Original Article

Nutritional Literacy Measurement among Iranian Elderly Population

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Received: 10 Apr 2021 Accepted: 21 Jun 2021

Abstract

Background & Objective: One of the criteria for determining health is health-promoting behaviors. A high level of nutrition literacy is an important factor for differences in diet and nutritional behaviors which promotes health. Therefore, the present study investigates nutrition literacy status and its related factors in the older adults in Tehran.

Materials & Methods: This is a descriptive-analytic (correlational) study. The study population included 270 older adults of Tehran city selected using random cluster sampling in Tehran in 2018. Data collection was carried out using a 28-item nutrition literacy scale (NLS) and demographic characteristics questionnaire. Then, data analysis was conducted using SPSS ver. 16 and descriptive statistics and Chi-square, Kruskal–Wallis, Spearman correlation coefficient and multiple regression tests.

Results: In this study, the majority of the older adults were in the group aged 60–64 years (41.9%). According to NLS, 52.2% of the older adults had inadequate nutritional literacy, 37% had borderline nutritional literacy, and only 10.7% of them had adequate nutrition literacy ($p<0.001$). Also, there was a significant relationship between nutrition literacy and age, sex, level of education, and occupation.

Conclusion: The majority of Iranian elderly had inadequate and borderline nutritional literacy, and only one-tenth of them had adequate nutrition literacy. Therefore, due to low nutritional literacy and its relationship with age, the elderly need to receive simple and understandable information to communicate and understand health information to make appropriate decisions, and it needs more attention from health workers, health workers and physicians.

Keywords: Elderly, Nutritional Literacy, Nutritional Literacy scale

Introduction

Aging is an inevitable biological process that occurs during normal development period (1). Old age is defined as being over 65 years in most developed countries (2). It is estimated that the proportion of the population over 60 years will almost double between 2015 and 2050, rising from 12% to 22% (3). According to the Statistical Center of Iran, the proportion of the elderly population over 65 years of age increased from 5.7% in 2011 to 6.8% in 2016 (4).

The aging phenomenon is associated with biological, mental metabolic and emotional changes, which is a progressive and irreversible phenomenon occurring throughout the life of each individual (5).

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[DOR: 20.1001.1.22285105.2021.11.4.4.7]
[DOI: 10.18502/jabs.v11i4.8627]

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In most societies, older adults face the greatest risk of impaired physical, psychological and cognitive abilities and are more likely to rely on formal and informal support to maintain health, performance, and self-sufficiency (6).

As the age increases, the prevalence of chronic illnesses increases significantly. A total of 80% of the older adults suffer from at least one chronic illness (7). Improving the nutrition status of the elderly population has a significant effect on reducing the incidence of communicable diseases, mortality and increasing functional capacity (8).

Modifying lifestyle factors such as diet can slow or prevent many chronic diseases associated with old age (9). Some studies have shown that the prevalence of diet-related chronic diseases is on the rise, but many people lack basic health literacy skills and nutrition literacy. Without such skills, individuals cannot understand and process public health information such as dietary guidance (10). Many authors consider nutritional literacy as a kind of health literacy that indicates the ability to interpret and use nutrition information (11, 12). Nutrition literacy is an important factor for differences in dietary habits, especially among the deprived population (13). so that higher nutrition literacy skills are positively related to healthy eating habits (14). Nutrition literacy can be defined as the degree to which individuals acquire, process, and understand the nutrition information and skills needed to make appropriate nutrition decisions (11). There is limited information on the evaluation of nutrition literacy in the elderly population, where low nutrition literacy may increase the incidence of specific diseases due to poor diet and unhealthy lifestyles (15).

In a study titled “Nutrition literacy status and preferred nutrition communication channels among adults in the Lower Mississippi Delta”, Zoellner et al. showed that 24% had very low nutritional literacy, 28% had low nutritional literacy, and 48% had adequate nutrition literacy (16).

In a study titled “Using the Nutrition Literacy Scale in the Elderly Group,” Patel et al. also showed that patients with a higher NLS score were younger and those with a lower NLS score (17).

Considering the increased life expectancy and consequently, the increased elderly population, as well as the chronic diseases and costs incurred by the health care system, Nutritional literacy is one of the factors influencing health-promoting behaviors and reducing entrustment to nursing homes due to the disability and costs of the health care system. Therefore, it is essential to gain knowledge of the importance of this topic and its effects, the present study aimed to investigate nutrition literacy status in Iranian older adults and its determinants to provide a proper basis for educational planning.

Materials & Methods

This is a descriptive-analytic (correlational) study (2016-2017) carried out on the older population (60 years and older) referred to health centers in Tehran. The sample size was calculated as 270 individuals considering a type I error rate of 0.05, 95% CI, and 10% dropout rate. Samples were selected using multistage sampling. Samples were selected by cluster random sampling as three categories from each healthcare center in Tehran. The sampling method in this study was cluster random. Thus, by referring to the North, East, and Shemiranat headquarters, a list of covered centers was prepared and one center was randomly selected from each headquarters and the samples in each center were systematically randomly based on the number of samples from the Households file number were selected. Inclusion criteria included the willingness to participate in the research, minimum reading and writing literacy, having household health records archived in health centers and ability to complete the questionnaire. The exclusion criterion also included incomplete completion of the questionnaire by the older adults and the elderly with cognitive or psychological problems.

After making coordination with the person in charge of each center, the older adults were invited to participate in the study. After introducing themselves, attracting their voluntary cooperation, and explaining procedures for completing the questionnaire, a 28-item nutrition literacy scale and demographic characteristics questionnaire were distributed among the older population with minimal literacy and were asked to complete them at the related centers. This study is the result of

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[DOI: 10.18502/jabs.v11i4.8627]

a research project with an ethical code of IR. SBMU. PHNS.1396.85 from Shahid Beheshti Medical Sciences University. The participation of individuals was also voluntary and they were assured that the information would remain confidential. Elderly consent was also obtained before presenting the questionnaire.

NLS was used to evaluate nutrition literacy in the study subjects. This questionnaire was developed using the information obtained from the Mayo Clinic Food and Nutrition Center, U.S. Department of Agriculture, Center for Nutrition Policy and Promotion and other similar nutrition websites. This questionnaire was used in a similar study by P. Pate et al. to evaluate nutrition literacy among older adults (16). The above questionnaire includes 28 questions about organic foods: calorie intake, etc. The questions are arranged from easy to hard. NLS asks for the appropriate answer to complete a sentence from a four-choice list. Each item is scored 1 (true) or 0 (false). A total number of scores was considered for analysis, with the highest percentage indicating the highest level of nutrition literacy and the lowest percentage representing the lowest level of nutrition literacy. Scores 0-14, 15-21, and 22-28 indicate inadequate, borderline, and adequate nutrition literacy, respectively (16). The validity of the above instrument was determined by assessing translation, face, and content validity, and reliability by assessing the stability and internal consistency reliability. The mean content validity index (CVI) calculated for the entire instrument was 0.86. The stability reliability and internal consistency reliability of the instrument were determined using test-retest (ICC= 0.92) and Cronbach's alpha coefficient (α=0.72), respectively (18). Data analysis was carried out using Chi-square, Kruskal–Wallis, Spearman correlation coefficient and multiple regression tests in SPSS ver.16.

Results

The majority of the older adults were in the 60-64 age group (n=113, 41.9%). Besides, female-male ratio was 143 (53%)-127 (47%). Also, 160 (59.3%) of them had an elementary education and only 21 older adults (7.8%) had university education. A total of 137 (50.7%) of older adults were employed or retired. There were also 159 older adults (58.9%) with moderate economic status and 111 (41.1%) with poor economic status.

In the 60-64 age group, the majority of the older adults (n= 53, 46.9%) had borderline nutritional literacy. The majority of the older adults in the 65-69 age group (n=44, 56.4%) and in the 70 -and-older age group (n= 56, 70.9%) had inadequate nutritional literacy. Majority of men (n=61, 48%) and women (n=80, 55.9%) had inadequate nutritional literacy. Most of the older adults (59.4%) were illiterate and had inadequate and borderline nutrition literacy (28.1%).

A total of 71.2% of the older adults with poor economic status had inadequate nutrition literacy and 27.9% had borderline nutrition literacy. Also Table 1 show, 43.4% of the older adults with moderate economic status had borderline nutrition literacy and 39% of them had inadequate nutrition literacy.

Table 1. The relationship between nutritional literacy categories and demographic variables

Variable	Subgroup	Insufficient	Borderline	Sufficient	P-Value
		N (%)	N (%)	N (%)	
Age	60-64 65-69 70≤	41(36.3) 44(56.4) 56(70.9)	53(46.9) 27(34.6) 20(25.3)	19(16.8) 7(9.0) 3(3.8)	<0.001
Gender	male Female	61(48.0) 80(55.9)	51(40.2) 49(34.3)	15(11.8) 14(9.8)	<0.001

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Husband education	Primary High school	96(57.5) 7(20)	40(24) 14(40)	31(18.6) 14(40)	<0.001
	Diploma	8(16.7)	15(31.3)	25(52.1)	
	Academic	1(5)	3(15)	16(80)	
Education	Primary High school	95(59.4) 10(25.6)	45(28.1) 11(28.2)	20(12.5) 18(46.2)	<0.001
	Diploma	5(10)	14(28)	31(62)	
	Academic	2(9.5)	2(9.5)	17(81)	
Economic	week medium	79(71.2) 62(39.0)	31(27.9) 69(43.4)	1(0.9) 28(17.6)	<0.001
Job	Employed Unemployed	45(32.8) 67(50.4)	34(24.8) 38(28.60	58(42.3) 28(21.1)	<0.001

Table 2 shows, approximately, half of the older adults (52.3%, n = 141) had inadequate nutrition literacy, 37% (n = 100) had borderline nutrition literacy, and only 10.7% (n = 29) had adequate nutrition literacy.

Table 2. The Frequency of Responses to Nutritional Literacy Questions by Elders

Items	Correct	Incorrect
	N (%)	N (%)
Healthy eating is really supposed to _____our heart a. grow b. age **c. help** d. bypass	139(51.5)	131(48.5)
However, no single food can supply all the nutrients in the _____ we need. a. meals **b. amount** c. fiber d. portions	143(53)	127(47)
Eating a _____of foods ensures you get all the nutrients needed for good health. a. lot b. many **c. variety** d. pound	140(51.9)	130(48.1)
Grains, fruits and vegetables are food groups that form the basis of a (an) _____ diet. a. energy b. fat-free c. protein **d. healthy**	143(53)	127(47)
For a healthy diet, we are advised to eat five _____ of fruits and vegetables a. cups b. fibers c. grams **d. servings**	186(68.9)	84(31.1)

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Each _____. **a. day** b. morning c. meal d. year	169(62.6)	101(37.4)
Foods like butter have lots of _____ fat which can increase cholesterol. a. calorie-free b. bacon **c. saturated** d. diet	69(25.6)	201(74.4)
We also know that cholesterol can be affected by foods high in trans fatty _____. a. oils **b. acids** c. fiber d. diet	66(24.4)	204(75.6)
Experts often say to _____ these foods, **a. avoid** b. use c. drink d. eat	261(96.7)	9(3.3)
Because they are _____.a. delicious b. healthy **c. fattening** d. calories	229(84.8)	41(15.2)
Fiber is the part of plant-based foods that your _____does not digest and absorb. **a. body** b. portion c. weight d. eating	114(42.2)	156(57.8)
Whole grains provide more _____ than processed grains. a. weight b. good **c. fiber** d. nutritious	42(15.6)	228(84.4)
A good diet should contain approximately 25 to 30 _____ of fiber a day. a. grams b. ounces c. portions d. calories	131(48.5)	139(51.5)
Calcium is _____ for bone health. **a. essential** b. osteoporosis c. expensive d. prescription	252(93.3)	18(6.7)
As you age, your bones may get thinner as minerals are _____. **a. lost** b. weakened c. skinny d. tall	193(71.5)	77(28.5)
Even in older people, Vitamin D is _____ to keep bones healthy. a. wants b. sunny c. mineral **d. needed**	234(86.7)	36(13.3)
Foods with added sugars are sometimes called foods with empty_____. a. pounds b. fat **c. calories** d. vitamins	75(27.8)	195(72.2)
To prevent _____from bacteria. a. omelets b. groceries c. pain **d. illness**	161(59.6)	109(40.4)
Keep eggs in the _____. a. pantry **b. refrigerator** c. frying pan d. chicken	266(98.5)	4(1.5)
Farmers who grow organic foods don't use _____ methods to control weeds. **a. conventional** b. expensive c. compost d. herbal	84(31.1)	186(68.9)

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They control _____by techniques such as crop rotation, rather than pesticides. a. nutrients **b. weeds** c. markets d. it	100(37)	170(63)
For this, as well as other reasons, organic food _____than conventional food. **a. costs more** b. tastes better c. cooks faster d. has more fiber	79(29.3)	191(70.7)
A 180 calorie _____ with 10 grams of fat has 50% of its calories from fat. a. vitamin b. fiber **c. serving** d. exercise	106(39.3)	164(60.7)
A 140-pound woman needs about 51 _____ of protein a day. a. servings **b. grams** c. portions d. ounces	155(57.4)	115(42.6)
Using fat-free _____ on a sandwich can really cut down on the grams of fat. a. sugars **b. mayonnaise** c. vitamins d. salads	87(32.2)	183(67.8)
My doctor told me that "fat-free" is not the same as_____. a. vitamin-free b. snack-free c. weight-free **d. calorie-free**	82(30.4)	188(69.6)
She also told me to make the size of my _____ smaller to help control a. waistline **b. portions** c. glass d. calories	96(35.6)	174(64.4)
My _____. a. fattening b. vitamins c. meals **d. weight**	158(58.5)	112(41.5)

Spearman correlation coefficient showed a significant negative relationship between nutrition literacy with age, sex, and job ($p<0.001$) so that the nutrition literacy score decreased with increasing age, female sex and unemployment. Table 3 shows, there is also a direct relationship between nutrition literacy and level of education, spouse's level of education, and economic status ($p<0.001$), meaning that nutrition literacy scores increase with the higher educational level of the older adults and higher educational level of the older adults' spouses as well as with higher economic status.

Multiple Linear Regression was used to identify predictors of nutritional literacy. Age, Gender, Education Level, Economic situation, Husbands education and Job Status as predictor variables and nutrition literacy as criterion variables were entered in the regression model and the stepwise method was used. There is a significant relationship between the level of education and nutrition literacy status in the presence of associated variables including age and socioeconomic status ($p<0.001$).

Teble3. Correlation between Demographic Variable and Nutritional Literacy

Variable	1	2	3	4	5	6	7
1.Age	1						
2.Gender	-0.193**	1					
3.Education Level	-0.149*	-0.220**	1				
4.Husbands education	-0.117	-0.038	0.686**	1			

5.Job Status	-0.151*	0.796**	-0.329**	-0.148*	1		
6.Economic situation	-0.147*	-0.033	0.335**	0.304**	-0.119	1	
7.Nutrition Literacy	-0.307**	-0.123*	0.634**	0.506**	-0.217**	0.396**	1

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)

The strongest predictor of nutrition literacy is the education level so that as the level of education increases, a person's nutrition literacy will increase by 0.54 units. There is also a significant relationship between age and nutrition literacy in the presence of associated variables, including education and economic status ($p<0.001$), so that as the age decreases, nutrition literacy decrease by 0.19 units. There is also a significant relationship between economic status and nutrition literacy in the presence of associated variables, including education, and age ($p<0.001$), so that a better economic situation leads to 0.18-unit increase in the nutrition literacy status. Also, Table 4 shows, the variables of education, age, and economic status of the regression model were able to explain 48% of nutritional literacy (R=0.69, R Square=0.48).

Table 4. The Results of Stepwise Multi-variable Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R	R Square
		B	Std. Error	Beta				
1	(Constant)	9.291	0.462		20.091	0.000	0.634	0.402
	Education	3.075	0.229	0.634	13.432	0.000		
2	(Constant)	22.160	2.759		8.033	0.000	0.670	0.448
	Education	2.918	0.223	0.602	13.100	0.000		
	Age	-0.188	0.040	-0.217	-4.727	0.000		
3	(Constant)	18.667	2.833			0.000	0.692	0.478
	Education	2.632	0.229	0.543	11.489	0.000		
	Age	-0.172	0.039	-0.199	-4.415	0.000		
	Economic	1.841	0.471	0.185	3.904	0.000		

Discussion

Nutrition literacy is an important factor for differences in dietary habits, especially among the older population. The present study aimed to investigate nutrition literacy and its related factors in the older population. Regarding the nutrition literacy status, the results showed that 52.2% of the older adults had inadequate nutrition literacy, 37% had borderline nutrition literacy, and only 10.7% had adequate nutrition literacy. That is, the majority of the older adults have inadequate nutrition literacy. The result of Hemmati et al.'s study was different from the present study. His study showed that the majority of people (77.3%) had adequate nutritional literacy (19). While in the present study, a small number (10.7%) had sufficient nutritional literacy. Perhaps the reason for the high level of nutritional literacy is the presence of teachers in the middle and higher economic and social level, their higher level of education, or the possibility of teachers accessing in-service training programs and using more resources

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[DOI: 10.18502/jabs.v11i4.8627]

to receive nutritional information. compared to the present study. In a study on adults in Mississippi, Zoellner et al., also found that 24% had very low nutrition literacy, 28% had low nutrition literacy, and 48% had adequate nutrition literacy. The results of comparing nutrition literacy of different age groups in this study reported the lowest score of nutrition literacy for the older adults (20).

Nutrition is one of the most important components of maintaining good health in older adults. When there is no balanced diet, malnutrition may have adverse effects on health. Increased nutrition literacy raises consumers' expectations of food quality, leading the authorities to put food safety and food quality on the agenda of food policies. Nutrition literacy is of particular importance for the prevention and management of many chronic diseases, especially among the older population. The results of the present study show low nutrition literacy in older adults that warns health policymakers and planners to promote nutrition literacy.

The strongest predictor of nutrition literacy in the older adults in the present study is the level of education so that with an increase in educational level, the individual's nutrition literacy will increase by 0.54 units. Higher education, because of higher study per capita and knowledge level, has a significant effect in making the older adults more sensitive to their personal health status, thus attaching more importance to their diet and self-care. However, Low education can impair the ability of older adults to communicate with the health care system due to the difficulty in written communication and limited familiarity with medical terms.

In their studies on the nutrition literacy of the Japanese older population, Yoko et al. also reported a direct and significant relationship between nutrition literacy and level of education (21). In their study on older adults, Patel et al. reported that as seniors' education increased, their nutrition literacy improved (17).

There is a significant inverse relationship between nutrition literacy and age. Age is also a predictor of nutrition literacy of the older adults in the present study so that nutrition literacy decrease by 0.20 units with increasing age.

Results showed a significant difference between different age groups in terms of nutrition literacy levels. In other words, nutrition literacy was significantly higher in the 60-65 age group and significantly lower in 70 and older age group than the other age groups, which is consistent with the results of Patel et al.'s study showing that patients with higher nutrition literacy scores were younger than those with lower nutrition literacy scores (17). The increasing expansion of information resources and telecommunication networks in recent decades, compared to last decades, may be one of the reasons for the higher nutrition literacy among the younger people.

Findings showed that there was a significant difference between the older adults with adequate nutrition literacy (3.8%) and the older adults with inadequate nutrition (70.9%) in the 70-and-older age group compared to the other two age groups. This means that the majority of the older adults in the above age group have inadequate nutritional literacy. However, older adults, especially in the older adult subgroup, are expected to report lower nutrition literacy due to physiological and cognitive changes. Among the older women, there was a significant difference between older adults with inadequate nutrition literacy (55.9%) and the older adults with adequate nutrition literacy (9.8%). There was also a significant relationship between nutrition literacy and gender.

Male older adults had higher nutrition literacy than women. Yoko et al.'s findings also showed that men had higher nutrition literacy than women (21). Which is consistent with the results of the present study. This may be due to the fact that since they are responsible for outdoor duties they may make healthier and better choices while preparing and buying foods. Health system planners should pay more attention to this issue because women are responsible for providing food at home Therefore, women should have a higher nutrition literacy in order.

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In the older Iranian families where couples live together, foods are purchased either by both of them and by mostly by men. In the latter case, it is traditionally common for women to make shopping lists, so, keeping this in mind, both men and women are expected to have equally high nutrition literacy levels, indicating the need for planning for this gender subgroup.

There was also a direct relationship between nutrition literacy and economic status. Older adults with better economic status have higher nutritional literacy. Yoko et al.'s findings also showed that economic status was related to nutrition literacy in women (21). This may be because the older adults with the appropriate financial capacity are able to obtain higher education on proper health and nutrition. A total of 71.2% of older adults with poor economic status have inadequate nutritional literacy.

There is also a significant relationship between nutrition literacy and occupation. Employed and retired older adults have a higher nutrition literacy score. This may also be because employed and retired seniors have more social communications in addition to higher education levels, which results in more information being exchanged. Concerning the unemployed older adults, the majority of them have inadequate nutritional literacy.

One of the strengths of the present study is that it is one of the first studies to use NLS in the field of nutrition literacy. Many studies have also examined the level of attitude of the elderly in the field of nutrition, but the present study examined the nutritional literacy that leads to appropriate decisions.

One of the limitations of this study is considering that some seniors do not refer to the health system Due to physiological problems, Caution should be exercised in generalizing the results of the present study. A self-report questionnaire was used to assess nutrition literacy in this study. In other words, illiterate older adults were not included, which may influence the research findings. The authors recommend taking into consideration limitations cited by researchers in future studies.

Conclusions

The fact that only a tenth of seniors have adequate nutrition literacy indicates an unacceptable situation. Thus, it emphasizes the urgent need to design and implement appropriate interventions to improve the literacy status of this vulnerable sub-group regarding health issues including nutrition.

Nutrition literacy is strongly influenced by the level of education. On the other hand, low levels of education require seniors to receive simple, comprehensible information and more time to communicate and understand health information so that they acquire, process, and understand basic health information and ultimately make appropriate decisions. Therefore, healthcare workers and physicians should pay attention to this important issue and, given the influential factors, devote more time to help older adults understand health care guidelines in a simple and appropriate manner.

Acknowledgements

The participation of people and study units was voluntary and they ensured that the information was confidential. Written informed consent was obtained from all participants. Authors would like to appreciate all professors in the health education and promotion department of Shahid Beheshti Medical Sciences University who have sincerely collaborated in this project and all elderly people who have helped in this research. This study is the result of a research project with the ethical code of IR.SBMU.PHNS.1396.85 from Shahid Beheshti Medical Sciences University.

Conflicts of interest

There are no conflicts of interest.

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[DOR: 20.1001.1.22285105.2021.11.4.4.7]
[DOI: 10.18502/jabs.v11i4.8627]