



## Original Article

# Relationship between Nutritional Status and Late-Life Depression in Esfarayen, Iran

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## ABSTRACT

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**Introduction:** Since nutritional status has a great impact on physical and mental health, this study was conducted to determine the relationship between nutritional status and depression in elderly referring to urban health centers of Esfarayen, North Khorasan province, Iran) in 2017.

**Methods:** This cross-sectional study was performed on 250 elderly referring to Esfarayen health centers. Data collecting tool was a standard questionnaire for investigating nutritional and depression status in the elderly. Data were analyzed using ANOVA, t-test, chi-square and correlation coefficient by SPSS18 software.

**Results:** According to the results, 8.4% of elderly were malnourished and 30% were exposed to malnutrition. There was an inverse correlation between age, number of children and nutritional status, and there was a significant relationship between living alone, underlying diseases, body mass index and nutritional status ( $p < 0.05$ ). Forty four percent of the elderly had severe depression and 40% had mild depression. Significant relationship was found between variables such as age, gender, education, economic status, living alone, underlying diseases and depression ( $p < 0.05$ ). There was a significant correlation between depression and nutritional status in the elderly ( $p < 0.001$ ,  $r = -0.615$ ).

**Conclusion:** Depression is prevalent among elderly, and their nutritional status is in moderate level. Regarding the correlation between these two variables, periodical psychiatric examinations, psychological interventions with the aim of treating depression as well as educational measures to improve the nutrition statuses of the elderly is necessary.

**Keywords:** Nutritional Status, Depression, Aged

## Introduction

Elderly health is one of the health issues in most societies. Physical and mental needs of elderly are very important. Aging is associated with decreases in physical performance and increases in risk of malnutrition (1).

As the age increases, the prevalence of certain mental disabilities increases (2). According to the results of different studies 15-25 percent of the elderly has significant

psychological problems (3) and suffers from disorders such as depression, cognitive impairment, anxiety, fear, addiction, and they may commit suicide (4). Depression is the most common mental problem in the elderly. Based on the result of a study, the prevalence of depression in the elderly in Iran is 24.2% (5). Recently lifestyle modifications have been considered as a healthy and low-cost option for

the management of depression in all ages, especially the elderly (6). It is believed that nutrition status is considered as an effective factor in lifestyle.

The results of various studies indicate a relationship between nutritional status and depression. The results of related studies show that a healthier nutrition index is associated with a lower chance of depression in adults (7, 8). Arsalani et al. in a study in Semnan, (9) concluded that poor nutritional status was associated with prevalent depression in the elderly. Based on a study in southwest Iran, over 50% of the elderly subjects had an undesirable nutritional status and about 42% had a degree of depression (10). However, Keshavarzi et al. believe that considering the importance of the association among psychological and nutritional problems and health related quality of life in caring for and promoting the welfare of the elders, their study provided fundamental information and a basis for further evaluation of this issue in developing and undeveloped countries (11).

Since nutritional disorders are common and may cause unintended effects on the elderly, it is important to identify its early stages and screen the nutritional status of the elderly. On the other hand, the prevalence of depression varies from one sector to another, and depends on social, cultural and ethnic characteristics (12). Therefore, the prevalence of malnutrition and depression in the elderly depends on the study population. Considering the vulnerability of the elderly, and since research in this field has not been carried out so far in the area of northern Khorasan, this study aimed to investigate the relationship between nutritional status and depression in the elderly referred to health centers of Esfarayen.

## Methods

### Study design

This cross-sectional, study conducted in Esfarayen, North Khorasan province, Iran in 2017.

The statistical population of this study was all the elderly referred to 9 health centers of the city; at the earliest level of the Iranian health system where basic and universal health services are provided. According to previous studies (9, 10), considering  $p = 0.56$ , 95% confidence interval and 0.06 error, the sample size was calculated 262 people. Convenience sampling method was used among the elderly referred to health centers.

The exclusion criteria were history of mental disorders such as mania, bipolar, congenital anomalies of nervous system, seizure, stroke and cerebrovascular disease, use of mood stabilizing medication as well as disability or lack of willingness to answer the questions.

### Tools

The data collection tool was a questionnaire consists of three sections including demographic characteristics, nutrition status assessment and measuring depression in the elderly. Demographic characteristics include gender, age, weight, height, occupation, economic status, educational level, marital status, and underlying disease (Hypertension, Diabetes, Cardiovascular disease, High blood lipids).

Mini Nutritional Assessment scale was used to assess the nutritional status. The validity and reliability of the scale was approved in previous studies (13, 14). The

questionnaire comprised 18 questions in four sections including anthropometric evaluation (weight, height, and weight loss), overall assessment (life status, drug use, and mobility), diet assessment (number of meals, food and fluids, and independence in eating) and mental evaluation (perception of the person about health and nutritional status). The maximum score for this questionnaire was 30. Scores below 17 indicated malnutrition, scores 17-23.5 indicated malnutrition risk and scores over 24 indicated a desirable nutritional status (13, 14).

For measuring depression symptoms, Geriatric Depression Scale including 30 questions was used. Validity and reliability of the scale was confirmed in previous studies (15). This scale includes 30 yes or no questions about the feelings of subjects over the past week. In order to calculate the score the numbers of yes answers were count except for ten specific questions that no answers were count. Scores 0-9 indicated normal statuses, scores 9-10 showed mild depression and scores 20-30 showed severe depression (15). Height, arm and legs circumference were measured using measuring tape with accuracy of 5 mm. The weight of participants, with minimum clothing, was measured using a digital balance with accuracy of 100 grams.

### Ethical considerations

This research was approved by the ethical committee of Esfarayen Faculty of Medical Sciences (ESFRUMS) with ethics code of IR.ESFARAYENUMS.REC.1396.40. After obtaining the necessary permissions and necessary training in the Department of Public Health the interviewers interviewed the elderly. Researchers explained the objectives of the study to the participants, and assured them that their information would remain confidential.

### Data analysis

Data were analyzed using SPSS18 software and at the significance level of 0.05. Chi-square test was used to examine the relationship between qualitative variables and correlation coefficient test was used to examine the relationship between total score of nutritional status and depression. Also T-test and ANOVA were used to compare mean scores of depression and nutritional status in different groups.

## Results

Among 250 elderly 62% were women, 77.6% unemployed and 62% illiterate. The results showed that 43.2% of the participants were in average economic status. The mean age of the subjects was  $65 \pm 7.6$ , their mean weight was  $66.5 \pm 12.97$  and the mean of body mass index (BMI) was  $26.43 \pm 4.68$ .

According to the results, 8.4% ( $n = 21$ ) of the elderly were malnourished, 30% ( $n = 75$ ) were exposed to malnutrition. Mean score of nutritional statuses was  $23.94 \pm 4.21$  and mean score of depression was  $17.52 \pm 6.65$ .

Mean score of nutrition in men ( $23.89 \pm 6.11$ ) and married ( $24.81 \pm 7.8$ ) was higher than other groups. Also, the elderly with high economic status (27.97%) and those with BMI over 23 (25.36%) had a higher score.

There was a negative and significant correlation between age and nutritional status ( $r = -0.301$ ,  $p < 0.001$ ); older

participants were more likely to become malnourished. There was not a significant relationship between gender, educational level, occupation and nutritional status ( $p > 0.05$ ). There was a significant relationship between nutritional status and underlying disease ( $P = 0.007$ ), so that people with hypertension and diabetes were more likely to have malnutrition. The Elderly who lived alone (without a spouse or children) were more likely to suffer from

malnutrition ( $p < 0.001$ ). There was a significant and reverse correlation between the number of children of the elderly and their nutritional status ( $p = 0.001$   $r = -0.044$ ). Also, there was a positive and significant correlation between BMI and nutritional scores ( $r = 0.534$ ,  $p < 0.05$ ), so that those with lower BMI were more likely to have malnutrition. (Table 1)

**Table1. Distribution of nutritional status of the elderly according to demographic characteristics**

Variable		Nutritional status									
		N	(%)	Normal		Exposed to malnutrition		Malnutrition		r	p-value
				N	(%)	N	(%)	N	(%)		
<b>Age (year)</b>	60-75	228	91.2	147	64.5	64	28.1	17	7.5	0.301-	0.001
	76-90	22	8.8	7	31.8	11	50	4	18.2		
<b>Gender</b>	Male	95	38	60	63.2	28	29.50	7	7.4	-	0.87
	Female	155	62	94	60.6	47	30.3	14	9		
<b>Occupation</b>	Employed	20	8	13	65	5	25	2	10	-	0.590
	Retired	36	14.4	30	83.3	5	13.9	1	2.8		
	Unemployed	194	77.6	111	57.2	65	33.5	18	9.3		
<b>Educational level</b>	Illiterate	155	62	89	57.4	50	32.3	16	10.3	-	0.23
	Elementary	68	27.2	43	63.2	22	32.4	3	4.4		
	Diploma	17	6.8	12	70.6	3	17.60	2	11.8		
	Associate degree	7	2.8	7	100	0	0	0	0		
<b>Economic statuses</b>	Bachelor's degree or higher	3	1.2	3	100	0	0	0	0	-	0.053
	Weak	106	42.4	54	50.9	41	38.7	11	10.4		
	Normal	108	43.2	74	68.5	25	23.1	9	8.3		
	Good	30	12	20	66.7	9	30	1	3.3		
<b>Living status</b>	Excellent	6	2.4	6	100	0	0	0	0	-	0.001
	Spouse and children	77	30.8	57	74	19	24.7	1	1.3		
	Spouse	84	33.6	56	66.7	23	27.4	5	6		
	Children	19	7.6	12	63.2	7	36.8	0	0		
<b>Number of children</b>	Alone	70	28	29	41.4	26	37.1	15	21.4	0.044-	0.245
	0-4	99	39.6	67	67.7	24	24.2	8	8.1		
	Over 4	151	60.4	87	57.6	51	33.8	13	1.6		
	Hypertension	55	22	30	54.5	16	29.1	9	16.4		
<b>Underlying disease</b>	Diabetes	9	3.6	3	33.3	4	44.4	22	22.2	-	0.007
	Cardiovascular disease	23	9.2	14	60.9	6	26.1	3	13		
	High blood lipids	8	3.2	6	75	2	25	0	0		
	Diabetes and hypertension	21	8.4	19	90.5	0	0	2	9.5		
	No underlying disease	43	17.2	31	72.1	12	27.9	0	0		
<b>Body mass index (BMI)</b>	More than two diseases	30	12	20	66.7	10	33.3	0	0	0.534	0.001
	Others	61	24.4	31	50.8	25	41	5	8.2		
	Less than 19	13	5.2	2	15.4	8	61.5	3	23.1		
	19 to less than 21	19	7.6	3	10.8	8	42.1	8	42.1		
	Less than 23	30	12	5	16.7	21	70	4	13.3		
23 or more	188	75.2	144	76.6	38	20.2	6	3.2			

According to the results 44% (n = 110) of the elderly were depressed, 40% (n = 102) had mild depression and the remaining (15.2%, n = 38) were in normal status. The mean depression score in men ( $18.8 \pm 5.9$ ), married ( $19.2 \pm 6.1$ ), with good economic status ( $22.7 \pm 4.41$ ) and with BMI 19-21 ( $11.8 \pm 6.3$ ) were higher than others.

Table 2 shows the severity of depression in the elderly according to their demographic characteristics. As the results showed, there was a negative and significant correlation between age and depression status ( $r = 0.23$ ,  $p < 0.001$ ). There was a significant relationship between gender and depression ( $p = 0.007$ ), so that depression rate in men was higher than women. Although depression in employed people was less severe, but there was no significant relationship between employment status and depression ( $p = 0.062$ ). There was a correlation between educational level and depression ( $p < 0.001$ ). Most participants were illiterate or had low level of education, but depression rate in this group was lower than educated participants.

Living alone was also associated with depression ( $p < 0.001$ ), however the number of the elderly who lived alone was low, but they showed high rate of depression (mild to severe). There was a negative correlation between the number of children and depression status, but it was not statistically significant ( $p = 0.384$ ,  $r = 0.116$ ). Also there was a relation between underlying disease and depression status in the elderly ( $p < 0.001$ ), so that depression rate in elderly with underlying disease was higher than other groups. It was also observed that there was a negative and significant correlation between depression score and nutritional status of the subjects, so that by increasing the nutritional score, depression scores decreased, ( $r = -0.615$ ,  $p < 0.001$ ) (Table 2).

According to Pearson correlation test, there was a significant, negative correlation between depression and nutritional status of the elderly ( $p < 0.001$ ,  $r = -0.615$ ), so that those with higher nutritional scores were less depressed.

**Table 2. Distribution of severity of depression in the elderly of Esfaryen in terms of demographic characteristics**

Variable		N	(%)	Severity of depression						r	p-value
				Normal		Mild		Severe			
				N	(%)	N	(%)	N	(%)		
Age (year)	60-75	228	91.2	29	12.7	93	40.8	106	46.5	-0.23	0.002
	76-90	22	8.8	9	40.9	9	40.9	4	18.2		
Gender	Male	95	38	6	6.3	40	42.1	49	51.6	-	0.007
	Female	155	62	32	20.6	62	40	61	39.4		
Occupation	Employed	20	8	2	10	13	65	5	25	-	0.062
	Retired	36	14.4	1	2.8	10	27.8	25	69.4		
	Unemployed	194	77.6	35	18	79	40.7	80	41.2		
Educational level	Illiterate	155	62	31	20	74	47.7	50	32.3	-	<0.001
	Elementary	68	27.2	5	7.4	20	29.4	43	63.2		
	Diploma	17	6.8	2	11.8	7	41.2	8	47.1		
	Associate	7	2.8	1	14.3	6	85.7	0	0		
	Degree										
	Bachelor's degree or higher	3	1.2	3	100	0	0	0	0		
Economic statuses	Weak	106	42.4	27	25.5	50	47.2	29	27.4	-	<0.001
	Average	108	43.2	10	9.3	48	44.4	50	46.3		
	Good	30	12	26	86.7	3	10	1	3.3		
	Excellent	6	2.4	0	0	1	16.7	5	83.3		
Living status	Spouse and children	77	30.8	46	59.7	30	39	1	1.3	-	<0.001
	Spouse	84	33.6	39	46.4	12	14.3	33	39.3		
	Children	19	7.6	6	31.6	7	36.8	6	31.6		
Number of children	Alone	70	28	19	27.1	19	27.1	32	45.7	-0.116	0.384
	0-4	99	39.6	13	13.1	31	36.4	50	50.5		
	Over 4	151	60.4	25	16.6	66	43.7	60	39.7		
Underlying disease	Hypertension	55	22	15	27.3	20	36.4	20	36.4	-	0.001
	Diabetes	9	3.6	2	22.2	3	33.3	4	44.4		
	Cardiovascular disease	23	9.2	5	21.7	6	26.1	12	52.2		
	High blood lipids	8	3.2	0	0	3	37.5	5	62.5		
	Diabetes and hypertension	21	8.4	14	4.8	7	33.3	13	61.9		
	No underlying disease	43	17.2	29	67.4	1	2.3	13	30.2		
	More than two diseases	30	12	2	6.7	19	63.3	9	30		
Others	61	24.4	12	19.7	31	50.8	18	29.5			

## Discussion

The aim of this study was to investigate the relationship between nutrition status and depression in the elderly of Esfarayen. Based on the results, the nutritional status of most elderly was in desirable status, but 38.8% of them were malnourished or were exposed to malnutrition. It is believed that nutrition is one of the major factors affecting the quality of life of the elderly and their nutritional status is related to their nutritional performance (16). Various studies have investigated the prevalence of malnutrition in the elderly, some results are consistent with the results of the current study and some are not (10, 16-19). The study by Ramezankhani et al. in Ilam indicated insufficient intake of important food groups in the elderly such as fruits, vegetables, beans and dairy that could cause malnutrition (16). According to a study by Payahoo et al. in Tabriz over 52% of elderly were malnourished or were at risk of malnutrition (10). A study by Guyonnet et al. in France found that 43% of the elderly were at risk of malnutrition and 9% had malnutrition (17). Other findings showed that the majority of Chinese elderly were malnourished, so a regular nutritional status screening should be done (18). However, some studies have reported a lower prevalence of malnutrition in the elderly. The results of a study by Vieira in Brazil showed that the prevalence of malnutrition in the elderly over 60 years was 1.3% and 25% of the elderly were at risk for malnutrition (19) Which is in agreement with the results of the present study that 38.8% of elders were malnourished or were exposed to malnutrition.

According to the results, there was a significant relationship between age, living alone, underlying disease, BMI and nutritional status of the elderly. There was a negative correlation between age and nutritional status, so that the younger participants had a better nutritional status. It can be due to the fact that older people are less able to take care of themselves and they cannot pay much attention to their nutritional status, as Ji et al. reported high age a risk factor for poor nutritional status (18). Another variable that was associated with the nutritional status of the elderly was companionship. In fact, the elderly who lived with their spouse or other family members had a better nutritional status. According to Ramic et al., living alone, being a widow and social isolation increase the risk of malnutrition in the elderly (20). According to a study by Arsalani et al. the elderly whose spouses had died had more malnutrition chances (9) which are consistent with the results of the current study. In the study of Aliabadi et al. (21) in Khorasan Razavi, the elderly who lived alone were more exposed to malnutrition. Tucker and Buranapin believe that loneliness and social isolation can reduce eating habits in the elderly (22).

Underlying diseases are other factors that significantly affect the nutritional status of the elderly. Diabetes, hypertension and cardiovascular disease were most associated with malnutrition. Vanderwee et al. indicated the most important underlying diseases that affect the nutritional status of elderly as gastrointestinal diseases, especially gastro-intestinal ulcers (23). According to a study by Arsalani et al. 100% of the elderly suffered from gastrointestinal ulcer and 45% of diabetic elderly had malnutrition (9).

The results of the present study showed that 44% of the elderly suffered from severe depression. The results

of similar studies also indicate a high prevalence of depression in the elderly. Based on a study on 3363 Iranian adults, the frequency of anxiety and depression was reported more than 45% (24). As reported by a study conducted in Semnan 22% of the elderly had severe depression and 34% had mild depression (9).

According to the findings of this study, there was a significant relationship between demographic variables (except the number of children and education level) and depression in the elderly. There was a negative and significant correlation between age and depression so that increase in age was associated with decreased in the severity of depression. A study by Hajek et al. in Germany showed the same result (25). Also, there was a significant negative correlation between the healthy nutritional status and the depression.

The results of the study showed that depression was significantly severe more in men. This can mean that older women get more social and emotional support and are therefore less depressed. Meanwhile, similar studies indicated that depression in women was more common (10, 26). It can be due to a combination of social, psychological, genetic, hormonal and biological factors. In a study in Tabriz, the prevalence of depression in women was six times higher than men (10). The results of a study by Barua and Kar in Europe also showed higher prevalence of depression in women (26), which is not consistent with the results of current study.

There was a significant correlation between the level of education and depression. So that depression was more severe in people with lower education. Similar results were observed in the study by Arsalani et al. in Semnan (9) and the study of Hajek et al. in Germany (25). It seems that People with higher education are more able to manage their mental problems.

Existence of a companion in the lives of the elderly was another variable that influenced the level of depression. According to the results, the elderly living with the family were less depressed in comparison with the elderly who lived alone. Similar to these results, Khodadadi et al. concluded that the elderly livings with their family are less depressed (27). It is believed that loneliness and social isolation can lead to depression (28). Manzouri in his study pointed out that living with the spouse had a protective role against severe and moderate depression in the elderly (29).

According to the results of the study, there was a significant relationship between underlying disease and depression. In fact diseases such as high blood pressure, diabetes, high blood lipids are found in greater chance with depression in the elderly. The results of the study by Aliev et al. in the United States showed that elderly with physical illness are more depressed (30). In a study by Yaka et al. patients with chronic diseases were more depressed (31).

The study found that the elderly who had malnutrition or were exposed to malnutrition were more depressed. Also, there was a significant and negative correlation between depression score and nutritional status of the elderly. It is believed that an appropriate BMI, eating healthy and nutritious foods, physical activity as well as proper diet will give the elderly vitality, confidence and self-esteem, which can reduce depression (32). Studies in Semnan (9) and the Netherlands (33) also indicated a negative and significant

relationship between nutritional status and depression in the elderly. Kuczmariski et al. also showed that high-quality diet and healthy eating index are inversely related to depression symptoms (34), which are confirmed by the results of this study. Meanwhile, according to Payahoo et al. there was a direct and significant correlation between these two variables (10).

### Conclusions

The nutritional status of the elderly was in moderate level and, there was a spectrum of depression in most of samples. Therefore, the results of the study confirmed a significant and negative relationship between depression and nutritional status. Regarding the mental conditions of the elderly, periodical psychiatric examinations, psychological interventions with the aim of treating depression as well as educational measures to improve the nutrition statuses of the elderly will be very necessary.

### Study limitations

One of the most important limitations of this study was to investigate the nutritional and depression status of elderly referred to the urban health centers, so the elderly living in the villages or nursing care centers and the elderly who did not referred to health centers have not been investigated. It is recommended that future studies examine the nutritional and depression status of all the elderly. Furthermore, most of the elderly referred to health centers were women and this was another limitations of the study.

### Conflict of interest

There was no conflict of interest in this study.

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### Authors' contributions

Design of the study: A.S, N.D, H.R  
 Data collection: A.Zh.F, N.D  
 Data analysis and interpretation: A.S, H.R, H.J  
 Preparation of draft manuscripts: A.S, HJ, H.R, A.Zh.F, N.D  
 Final approve of manuscript: All authors have reviewed and approved the final version.

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