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Association Between Sarcopenia, Insomnia, and Depression in Elderly Patients

Yaşlı Hastalarda Sarkopeni, Uyku Bozukluğu ve Depresyon İlişkisi

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Abstract

Objective: Sarcopenia is progressive and generalized loss of muscle mass, muscle strength, and function. In this study, we aimed to examine the relationship between the presence of depression and insomnia in elderly sarcopenic patients.

Methods: Volunteer patients to participate in the study who applied to the geriatric outpatient clinic with any complaints as of June 2022 were included. The inclusion criteria were being over 65 years of age and with a score of over 24 out of 30 in the mini-mental state examination. Neuropsychological tests were performed by specialist psychologists in an appropriate environment and at an appropriate time. Those diagnosed with depression according to the Geriatric Depression Scale were recorded. Patients with insomnias were questioned whether they had complaints about sleep onset latency, staying asleep, and duration of sleep.

Results: Two hundred-five patients were included in the study. The mean age of the patients was 75.54 (±6.5) years, with 117 females 57% and 88 males 43%. According to the European Sarcopenia Diagnostic Guide, 48 (23.4%) patients were found to be sarcopenic. There was no difference between men and women in terms of the frequency of sarcopenia. Depression was significantly more common in the sarcopenic group. We found out that patients with sarcopenia had a higher rate of insomnia. Sleep onset latency, staying asleep, and duration of sleep problems were more common in these patients.

Conclusion: When sarcopenic patients and non-sarcopenic patients were compared, depression and insomnia were more common in the sarcopenic group.

Keywords: Sarcopenia, elderly, insomnia, depression

Öz

Amaç: Sarkopeni; kas kütlesi, kas gücü ve fonksiyonlarında progresif ve jeneralize kayıptır. Biz bu çalışmamızda yaşlı sarkopenik hastalarda depresyon varlığı ve uyku bozukluğu ilişkisini araştırmayı amaçladık

Yöntem: Geriatri polikliniğine Haziran 2022 tarihinde itibaren herhangi bir şikayeti nedeni ile başvuran hastalar arasından çalışmaya katılmaya gönüllü olan hastalar alındı. Alınma kriterleri 65 yaş üstü, mini mental durum değerlendirme testi 30 puan üzerinden 24 puan üzerinde olanlar dahil edildi. Nöropsikiyatrik testler uygun bir ortamdan ve uygun bir sürede uzman psikologlar tarafından uygulandı. Geriatrik depresyon skorlamasına göre depresyon tanısı olanlar kayıt edildi. Uyku bozukluğu hastalara uykuya başlama, sürdürme ve süre ile ilgili şikayetlerinin olup olmadığı sorgulandı.

Bulgular: Çalışmaya 205 hasta dahil edildi. Hastaların yaş ortalaması 75,54±6,5 olup 117 (%57) kadın ve 88 (%43) erkekten oluşmaktaydı. Hastaların Avrupa Sarkopeni tanı Klavuzu'na göre 48 (%23,4) kişi sarkopenik olarak saptandı. Sarkopeni sıklığı açısından kadın ve erkekler arasında fark saptanmadı. Sarkopenik

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Öz

grupta depresyon anlamlı derecede daha fazla görülmekteydi. Sarkopenisi olan hastalarda uyku bozukluğu şikayeti daha fazla oranda olduğunu saptadık. Hastaların uykuya başlama, devam ettirme ve süre sorunları daha fazla görülmekteydi.

Sonuç: Sarkopenik hastalar ile sarkopenik olmayan hastalar karşılaştırıldığında sarkopenik grup hastalarda depresyon ve uyku bozukluğu daha fazla oranda görülmekteydi.

Anahtar Kelimeler: Sarkopeni, yaşlı, insomnia, depresyon

Introduction

Sarcopenia is a progressive and generalized loss of muscle mass, muscle strength, and function. The European study group on sarcopenia in the elderly, the European Working Group on Sarcopenia in Older People (EWGSOP), defined sarcopenia as low muscle mass and low muscle function[1]. While the prevalence of sarcopenia is between 13% and 27% at <70 years of age, it reaches 50% at >80 years of age[2]. It is a result of the aging process and is considered as a geriatric syndrome.

With the increase in the elderly population all over the world, the frequency of sarcopenia also increases, making it difficult to diagnose in clinical practice.

Sarcopenia is usually accompanied by a decline in physical inactivity and mobility, slow walking speed, falling, fractures, and decreased physical strength. In addition, it can cause health problems related to diabetes mellitus, metabolic syndrome, cardiovascular diseases, mortality, and physical inactivity[3]. The development of sarcopenia in elderly patients affects daily life and instrumental daily life activities[4]. The presence of sarcopenia causes poor quality of life in elderly patients, and there are studies showing that it can cause depression[5]. Due to the decrease in muscle strength and mobility, the socialization of the elderly is impaired and they become introverted. In some cases, the clinical pictures are intertwined. Insomnia is frequently observed in these patients[6].

Depression may develop in the elderly population for many reasons. Depression in the elderly presents with symptoms such as introversion, sadness, crying, sleep disorder, attention disorder, appetite, and weight loss[7]. These symptoms are often regarded as natural signs of aging. Causes such as chronic diseases, loss of family and friends, financial disorders, pain, social isolation, low socio-economic status, and physical deterioration may also cause depression in the elderly[8]. The frequency of depression and insomnia varies according to countries and societies. Reasons may vary in each society. Depression and insomnia are very common in some countries. Depression and insomnia may also differ between the young and old.

In this study, we aimed to investigate the relationship between the presence of depression and insomnia in elderly sarcopenic patients.

Materials and Methods

Volunteer patients to participate in the study who applied to the geriatric outpatient clinic with any complaints as of June 2022 were included. The study consent of all patients were obtained. The inclusion criteria were being over 65 years of age and having a score of over 24 out of 30 in the mini-mental status examination (MMSE). Patients with walking difficulties (due to pain, prosthesis, vision loss, etc.), vitamin D deficiency[9], or using ancillary tools (walker, cane, etc.), patients with sequelae and hip fractures after cerebrovascular disease, and those without postoperative 6 months were not included.

The Lawton-Brody instrumental activities of daily living (IADL) and the Barthel index for activities of daily living (ADL) tests were performed on the patients.

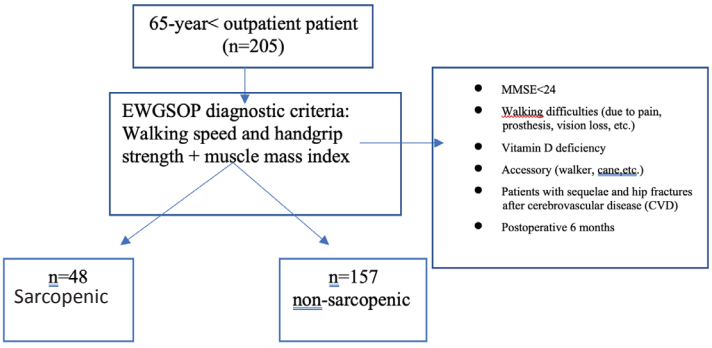
Neuropsychological tests were performed by specialist psychologists in an appropriate environment and at an appropriate time. Those with 4< according to the Yesavage Geriatric Depression Scale (YGDS) and those diagnosed with depression were recorded.

This study was approved by İzmir Katip Çelebi University (no: 0315, date: 16.06.2022).

Sarcopenia

EWGSOP diagnostic criteria were used for sarcopenia. Handgrip and walking speed of the patients who were admitted to the outpatient clinic were measured and bioelectrical impedance analysis for the diagnosis of sarcopenia[1]. First, patients were tested with a Jamar hand dynamometer twice on both arms at a 90-degree angle in each sitting position.

The highest measured value was set. A walking track of 4.5 m was created for the walking speed of the patients, and two trials were conducted. The patient's fastest walking speed was accepted. Sarcopenia was diagnosed by measuring the handgrip strength. A reference value of 32 kg in men and 22 kg in women was accepted for the diagnosis of sarcopenia[10]. A walking speed of 0.8 m/s> and a handgrip strength of 32 kg> for men and 22 kg> for women, a muscle mass index of 10.75 kg/m^2> for men, and a muscle mass index of 6.75 kg/m^2> for women are definitive for sarcopenia[11]. Those who were diagnosed as sarcopenic (48 patients, 23.4%). The muscle mass index of 5.37 kg/m^2 in the sarcopenic group, 14.7 kg/m^2 in the non-sarcopenic group, 5.20 kg/m^2 in the sarcopenic group of women, and 8.40 kg/m^2 in the non-sarcopenic group of women. The muscle mass index was calculated by dividing the square of the height in meters by the total muscle mass calculated by the "Tanita-300 Body Composition Analyzer" used in our study.



Triceps skin thickness and mid-arm circumference measurements are parameters that can be used for anthropometric evaluation, but they were not preferred in elderly patients because of changes in body fat distribution.

Depression and Insomnia

For the diagnosis of depression, the burnout status of the patients was questioned, and the Yesavage geriatric depression scale was implemented. The YGDS-15 test was preferred because of its validity and reliability in Turkish[12]. A 15-question test was performed for the diagnosis of depression. <4 score was considered depressive.

The patients were questioned regarding insomnia while taking anamnesis. Patients with sleep onset latency and total duration problems were classified as having insomnia. Patients with poor sleep hygiene (those who slept many times during the day) were not included.

Measurement of Other Variables

Height, weight measurements, smoking and/or alcohol use, educational status, marital status, and laboratory values of the patients were recorded during their admission. The examinations of the patients were performed during morning fasting. Comorbidities were questioned and checked through the health system.

The MMSE, the Barthel index for ADL, and the Lawton-Broody IADL were administered by expert psychologists in the appropriate environment and time. MMSE was applied separately for those who were educated and uneducated over 30 points, ADL-Barthel was evaluated over 100 points, and patients were scored in 10 different areas such as nutrition, bathing, self-care, dressing and undressing, incontinence of urine and feces, using the toilet alone, wheelchair use, mobility status, and climbing stairs. The IADL test consists of 8 sections and is evaluated over a score of 17. It tests the subjects of using the phone, shopping, preparing meals, cleaning the house, using laundry, using medicine, traveling, and financial affairs, and low scores are accepted as an indicator of addiction. Those who scored below 8 points were considered addicts.

Statistical Analysis

Demographic data are presented as frequency and percentage. Normal distribution was tested using the Kolmogorov-Smirnov test. Categorical values were compared using the chi-square test. Continuous data were compared using Student's t-test. A p-value <0.05 (two-tailed) was considered statistical significant. All statistical analyses were performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA).

Results

Two hundred and five patients were included in the study. The mean age of the patients was 75.54 (±6.5) years, with 117 females 57% and 88 males (43%). According to the European Sarcopenia Diagnostic Guide, 48 (23.4%) patients were found to be sarcopenic. There was no difference between men and women in the frequency of sarcopenia.

Demographic data, marital status, educational status, height, weight, body mass index (BMI), smoking, and alcohol use of the patients and the most common comorbid conditions are presented in Table 1. There was no statistically significant difference between patients' age, BMI, educational status, use of alcohol, and smoking. Comorbidities other than hypertension were similar in terms of chronic diseases. The

cognitive functions of the patients were found to be low in the sarcopenic group, and the ADL and IADL tests were found to be significantly lower in the sarcopenic group. These patients needed help in their daily lives.

The mean MMSE score was 26.35 in the sarcopenic group and 28.15 in the non-sarcopenic group, and there was a significant difference between the two groups. MMSE scores in the sarcopenic group were lower. Patients with a score of 4< according to YGDS short form (15 questions) who were clinically compatible were diagnosed with depression. 63 (30.7%) patients had depression and 38 (18.5%) patients had insomnia.

Table 2 shows a comparison of the laboratory parameters of the patients. There was no significant difference between the sarcopenic and non-sarcopenic groups in terms of laboratory values.

Twenty-six elderly patients had been diagnosed with depression and are being treated. With our scans, this number increased to 63 patients. Thirty-seven patients were diagnosed with depression disorder. Depression was higher in women than in men. It was similar to other studies[13].

Depression was significantly higher in patients with sarcopenia. Table 3 relationship between depression and those with sarcopenia and non-sarcopenia is given. Depression was significantly more common in the sarcopenic group, with

Table 1. Patients characteristics (n=205)

	Sarcopenic	Non-sarcopenic	p
Age, yr	78.33	74.68	0.542
Sex (female/male)	33/15	84/73	0.62
Height (cm)	156.87	161.62	0.06
Weight (kg)	71.06	74.21	0.93
BMI, kg/m^2	28.89	28.44	0.46
Smoke N/Y %	23/33.3	77/66.7	0.47
Alcohol N/Y %	24/0	76/100	0.21
Educational status			
Un-educated %	25	75	0.72
Primary-secondary school	22.6	77.4	
High school	27.7	72.3	
University	16	84	
Hypertension %	35.7	64.3	0.03
Diabetes mellitus %	38.5	61.5	0.14
Ischemic heart disease %	26.7	73.3	0.57
Hyperlipidemia %	24.4	75.6	0.86
COPD %	21.1	78.9	0.79
Osteoporosis %	21.9	78.1	0.707
ADL	23.4	76.6	<0.001
LBIADL	23.4	76.6	<0.001
MMSE	26.35	28.15	<0.001
Walking speed (sn)	7.66	4.02	
Handgrip stregth M/F (kg)	18.2/13.45	24.14/14.5	
Muscle mass index M/F (kg)	4.96/5.14	14.72/8.34	

COPD: Chronic obstructive pulmonary disease, ADL: Activities of daily living, LBIADL: Lawton-Brody instrumental activities of daily living, MMSE: Mini-mental state examination, BMI: Body mass index

Table 2. Laboratory comparison between sarcopenia and non-sarcopenia

	Sarcopenic	Non-sarcopenia	p
Glucose (mg/dL)	113.08	111.68	0.22
Hemoglobin	13.40	13.90	0.47
BUN (mg/dL)	42.26	37.16	0.57
Creatinine (mg/dL)	1.00	1.00	0.10
Uric acid	6.54	6.52	0.35
Cholesterol	204.13	202.77	0.71
Triglyceride	129.67	141.26	0.68
HDL	57.11	52.90	0.35
LDL	123.40	121.79	0.43
AST (IU/L)	21.24	22.28	0.49
ALT (IU/L)	19.86	18.72	0.75
ALP	82.48	79.56	0.83
GGT	41.17	26.80	0.10
Protein (g/dL)	7.09	6.93	0.46
Albumin (mg/dL)	4.12	4.26	0.17
LD	200.94	200	0.46
Magnesium	2.01	2.00	0.07
Calcium (mg/dL)	9.39	10.38	0.10
Sodium	136.30	146.19	0.15
Potassium	4.55	4.44	0.44
Vitamin B12	535.65	501	0.43
Folate	9.74	18.25	0.31
Ferritin	81.85	71.39	0.52
Iron	79.73	75.70	0.34
TSH	2.74	2.02	0.39
Vitamin D	26.65	25.94	0.28

BUN: Blood urea nitrogen, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, ALP: Alkaline phosphatase, GGT: Gamma glutamyl transferase, LD: Lactate dehydrogenase, TSH: Thyroid-stimulating hormone

Table 3. Relationship between sarcopenia and depression

		Sarcopenia		
		Yes	**No**	**p**
Depression	Yes/no	25/23	38/119	<0.001
	%	39.7%/16.2%	60.3%/83.8%	100.0%
Total	Count	48	157	205

Table 4. Relationship between sarcopenia and insomnia

		Sarcopenia		p
		Yes	**no**	
Insomnia	No/yes	25/23	142/15	<0.001
		15.0%/60.5	85.0%/39.5	
Total		48	157	205

39.7% of sarcopenic patients having symptoms of depression.

We found that the rate of insomnia complaints was higher in patients with sarcopenia. Table 4 shows the relationship between insomnia and those with and without sarcopenia. The problems of sleep onset latency, staying asleep, and duration of sleep was more common in these patients. Insomnia was found in 38 (60.5%) of 48 patients with sarcopenia.

Discussion

There are many factors that can cause depression. Social isolation, being widowed, divorced or in a separate marital status, low socio-economic status, comorbid general medical conditions, uncontrolled pain, insomnia, functional disorder, and cognitive impairment can cause depression[8]. There are studies showing that sarcopenia has effects on mental health such as stress, anxiety, suicidal ideation, and depression[14-16]. There are studies showing that depression may also be the cause of sarcopenia. There are also studies stating that there is no relationship between them[17]. Decreased physical inactivity in depressed people may also cause sarcopenia[18]. Therefore, this issue needs to be clarified.

The negative effect of depression on sleep increases with age. Although the negative effects of depression on sleep have been described, untreated insomnia is also seen as a risk factor for the development and recurrence of depression[19]. Depression and insomnia are very common in patients who visit the outpatient clinic. In this study, we investigated the relationship between important morbidities affecting life in elderly sarcopenic patients.

In elderly people, circadian rhythm changes due to physiological changes[20]. In addition, insomnia is observed due to chronic diseases, drugs, pain, etc. Sleep onset problems were reported in 27-45% of the elderly, sleep disruption in 20-65%, early morning awakening in 15-54% and unrested awakening in 10%[19-21].

Sarcopenia's etiology is multifactorial[22]. Malnutrition, hormone levels, immobility, a sedentary lifestyle, increased inflammation and oxidative stress, co-morbidities, chronic diseases, and medications all have a role[23]. Vitamin D deficiency is known to cause the onset of sarcopenia in elderly patients[9]. Patients with vitamin D deficiency were excluded from the study.

Sarcopenia may develop as a natural consequence of age, or it may develop because of one or more underlying causes. Chronic conditions, such as endocrine disorders, malignancies, chronic inflammatory diseases, and severe organ failure, can increase sarcopenia through chronic inflammation and metabolic derangements[24]. Among the most major risk factors for sarcopenia in elderly patients is diabetes that is not well controlled[25].

There are studies indicating that inflammation may play a role in the development of sarcopenia, depression[26], and insomnia[27]; however, no proper study has determined an approved inflammatory marker and cut-off value.

We believe that it would be correct to detect sarcopenia or treat sarcopenia in these patients in addition to depression and insomnia treatment. The presence of sarcopenia may be the cause of depression and insomnia, or vise versa.

The MMSE scores of sarcopenic patients were found to be significantly lower than those of non-sarcopenic patients[16]. Sarcopenia indicates that it may also impact cognitive abilities[16].

Study Limitations

This was a cross-sectional study conducted on a group of elderly patients with chronic diseases; therefore, it is possible that multiple factors contribute to the development of depression and insomnia. In this study, we revealed that sarcopenia can also contribute to depression and insomnia.

Conclusion

When sarcopenic and non-sarcopenic patients were compared, depression and insomnia were more common in the sarcopenic group, and this was statistically significant. This relationship in elderly patients suggests that they may be

related to each other. In sarcopenic patients, social isolation and introversion can cause depression and insomnia. When the ADL and IADL scores of the patients were compared, it was found that the ADL of these patients were impaired in the sarcopenic group, and they were more dependent. There were also significant differences between the life activities of the patients.

Ethics

Ethics Committee Approval: This study was approved by İzmir Katip Çelebi University (no: 0315, date: 16.06.2022).

Informed Consent: The study consent of all patients was obtained.

Authorship Contributions

Surgical and Medical Practices: H.Ö., Concept: H.Ö., Design: H.Ö., Data Collection or Processing: H.Ö., K.K., Analysis or Interpretation: H.Ö., Literature Search: H.Ö., Writing: H.Ö., K.K.

Conflict of Interest: No conflict of interest was declared by the authors.

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