

Dependence of the Geriatric Depression on Nutritional Status and Anthropometric Indices in Elderly Population

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Objective: Malnutrition and depression are highly prevalent in the elderly and can lead to unfavorable outcomes. The aims of the current study were to determine the association between malnutrition and depression and also to find any correlation of depression with some anthropometric indices in free living elderly.

Method: In this cross-sectional study, 337 elderly subjects (193 females) were selected using cluster sampling. Depressive symptoms and nutritional status were determined by the Geriatric Depression Scale (GDS) and the Mini-Nutritional Assessment (MNA) scores questionnaires, respectively. Anthropometric indices were measured all in standard situations. Chi squared test and t-test were used when necessary. Pearson correlation coefficients were calculated for linear relations between variables.

Results: Of all the total subjects, 43.62 %were depressed; and of whom, 48.01% were malnourished or at risk of malnutrition. GDS had a significant negative dependence with the MNA for the entire sample ($r=-0.58$, $p < 0.0001$). However, there was no significant correlation between age and GDS or MNA scores. Moreover, the mean GDS scores differed significantly between men and women ($p < 0.05$), and women were more depressed than men (27.9% vs. 15%, respectively). The elderly subjects living in urban areas were more depressed than those living in rural areas (39.46% vs. 3.85% respectively).

Conclusion: The results of the present study revealed a high prevalence of depression and malnutrition among old subjects. Moreover, depression was associated with worsening of nutritional status. The mechanism of this association needs further study.

Key words: Depression; geriatric; anthropometric indices; elderly; care and nutrition

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Depressive conditions are highly prevalent in later life and are among health policy priorities. According to the World Health Organization, the world elderly population will reach 800 million by 2025, and two-third of them will be in developing countries. The prevalence of depression and feeling of loneliness was estimated to be about 22.4% among elderly population of Iran (1). Depression can lead to adverse outcomes such as relative lower social performance, poorer health status, and greater medical burden (2-3).

Depression has been correlated with some socio-demographic factors in adult life (4-5).

On the other hand, people may be at greater risk of malnutrition in later life. Some observational studies have reported that depression may deteriorate the risk of malnutrition in older subjects (6). When the nutrient intake does not meet the nutritional needs, moderate micro nutrient deficiencies may occur, and gradually it may decline into the protein calorie malnutrition (PCM). The later is more common in the institutionalized elderly population (30 - 50%) vs.

home-living elderly (2-4%), while the prevalence of moderate micro nutrient deficiencies is much more (7). Dehydration, weakness, fatigue, apathy, decline in muscle strength, weight loss, immunosuppressant, infection, calcium bone loss, increasing risk of morbidity and mortality are some consequences of malnutrition in old patients (7-9).

Depression is mentioned among other causes of malnutrition in older people aside with chewing or swallowing disorders, loneliness, and social deprivation (8).

To date, the causal association linking depression and nutritional status is indistinct (6). The effect of depression on nutritional status feeding habits and elderly weight is still controversial. Some studies have reported weight gain and visceral fat accumulation in old depressive subjects (10-11), while others report depression as a contributing factor to weight loss in older people (12-13).

The goals of the current study were to determine the association between malnutrition and depression and also to find any correlation of depression with some anthropometric indices in free living elderly people based on Mini-Nutritional Assessment (MNA) and Geriatric Depression Scale (GDS).

Material and Methods

Using cluster sampling, 337 free-living elderly subjects (193 females and 144 males) were entered in a cross-sectional designed study in Shiraz (Iran). The study population was divided into regional clusters based on regional municipality; and, a random sample of these clusters was selected. Then, subjects were randomly selected from these clusters equally. Each subject signed the informed written consent form to take part into the study. The study was approved by the ethical committee of Shiraz University of Medical Sciences.

Exclusion criteria were dementia, psychotic disorders and inability to participate in anthropometric measurements. Demographic questionnaire and 24hour food recall were completed based on interviews performed by a trained dietitian. Anthropometric indices, including height, weight, mid-arm circumference (MAC), waist circumference, and hip circumference were measured in standard situation and body mass index, waist-hip ratio (WHR), waist to height ratio (WHTR) were calculated.

Following structured diagnostic interview by a psychologist, depressive signs were evaluated using the Geriatric Depression Scale (GDS). The nutritional status of subjects was determined using Mini-Nutritional Assessment (MNA) scores questionnaire via an interview conducted by a trained dietitian.

The MNA is an internationally validated assessment and screening tool that can be used in elderly subjects to identify malnourished patients and those at risk of malnutrition (14-15). In the MNA, according to screening segment, if the score of patient is 12 or more, the patient is not at risk of malnutrition and there is no

need to complete the rest of the questionnaire. However, if the score is 11 or less, the patient may be at risk and the full MNA form should be completed. Based on final scores, patients will classify into three groups: at risk of malnutrition, malnourished, and well nourished (16).

To screen the elderly patients at risk of depression, the GDS questionnaire was used. This tool has been validated in Iran (17). In the GDS, according to screening part, if the score of patient is 8 points or less, the patient is not at risk (17).

Statistical Analysis

Continuous variables are reported as means \pm SDs and categorical variables are expressed as frequencies and percentages. Differences in nutritional status in various layers of the categorical variables were analyzed by the chi-square test.

For comparison of qualitative variables in the two groups (depressed and non-depressed) "chi squared test" was used. Moreover, means of quantitative variables including body mass index, triceps skin folds, MAC, waist, calf, and total body fat were compared between the two groups by means of independent sample t-test.

Pearson correlation coefficients were calculated for linear relations between total GDS scores as well as MNA scores and continuous variables such as total body fat, measures of BMI, triceps skin-folds, MAC, Calf, and waist circumference.

Significance was evaluated at $P \leq 0.05$ level. Data were analyzed using SPSS-17 software.

Result

Total of 337 elderly subjects participated in this study. The participants' mean age \pm SD was 63.1 ± 8.1 years (64.4 ± 8.0 in male subjects and 62.1 ± 8.1 in females). Other demographic variables of the study are listed in table 1.

Anthropometric variables in elderly subjects with depressive symptoms compared to elderly subjects with no depressive symptoms are listed in table-2.

Nutritional status (base on MNA) in elderly subjects with depressive symptoms in comparison with elderly subjects with no depressive symptoms is demonstrated in table-3.

According to GDS, 43.62% of the subjects were depressed, and women were more depressed than men (27.9% vs. 15%, respectively). People living in urban areas were more depressed than rural areas (39.46% vs. 3.85% respectively). Subjects with less than twelve years of education were more depressed than those with more than twelve years of education (31.45% vs. 12.16% respectively).

According to MNA, only 39.45% of depressed subjects were well nourished. Forty three percent of women were malnourished or at risk of malnutrition compared to 25.7% of men ($p=0.004$). Percent of malnutrition or risk of malnutrition was higher in urban subjects compared to rural subjects (33.53% vs. 2.07%

respectively), and it was also higher among subjects with less than 12 years of education compared to those with more than 12 years of education (25.8% vs. 9.79% respectively).

About 48% of the subjects with severe and mild depression were malnourished or at risk of malnutrition. GDS had a significant negative dependence with the MNA for the entire sample ($r=-0.58$, $p\text{-value}<0.0001$). However, there was no significant correlation between age and GDS or MNA scores. Moreover, the mean GDS scores differed significantly between men and women ($p\text{-value}<0.05$),

and the prevalence of depression was higher among women.

Discussion

Malnutrition and depression are both complicated and correlated so that depression may lead to appetite loss and under nutrition. On the other hand, malnutrition may deteriorate depression and apathy (13, 18-19). The causal relationship of nutritional status and depression is inconclusive. It is not well known whether depression cause malnutrition or poor nutritional status leads to depressive disorders.

Table 1: Demographic variables in the study of depression in elderly subjects

Variable	Frequency [†]	Percent
Gender		
Male	144	42.73
Female	193	57.27
Residential region		
Urban	311	92.28
Rural	26	7.72
Current smoker		
Yes	18	5.35
No	319	94.65
educational level (years)		
≤12(years)	219	64.98
>12(years)	118	35.02

†: Total number of subjects was 337 elderly

Table 2: Anthropometric variables in the elderly with depressive symptoms (based on GDS scores) In comparison with the elderly with no depressive symptoms

	No-Depressive Symptoms(n=190)	Depressive Symptoms(n=147)	P value ^{¶¶}
Body mass index (BMI, kg/m²)	27.1(±4.9)	27.9(±4.7)	0.098
BMI category[‡]			0.462
Normal weight (n=67)	42(22.3%)	25(17.1%)	
Overweight(n=144)	81(43.1%)	63(43.2%)	
Obesity(n=123)	65(34.6%)	58(39.7%)	
Triceps skin-folds (mm)	19.3(±10.0)	22.2(±10.7)	0.01*
MAC[†] (cm)	29.8(±7.9)	29.5(±3.4)	0.713
Waist (cm)	92.2(±11.3)	93.0(±14.0)	0.571
Calf (cm)	34.3(±4.4)	34.8(±4.5)	0.296
Total Body Fat	31.5(±12.2)	35.3(±12.2)	0.004*

GDS: Geriatric Depression Scale ^{¶¶}

For comparison of qualitative variables "chi squared test" and for comparing means of quantitative variables between two groups "independent sample t-test" was used.

‡: BMI was categorized as normal weight (<24.0 kg/m²), overweight (24.0 to 27.9 kg/m²), or obese (≥28.0 kg/m²). Data of BMI category is missing for three participants.

†: MAC—Mid-Upper Arm Circumference

* Significant differences between two groups ($p \leq 0.05$)

Table 3: Nutritional status (base on MNA) in elderly subjects with depressive symptoms (based on GDS scores) comparing to elderly subjects with no depressive symptoms

	No-Depressive Symptoms(n=190)	Depressive Symptoms(n=147)	P value [†]
Nutritional status(base on MNA) [‡]			<0.0001**
Malnutrition(n=6)	0(0%)	6(4.1%)	
Boarder line(n=114)	31(16.3%)	83(56.5%)	
Well nutrition(n=214)	159(83.7%)	58(39.5%)	

MNA: Mini-Nutritional Assessment

‡: Data of nutritional status is missing for three participants.

†: chi squared test

** Very significant difference between two groups ($p \leq 0.0001$)

de wit and colleagues (20) reported a significant u-shaped trend in the association between BMI and depression. They found more depression among obese subjects, less depression among normal weight participants and again higher trends of depression among underweight subjects (20).

The MNA tool is a well validated and effective way of assessing the nutritional status in old patients. Estimation of an individual's malnutrition risk is the aim of the MNA (21). There is unanimity among nutritionists and researchers about the usage of this questionnaire for early detection of malnutrition in elderly subjects (22-23). Appetite, nutritional behavior and dietary intake are highly affected by depression in elderly population (24).

German L. (25) and colleagues found that MNA scores were significantly lower among depressed patients as compared with non-depressed, indicating a higher risk for under-nutrition among depressed people. The current study found the same results. The main difference of the present research with previous works is examining the association of anthropometric indices with depression as a control for MNA and nutritional status in old subjects .

Depression and BMI are inversely associated with each other (26) which reveal greater physiologic, functional and mental preservation from amounts of muscle mass and greater exercise that protect patients against depressive symptoms (27). This is reflected in our study by statistically significant more Triceps skin-folds and Total Body Fat in depressed participants.

The prevalence of malnutrition and depression in old inpatient population was much more than free living and family supported old subjects (25) which reveal the role of family support on nutritional and mental status (28).

In contrary to our results, some studies (29-30) have reported that depressive symptoms and malnutrition in rural areas are higher than urban areas. This might be a result of significantly different numbers of urban and rural participants (311 vs. 26 respectively) in our study . As found by previous studies (31-33), women are more at risk of both depression and malnutrition. We reached the same results as well. One rational for this phenomenon is that depression may be induced by incorrect body image and periodic weight loss dieting and/or more eating disorders among women .

Although the current study was not designed to find any causal relationship between nutritional status and depression, future cohort studies may be able to elucidate this issue.

Limitations

The main limitation of this study was lack of a control group. We highly recommend a case-control designed study in this field.

Conclusion

The results of the present study revealed a high prevalence of depression and malnutrition among the elderly. Hence, health policy makers should address this issue. Moreover, Depression was associated with worsening of nutritional status. Therefore, households and nursing homes that provide care for the female elderly should pay close attention to their nutritional status and depressive disorder at the same time. Depressive symptoms may be a risk factor for malnutrition in later life. The mechanism of this association needs further elucidations, and future studies are needed to evaluate the extent these nutritional disturbances are reversible.

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Conflict of interest

Authors declare no conflict of interest related to this work.

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