Aging Medicine and Healthcare 2022;13(3):118-124. doi:10.33879/AMH.133.2021.09080

Aging Medicine and Healthcare
https://www.agingmedhealthc.com

Original Article

Association Between Nutritional Status and Depression in Hospitalized Elderly Patients

*Gökcen DOĞAN[1], Nurcan YABANCI AYHAN[1], Murat VARLI[2]

[1]Health Sciences Faculty, Department of Nutrition and Dietetics, Ankara University, Turkey
[2]School of Medicine, Department of Internal Medicine, Division of Geriatrics, Ankara University, Turkey

***Correspondence**
Mrs. Gökcen DOĞAN
Health Sciences Faculty, Department of Nutrition and Dietetics, Ankara University, Turkey
E-mail:
gökcen_iplikci@hotmail.com

Received 8 September 2021
Accepted 6 October 2021

Keywords
Depression, elderly, malnutrition, nutrition.

ABSTRACT

Background/Purpose: The global population is aging and this is expected to continue. For this reason, the number of hospitalized elderly people is increasing, especially in developing countries. This study aimed to examine depression, malnutrition, and dietary intake and the associations between them in hospitalized elderly people.

Methods: This prospective, descriptive, case–control study was conducted with 65 hospitalized elderly people. A questionnaire form was applied via face-to-face interview and the MNA-SF was used to assess nutritional status. A 24-hour dietary recall technique and the Geriatric Depression Scale (GDS) were applied.

Results: The prevalence of malnutrition was 32.3% and of malnutrition risk was 52.3% in this study. A significant relationship was found between the MNA-SF and the GDS (r=-0.427, p <0.001). It was also found that age, marital status, sleeping in the day time, MNA-SF scores, number of daily meals, and state of appetite affect the emergence of depression in hospitalized geriatric patients (p <0.05).

Conclusion: Both depression and malnutrition are common in hospitalized elderly people and they have an impact on general health. Therefore, close follow-up of patients is important.

1. INTRODUCTION

The elderly population is increasing rapidly in this country as in the whole world. Turkey's elderly population (aged 65 years and over) reached nearly 8 million as of the end of 2020, with the proportion of the elderly population in the total population being 9.5%.[1] Chronic diseases and social and physical problems that occur with increasing age affect the nutritional status of the elderly and reduce their quality of life.[2]

While the prevalence of depression was 4-16% in community-dwelling elderly people, this value approached 20-56% in those hospitalized.[3,4] Depression in the elderly is associated with many health problems such as increased risk of morbidity and suicide and decreased cognitive functioning and quality of life.[5]

Nutrition is important in psychological disorders as well as in many physiological diseases.[6] Several studies have shown that insufficient fruit and

vegetable consumption,[7] skipping a meal,[8] and vitamin B_{12},[9] B_6, and folate deficiencies are associated with depressive symptoms in older people.[10] Another nutrient whose relationship with depression is emphasized is n-3 polyunsaturated fatty acids. These supplements have been shown to reduce depressive symptoms in some studies.[11,12]

Geriatric depression affects nutritional status and nutritional status affects depression. It can be surmised that geriatric depression is more affected by nutrition than depression seen at younger ages, especially considering the changes in nutritional habits, decrease in food consumption, and decreases in the bioavailability of nutrients in old age.[13]

Thus, our study aimed to examine depression, malnutrition, and dietary intake and the associations between them in hospitalized elderly patients.

2. METHODS

2.1. Study Setting and Population

This single-center, prospective, controlled, and cross-sectional research was approved by Ankara University Faculty of Medicine Clinical Research Ethics Committee (06-223-16). This study was conducted in Ankara University Faculty of Medicine Geriatrics Clinic between May 2016 and February 2017. Written informed consent was obtained from all of the participants. Patients who were admitted to the geriatric clinic, volunteered to participate, were aged 65 years old or over, signed the consent form, were not diagnosed with malignancy, chronic liver disease, chronic kidney disease, Alzheimer's or other dementia types, could understand/answer the questionnaire and scale questions, and could be fed orally were included in the study.

A questionnaire form was applied to the volunteers to determine their socio-demographic characteristics and nutritional status by face-to-face interview.

2.2. Dietary Intake

In order to examine food intake, a 24-hour dietary recall technique was applied. The consumption amounts of the meals consumed by the elderly were asked with the help of the "Turkish Food Photo Catalogue".[14] The amount of food included in the portion of the meals was calculated using the "Standard Food Recipes for Institutions".[15] After the amounts of consumed foods were determined, daily energy, and macro- and micronutrient intakes were calculated using software, the "Nutrition Information Systems (BeBiS) Package Program", and their averages were obtained. The results were evaluated using the energy and nutrients recommended for individuals aged 65 or over according to the "Turkey Nutrition Guide 2015 (TUBER)".[16] In these evaluations, as the cut-off points, those who received energy and nutrients at the recommended level were considered sufficient (≥67%) and those below the recommended value (<67%) were considered insufficient.[17]

2.3. Geriatric Depression Scale (GDS)

The Geriatric Depression Scale (GDS) is a 30-item scale developed by Yesevage et al. (1983) for the elderly population.[18] The validity and reliability of the Turkish version were confirmed by Turan et al. (1996).[19] It was reported by Burke et al. (1991) that GDS can be used except in severe Alzheimer's and dementia patients.[20] The short form of the scale was developed to provide convenience and speed in the application. GDS-15 is an easy-to-answer scale for the elderly, consisting of 15 questions, based on self-report, with only "yes" and "no" answers. In the GDS-15, one point is given to the elderly person for each answer given in favor of depression and zero points for each answer given against it. The scale score calculated in this way constitutes the depression score of the elderly person. The total score can be between 0 and 15. Those with a GDS-SF score between 0 and 5.9 points are classified as "patients without depression", and those with between 6.0 and 15.0 points as "patients with depression".[18] In the present study, the elderly with GDS-scores <6 were defined as the control group and those with GDS-scores of ≥6 as the case group.

2.4. Mini Nutritional Assessment (MNA)

The short form of the MNA (MNA-SF) consisting of 6 questions was published in 2001 by Rubenstein et al. (2001).[21] This test consists of questions including anthropometric evaluation (body mass index (BMI) or calf circumference), self-assessment, diet, and appetite evaluation. It has been reported that the long and short forms of the MNA test are valid for determining the nutritional status of the elderly in Turkey.[22] An MNA-SF score between 0 and 7 points indicates "malnutrition", between 8 and 11 points "malnutrition risk", and between 12 and 14 points "normal nutritional status".

Fasting laboratory values including serum albumin, hemoglobin, fasting plasma glucose, total protein, vitamin B_{12}, sodium, potassium, calcium, magnesium, and chlorine were recorded.

2.5. Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) was used for the statistical evaluation of the data. In the descriptive analysis of the data, number (n), percentage (%), mean, standard deviation, and median values were used. The Kolmogorov–Smirnov and Shapiro–Wilk tests were used to determine

whether the data had a normal distribution. Differences in continuous variables were analyzed by Student's t-test if normally distributed. Otherwise, the Mann–Whitney U test was used. Pearson's correlation test was used to determine the direction and strength of the relationship between two numerical variables. Pearson's chi-square test was used for comparison of qualitative data. For all tests, p <0.05 was considered statistically significant.

Post hoc power analysis was carried out to determine whether the study had adequate power. According to the difference between the case and control groups' MNA scores, the effect size was calculated to be 0.7387169, while the post hoc power of the study (1 – β) was 0.830 (α=0.05). Therefore, it was concluded that there was an 83% probability of detecting the observed difference.

3. RESULTS

A total of 65 elderly individuals between the ages of 65 and 99 years were included, of which 36 had geriatric depression (20 women, 16 men) (case group) and 29 were in the control group (17 women, 12 men). The characteristics of the participants are presented in Table 1. The mean age was higher in the case group (p=0.003). Elderly people with depression described their appetites as worse than those without depression (p=0.017). In the case group, 44.4% of elderly individuals were widowed (p=0.005).

When the MNA-SF scores of the case and control groups were examined, it was seen that the case group had a significantly lower mean score. When classified according to the MNA-SF, although there was no statistically significant difference, it was observed that the frequency of malnutrition was higher in the case group. According to the data obtained from the 24-hour dietary recall, no significant difference was observed between the case and control groups when daily energy and nutrient intakes were compared. It was determined that the number of daily meals was less in the case group and the frequency of skipping meals was higher. In describing the appetite status of the elderly individuals, the case group declared that their appetite was worse (Table 2).

Figure 1 shows the correlation between MNA-SF and GDS scores. As the GDS scores of the elderly increase, the MNA-SF scores decrease (r=-0.427, p <0.001) (Figure 1).

The data obtained from the 24-hour dietary recall of the elderly were classified as sufficient and insufficient according to the Turkey Nutrition Guide. When these classifications were compared using Pearson's chi-square test, no significant difference was found for any item, but the graph shows that the frequency of inadequate intake was higher in the case group (Figure 2). (Energy: x^2=1.956, p=0.376; Protein: x^2=2.162, p=0.339; Fat: x^2=2.572, p=0.276; Fiber: x^2=0.172, p=0.678; Vitamin A: x^2=3.654, p=0.161;

Table 1. Characteristics of the participants

	Patients without Depression (n=29)	Patients with Depression (n=36)	p
Age (years)	72.7 (5.61)	78.0 (7.66)	0.003[a]
Sex			
Male	12 (41.4)	16 (44.4)	0.804[c]
Female	17 (58.6)	20 (55.6)	
Educational Status			
Non-educated	11 (37.9)	16 (34.4)	
Primary school	17 (58.7)	18 (50.0)	0.694[c]
High school	-	1 (2.8)	
University	1 (3.4)	1 (2.8)	
Marital Status			
Single	2 (6.9)	1 (2.8)	
Married	24 (82.8)	19 (52.8)	0.005[c]
Widowed	3 (10.3)	16 (44.4)	
Sleeping Time			
In day time (h)	2.0 (2.5)	3.0 (2.0)	0.002[b]
At night (h)	8.5 (1.74)	8.6 (2.46)	0.744[a]
Diseases			
Hypertension	25 (86.2)	28 (77.7)	0.416[c]
Diabetes Mellitus	16 (55.2)	15 (41.6)	0.098[c]
Cardiovascular Diseases	14 (48.3)	17 (47.2)	0.171[c]
Anemia	5 (17.2)	5 (13.8)	0.287[c]
No. of Drugs			
≤5	20 (68.9)	19 (52.7)	0.185[c]
>5	9 (31.1)	17 (47.2)	
Tooth Loss			
Yes	27 (93.1)	33 (91.6)	0.652[c]
No	2 (6.9)	3 (8.4)	
Blood Tests			
Fasting Plasma Glucose (mg/dL)	124.7 (52.2)	128.1 (82.9)	0.377[a]
Albumin (mg/dL)	3.5 (0.95)	3.7 (0.77)	0.955[b]
Total Protein (g/dL)	6.1 (2.15)	6.8 (0.75)	0.061[b]
Hemoglobin (g/dL)	11.2 (1.8)	10.3 (2.2)	0.073[a]
Vitamin B_{12} (pg/mL)	634.9 (418.3)	494.2 (251.5)	0.245[a]
Sodium (mEq/L)	139.9 (3.4)	138.9 (5.7)	0.453[a]
Potassium (mmol/L)	4.4 (0.5)	4.3 (0.5)	0.436[a]
Calcium (mg/dL)	9.3 (0.7)	11.2 (13.7)	0.443[a]
Magnesium (mg/dL)	1.9 (0.2)	1.9 (0.3)	0.128[a]
Chlorine (mEq/L)	102.2 (4.7)	104.2 (5.8)	0.462[a]
Phosphorus (mg/dL)	3.7 (0.5)	3.6 (0.5)	0.981[a]

Continuous variables are presented as mean with standard deviation (*SD*) if normally distributed and as median with interquartile range if not normally distributed. Data are given as number (percent) for the following variables: sex, educational status, marital status, diseases, no. of drugs, tooth loss.
[a]Student's t test; [b]Mann–Whitney U test; [c]Pearson's chi-square test

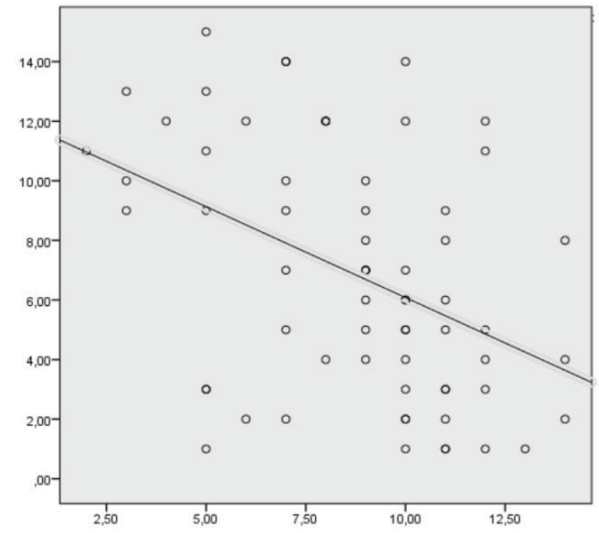
Vitamin E: x^2=1.201, p=0.548; Thiamine: x^2=0.065, p=0.798; Riboflavin: x^2=0.73, p=0.751; Niacin: x^2=2.720, p=0.195; Vit B_6 x^2=0.287, p=0.867; Vit B_{12} x^2=3.003, p=0.223; Folic Acid: x^2=0.070, p=0.933; Vit C: x^2=2.921, p=0.232; Calcium: x^2=0.180, p=0.914; Magnesium: x^2=0.921, p=0.631; Iron: x^2=2.856, p=0.091; Zinc: x^2=1.230, p=0.541; Phosphorus: x^2=0.596, p=0.742).

Table 2. Nutritional characteristics of the participants

	Patients without Depression (n=29)	Patients with Depression (n=36)	*p*
MNA-SF score	9.9 (2.5)	7.9 (2.9)	0.005[a]
Malnutrition status according to MNA-SF			
Malnutrition	6 (20.6)	15 (41.6)	
Risk of malnutrition	16 (55.2)	18 (50.0)	0.087[c]
Normal nutritional status	7 (24.1)	3 (8.4)	
BMI (kg/m^2)	29.9 (5.3)	25.4 (4.9)	0.241[a]
Nutrient intake			
Energy (kcal)	1327.0 (367.7)	1255.8 (486.3)	0.517[a]
Carbohydrate (g)	155.3 (54.6)	141.1 (61.2)	0.332[a]
Protein (g)	57.6 (20.5)	52.6 (20.7)	0.333[a]
Fat (g)	51.0 (16.8)	49.9 (20.0)	0.807[a]
Fiber (g)	17.2 (6.7)	14.5 (6.9)	0.125[a]
Cholesterol (mg)	185.9 (97.5)	213.0 (128.0)	0.351[a]
Vitamin A (mcg)	766.1 (320.3)	624.9 (308.1)	0.076[a]
Vitamin E (mg)	11.9 (5.1)	11.3 (5.9)	0.662[a]
Thiamine (mg)	0.7 (0.2)	0.6 (0.2)	0.294[a]
Riboflavin (mg)	1.2 (0.5)	1.1 (0.5)	0.978[a]
Niacin (mg)	21.6 (8.5)	19.5 (8.7)	0.351[a]
Vitamin B_5 (mg)	3.9 (1.6)	4.0 (1.9)	0.852[a]
Vitamin B_6 (mg)	1.14 (0.4)	1.0 (0.45)	0.310[a]
Vitamin B_{12} (mcg)	3.9 (2.4)	3.7 (2.5)	0.855[a]
Folic Acid (mcg)	217.1 (75.3)	200.5 (82.8)	0.406[a]
Vitamin C (mg)	91.8 (48.6)	82.0 (56.0)	0.459[a]
Calcium (mg)	621.8 (290.0)	652.1 (313.7)	0.691[a]
Magnesium (mg)	227.2 (96.5)	207.3 (93.6)	0.405[a]
Iron (mg)	9.2 (2.9)	7.8 (3.3)	0.094[a]
Zinc (mg)	8.8 (3.4)	7.6 (3.3)	0.162[a]
Phosphorus (mg)	974.4 (384.0)	961.7 (397.6)	0.130[a]
Nutrition Habits			
Number of daily meals	3.0 (1.0)	2.0 (1.0)	0.043[b]
Reason for skip a meal			
Forgetting	2 (6.9)	3 (8.3)	x^2=36.5
Anorexia	10 (34.5)	19 (52.8)	p <0.001[c]
Cannot Prepare	-	2 (5.6)	
State of appetite			
Very bad	2 (6.9)	7 (19.4)	
Bad	4 (13.8)	10 (27.8)	
Moderate	13 (44.8)	14 (38.9)	0.017[c]
Good	8 (27.6)	4 (11.1)	
Very good	2 (6.9)	1 (2.8)	

Continuous variables are presented as mean with standard deviation (*SD*) if normally distributed. Data are given as number (percent) for the following variable: malnutrition status, appetite statement
[a]Student's t test; [b]Mann–Whitney U test; [c]Pearson's chi-square test

Figure 1. Correlation between MNA-SF score and GDS-score



Pearson Correlation test, r=-0.427, p<0.001

4. DISCUSSION

Ageing is a period when chronic diseases are more common and the frequency of malnutrition and depression increase.[23-25] Early diagnosis and treatment of both malnutrition and depression will not only increase the quality of life of the individual, but also shorten the hospital stay and reduce the mortality rate.[26] In the present study, it was investigated whether geriatric depression has an effect on nutritional habits, dietary intake, and nutritional status in hospitalized elderly patients. Although no significant relationship was found between nutrient intake and depression in this study, it is observed that the frequency of insufficient intake was higher in patients without depression (p <0.05).

The study included 28 male and 37 female elderly individuals, among whom 36 (55.3%) had geriatric depression. According to the MNA-SF results, the prevalence of malnutrition was 32.3% and prevalence of malnutrition risk was 52.3%. The MNA-SF score was significantly lower in the depressed group and the incidence of malnutrition was higher in the case group according to the MNA-SF. There was also a significant correlation between MNA-SF and GDS scores (p <0.001). There are studies supporting these findings regarding the relationship between depression and malnutrition in the elderly.[27,28]

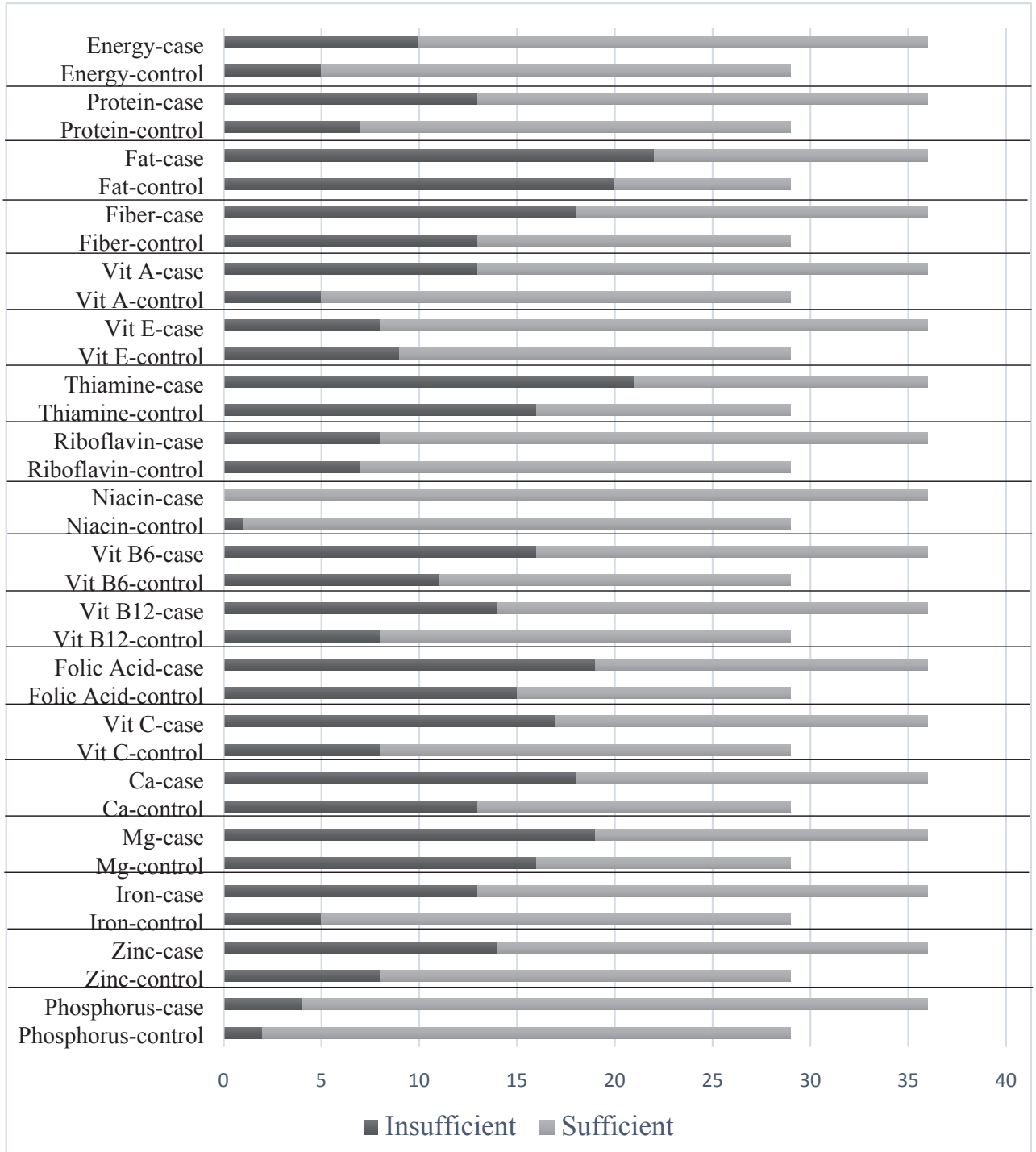
It is also seen that depression affects eating habits and appetite status. While the control group often had 3 meals a day, the case group had 2 meals a day. The frequency of skipping meals also increased in the case group. Moreover, "anorexia" is more common in the case group in the reasons for skipping meals. In another study involving 4467 elderly people, it

was found that skipping meals was associated with depression (p <0.05).[29]

In the present study, which was performed with 28 men and 37 women (29 control group, 36 case group), the mean age of the case group was significantly higher than that of the control group (p=0.003). Song et al. (2014) found that the frequency and score of depression increased with increasing age and obtained similar results.[30]

It is generally thought that geriatric depression and marital status are related. Losing a spouse, especially after being married for many years, is a major risk factor for depression.[31,32] In the present study conducted in the geriatrics clinic, the marital status of the individuals was grouped as single, married, and widowed. While 10.3% of those without depressive symptoms were widowed, this rate increased to 44.4% in the elderly with depressive symptoms (p=0.005).

Figure 2. Energy and micronutrient intake of elderly people measured with 24-hour dietary recall and compared to Turkey Nutrition Guide 2015



Both sleeping a lot during the day and sleeping at mealtimes reduce energy intake. Although no relationship was found between nighttime sleep durations and depressive symptoms, a statistically significant correlation was found with daytime sleep durations. Armitage et al. (1997) found that total daily sleep time was higher in elderly people with depression.[33]

The energy and nutrient intakes of the elderly participants were evaluated with 24-hour food recall. There were no significant differences between the case and control groups, either in the evaluation of the mean intakes or in the comparison of the people who did not receive sufficient intake. However, it is seen that insufficient intakes are higher in the case group compared to the control group. In another study, conducted with Korean elderly people, it was found that the daily intakes of dietary fiber, riboflavin, niacin, potassium, and iron were significantly lower in depressed elderly people.[34]

In conclusion, both depression, and malnutrition are common in hospitalized elderly people, and they have an impact on general health. Therefore, close follow-up of patients and an appropriate care plan are important. If nutrient deficiencies or malnutrition are not diagnosed in time, the elderly people's need for institution and treatment costs increase. Efforts should be made to adopt healthy nutrition practices in order to protect the functional status of the elderly.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

ACKNOWLEDGEMENTS

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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