (1). The United Nations has anticipated an increase in the elderly population from 10.5% in 2007 to 21.8% in 2050 (2). During 2015-2050, the proportion of the world's population aged more than 60 years will nearly double (from 12% to 22%), and 80% will be residing in low- and moderate-income countries (1). In Iran, the elderly population was reported to be 10 million in 2019 (3).

Aging is a critical life stage, which is associated with the increased possibility of physical, psychological, and social issues due to the changes in the structure and function of various body organs (4). In addition, aging-related complications impose heavy costs on communities. Strength training has been shown to help preserve muscle mass, and adequate nutrition could diminish the complications caused by aging (5).

Malnutrition in the elderly is defined as undernourishment characterized by inadequate food intake, poor appetite, and loss of muscle mass and weight. Health status and quality of life are largely influenced by malnutrition. Furthermore, malnutrition in the elderly is associated with a high social burden, which encompasses a multi-dimensional concept with physical and psychological aspects (6). Therefore, nutritional status in the elderly is a notable issue in developing countries. Nutrition has a significant impact on mortality, disability, and quality of life in the elderly.

Several studies have shown that poor nutritional status in the elderly not only increases the risk of hospitalization, but is also associated with a higher possibility of health complications, mortality, decreased quality of life, and prolonged hospitalization (7-10). Chronic diseases threatening the elderly could be prevented or treated by nutrition improvement, which highlights the importance of nutritional screening in the elderly (6, 11-13).

Since the elderly are considered a vulnerable population, multiple factors (e.g., individual characteristics, ethnic and cultural differences) could affect their nutritional status (14-16). Therefore, evaluation of the nutritional status and the influential factors in the elderly facilitates the identification of high-risk cases, designing appropriate nutritional interventions, monitoring interventions, and determining the nutritional requirements of the elderly and their need for social support.

Given the high rate of malnutrition in the elderly and the possibility of eliminating some of the contributing factors through proper interventions, the present study aimed to assess nutritional status and the influential factors in the elderly in Gonbad Kavus, Iran.

Methods

This cross-sectional, descriptive study was performed on the elderly population of Gonbad Kavus city, located in the northeast of Iran, in 2013. In total, 139 eligible elderlies were selected via two-stage cluster sampling, and each health center was considered as a cluster. Several clusters were randomly selected in the first stage, followed by the systematic sampling of the subjects from each cluster in proportion to the volume of the entire elderly community of the city.

The inclusion criteria of the study were the minimum age of 60 years, absence of severe diseases, and willingness to participate. Based on previous studies (4), the sample size was estimated at 116 with a 5% type 1 error and a relative error of one. Given the use of cluster sampling, the final sample size was determined to be 139 considering the effect size of 1.2.

$$n = \frac{z_{1-\alpha/2}^{\ 2}\ \ s^{\ 2}}{d^2}$$

The standard deviation (SD) of the acquired score of the mini nutritional assessment (MNA) questionnaire was 3.3. Data were collected using a demographic questionnaire and the MNA questionnaire. In addition, anthropometric indices (e.g., body dimensions, weight, and height) were measured using a fabric meter, stadiometer, and Seca scale.

MNA is a proper tool for malnutrition screening and is regarded as a highly applicable and accurate method. The validity and reliability of MNA have been confirmed in various studies for the nutritional assessment of the elderly. MNA has also been standardized for the Iranian population (17-20). The questionnaire consists of 39 items, and 18 items in MNA and its anthropometry section assess

malnutrition. Moreover, MNA has 18 items on anthropometric, general, dietary, and mental assessment; the maximum score of the instrument is 30. Based on the acquired scores, the elderlies were classified into three categories of normal (scores 23.5-30), high-risk for malnutrition (scores 17-23.5), and malnourished (<17) (17).

In the present study, the body mass index (BMI) of the elderly was calculated as the ratio of weight (kg) divided by height (m^2). Accordingly, those with a BMI of <18.5 kg/m^2 were considered underweight, while the BMI of 18.6-24.9, 25-29.9, and >30 kg/m^2 were defined as normal weight, overweight, and obese, respectively (21). The height and weight of the participants were also measured by referring to the residence of the subjects. Weight was measured using a Seca scale (accuracy: 0.1 kg) with minimum clothing and no shoes. In addition, a Seca stadiometer was used to measure height, and a fabric meter (accuracy: 0.1 cm) was used to measure the dimensions of the gastrocnemius muscle. Chumlea's equations based on knee height were also applied to measure the height of the elderlies who were unable to stand upright (17). Informed consent was obtained from the subjects prior to enrollment, and those who were unwilling to partake were excluded from the study.

SPSS Statistics for Windows, version x.0 (SPSS Inc., Chicago, Ill., USA)' using frequency tables and statistical indices (e.g., central tendency, median, SD) to describe the observations, and ordinal logistic regression was employed to assess the simultaneous effects of demographic variables on the BMI and malnutrition levels. Moreover, Chi-square and Fisher's exact test were used to evaluate the effect of each demographic variable on the level of malnutrition separately, and a parametric t-test was applied to determine the equality of the mean BMI between two ethnic groups.

Results

In total, 139 elderlies participated in the study, including 69 males and 70 females. According to the results, 36% of the participants had a normal nutritional status, whereas 59% and 5% were at risk of malnutrition or malnourished, respectively. The nutritional status of the elderlies based on their demographic characteristics revealed that the majority of the malnourished subjects were female (8.6%), non-Turkmen (7.8%), and housewives (8.7%). On the other hand, the majority of the subjects who were at risk of malnutrition were female (70%), single (80.6%), and housewife (66.7%). Significant association were observed between the malnutrition status and all the studied variables, with the exception of ethnicity and education level (P<0.05). In addition, the majority of the elderlies who had a normal nutritional status were either employed or retired (57.1%), male (50.7%), and married (43%) (Table 1).

Table 1. Nutrition status of elderly according to demographic characteristics

Co-variables	Malnourished (MNA<17) N (%)	At Risk of Malnutrition (17≤MNA≤23.5) N (%)	Normal (23.5<MNA≤30) N (%)	Total	Univariate P-value
Marital Status					
Single	2 (6.5)	25 (80.6)	4 (12.9)	31	0.005
Married	5 (4.7)	56 (52.3)	46 (43)	100	
Gender					
Male	1 (1.4)	33 (47.8)	35 (50.7)	69	<0.001
Female	6 (8.6)	49 (70)	15 (21.4)	70	
Ethnicity					
Turkmen	2 (2.7)	45 (60)	28 (37.3)	75	0.41
non-Turkmen	5 (7.8)	37 (57.8)	22 (34.4)	64	
Education Level					
Illiterate	7 (6.9)	60 (59.4)	34 (33.7)	101	0.7
Elementary School	0	13 (56.5)	10 (43.5)	23	
Middle School	0	9 (60)	6 (40)	15	
Occupational Status					
Housewife	6 (8.7)	46 (66.7)	17 (24.6)	69	0.015
Retired/Employee	0	9 (42.9)	12 (57.1)	21	
Other	1 (2.1)	26 (54.2)	21 (43.8)	48	

According to the results of ordinal logistic regression, gender was the only variable with a significant effect on the malnutrition level even in the presence of other variables. In other words, the risk of malnutrition was nine-fold in the female subjects compared to the males (1÷0.11). Therefore, it could be concluded that the risk of severe malnutrition was significantly lower in men compared to women (Table 2).

Table 2. Results of ordinal logistic regression with nutritional status as order response

Co-variable	Regression Coefficient	Std. Error	P-value	Odds Ratio EXP (B)	95% CI
Intercept 1	-5.183	2.4964	0.038	-	-
Intercept 2	-1.29	2.4479	0.598	-	-
Occupational status					
Housewife	-1.262	1.0348	0.223	0.283	0.37-2.151
Retired/Employee	-0.449	0.7094	0.527	0.638	0.159-2.564
Age	-0.032	0.0306	0.295	0.968	0.912-1.028
Gender	-2.202	1.06626	0.038	0.111	0.014-0.887
Marital status	-0.753	0.5393	0.162	0.471	0.164-1.355
Educational level	0.064	0.3536	0.855	1.067	0.533-2.133
Ethnicity	-0.183	0.3709	0.623	0.833	0.403-1.724

According to the findings, the highest and lowest BMI in the Turkmen and non-Turkmen ethnicities were 43.70 and 41.27 kg/m2 and 15.06 and 16.98 kg/m2, respectively. In addition, the mean BMI in the Turkmen ethnicity was 27 and 27.14 in the non-Turkmen ethnicity. However, the difference in this regard was not considered significant (P=0.8). Furthermore, we repeated ordinal logistic regression to evaluate the simultaneous effects of the malnutrition status and other independent variables on the BMI. According to the obtained results, malnutrition status and marital status were the only variables with a significant effect on the BMI in the presence of other variables, so that per one unit increase in the severity of malnutrition, the risk of obesity would be 3.3 times (1÷0.3) higher compared to the subjects with a lower weight (Table 3). By assuming the other fixed variables, the risk of obesity was observed to be significantly lower in the married participants compared to the singles. In other words, the risk of obesity was 2.8 times (1÷0.35) higher in the single elderlies compared to those who were married.

Table 3. Results of Ordinal Logistic Regression with BMI as Order Response

Co-variable	Regression Coefficient	Std. Error	P-value	Odds Ratio EXP (B)	95% CI
Intercept 1	-8.488	2.3969	<0.001	-	-
Intercept 2	-5.284	2.3113	0.022	-	-
Intercept 3	-3.502	2.2844	0.125	-	-
Nutrition status	-1.294	0.3305	<0.001	0.274	0.144-0.524
Occupational status					
Housewife	-0.68	0.8543	0.421	0.503	0.094-2.684
Retired/Employee	0.019	0.6262	0.976	1.019	0.299-3.477
Age	-0.26	0.0275	0.348	0.975	0.924-1.028
Gender	-1.12	0.8859	0.206	0.326	0.057-1.853
Ethnicity	-0.209	0.335	0.533	0.812	0.421-1.565
Marital Status	-1.039	0.4879	0.033	0.354	0.136-0.921
Educational Level	-0.201	0.3234	0.535	0.818	0.434-1.542

According to the obtained results, both Turkmen and non-Turkmen ethnicities consumed more fruits than vegetables, while no significant difference was observed in this regard (Table 4).

Table 4. Fruit and Vegetable Consumption Status Based on Ethnicity

		Turkmen			Non-Turkmen		
		Median	Max.	Min.	Median	Max.	Min.
Fruits	Day	4	7	0	3.5	7	0
	Unit	4	11.5	0	3	10	0
Vegetables	Day	2.5	7	0	2.5	7	0
	Unit	2.2	6	0	2	8	0

Discussion

In the present study, 36% of the elderlies had a normal nutritional status, whereas 59% and 5% were at the risk of malnutrition and malnourished, respectively. In a similar research, Bakhtiari et al. evaluated 115 female and 211 male elderlies using MNA, and the results indicated that 3% of the subjects were malnourished, while 25.1% were at the risk of malnutrition (6). In another study conducted in Gorgan (Iran), the level of malnutrition and its risk were estimated at 4.8% and 44.7%, respectively (17). In Hamedan (Iran), 27.5% of the subjects were reported to be at the risk of malnutrition, while 72.5% had a normal nutritional status (18).

Among 199 elderlies examined in Markazi Province (Iran), 19.6% were malnourished, while 53.3% and 27.1% were at the risk of malnutrition and had a normal nutritional status, respectively (22). In Kermanshah (Iran), 38.7% and 14.9% of the evaluated elderlies had moderate and severe malnutrition, respectively (22). Our findings are congruent with the research performed in Gorgan, while the reported malnutrition level was lower in Gonbad Kavus compared to Kermanshah and Markazi province and higher compared to Hamedan. The discrepancy might be due to the differences in the economic, social, and cultural status of these provinces, as well as the design and time of the studies.

In the current research, the lack of a significant difference between the Turkmen and non-Turkmen subjects indicated that ethnicity did not affect malnutrition in this city. In another research, Engelheart reported the malnutrition level to be 18-30% in various elderly populations requiring healthcare services (23).

Other studies have also been focused on this issue across the world. For instance, a study showed that 20.8% and 49.2% of the participants were malnourished and at risk of malnutrition, respectively (24). In Turkey, the results of the MNA questionnaire indicated that among 102 elderly patients referring to outpatient clinics, 38.2% were malnourished, and 18.6% were at the risk of malnutrition (23). In a cross-sectional study, Vaish et al. (2017) assessed the elderlies in two villages in East Delhi (n=353; age<60 years), reporting the rate of malnutrition to be 49.3% in these regions (25).

In another study conducted in Puducherry villages (India), 17.9% of the elderly were malnourished, and 58.7% were at risk of malnutrition (26). Other international studies have reported different rates of malnutrition in the elderly. The estimated level and risk of malnutrition in the present study are consistent with the findings of Bakhtiari and Gorji, as well as the studies performed in the neighboring countries of Iran. The difference in the reported rates could be due to the differences in the applied measurement tools and the economic, social, and cultural status of various communities (25-27).

In the current research, the results of the MNA questionnaire indicated the higher rate of malnutrition in the non-Turkmen elderlies (7.8%) compared to the Fars elderlies. However, no significant difference was observed between the Turkmen and non-Turkmen ethnicities in terms of the BMI (27 vs. 27.14 kg/m^2). Our literature review showed no prior studies evaluating the differences in the rate and causes of malnutrition in different ethnicities. The results of the present study indicated the higher rate of malnutrition in the female subjects (8.6%) compared to the males, which is consistent with the previous studies in this regard (6, 27, 28). The significant association between malnutrition and female gender could be attributed to gender inequalities and the social role of women; such example is the effects of traditional eating habits in mothers and fathers and the fact that mothers may consume 'leftovers' containing fewer nutrients after serving their spouse and children. Similar to other studies, our findings demonstrated a significant association between malnutrition and increased age (2, 8, 22, 24).

Previous studies have reported different malnutrition rates in the elderly. Our findings in this regard are in line with the results obtained by Bakhtiari and Gorji about malnutrition and its risk factors (6, 8). The similarity could be due to a sedentary lifestyle and increased economic issues due to aging, as well as physiological changes or chronic diseases in this population, which in turn lead to the loss of appetite and poor food intake in the elderly. According to the results of the present study, the rate of malnutrition was higher in the housewives (8.7%), single subjects (80.6%), and housewives (66.7%).

According to the results of univariate analysis, malnutrition status is affected significantly by all the demographic variables (except ethnicity and education level). In addition, the risk of severe malnutrition was significantly lower in the male subjects compared to the females. The risk of obesity was also 2.8 times higher in single subjects compared to the married elderlies. In both ethnicities, fruit intake was higher than vegetables, while no significant difference was observed between the ethnicities regarding the pattern of fruit and vegetable consumption.

In a systematic review and meta-analysis conducted by Gorji et al. (2016), the total prevalence of malnutrition was estimated at 12.2% in Iran and 9.2% and 21.6% in the elderly subgroups living at home and in nursing homes, respectively (8). In general, the aforementioned studies have indicated that poor nutrition is more common in the elderlies who have a solitary life, low education levels, no financial independence, multiple physical disabilities, chronic diseases, drug consumption, smoking habits, and poor mental/oral health. Furthermore, according to the findings of the same studies, significant association between the malnutrition status of the elderlies and their place of residence, occupation status, and meeting relatives were observed (6, 7, 17, 24, 27, 29-34).

In the present study, the elderlies with academic education had a better nutritional status, while illiteracy was considered to be a risk factor for malnutrition. This is in line with the results of the studies performed in different regions (27). Overall, it seems that higher literacy positively influences the socioeconomic status and nutrition literacy of individuals.

The main limitation of this study was the relatively small sample size. In addition, our research was based on the MNA questionnaire, and no laboratory examination was carried out to confirm the nutritional status of the subjects. As mentioned earlier, the significant association denoted between malnutrition and the female gender might be due to gender inequalities and the social role of women since mothers may become undernourished due to consuming less nutritious foods given the fact that they often serve their family first and put themselves second.

Conclusion

Attention to aging and the required nutrition is essential to the prevention and treatment of numerous age-related complications and minimizing the costs imposed on the health system. In this study, evaluation of the nutritional status in the elderlies using the MNA questionnaire was a cost-effective technique, which is executable in most environments. It is also recommended that the nutritional requirements of female elderlies with low education levels and financial dependence be properly addressed. Similar assessments should be performed periodically in the elderly population.

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Ethical statement

This study was approved by the ethics committee of the Golestan University of Medical Sciences.

Conflict of interest

The authors declare that there is no conflict of interests.

Author contributions

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