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NEÜ YAYINEVİ

The Effect of Mediterranean Diet Compliance on Cognitive Functions in COPD Patients

Akdeniz Diyeti Uyumunun KOAH Hastalarında Bilişsel Fonksiyonlar Üzerine Etkisi

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Öz

Amaç: Kronik obstrüktif akciğer hastalığı, dünya çapında önde gelen morbidite ve mortalite nedenlerinden biridir. Hastalığın ilerlemesiyle birlikte sık görülen komorbid durumlardan biri de kognitif disfonksiyondur. Bilişsel işlev bozukluğunun gelişmesi ile hastalığın tedavi yönetimi zorlaştığından, süreç sağlık çalışanları ve hastalar için zorlaşmaktadır. Akdeniz diyeti antioksidan beslenme tipine uygun bir diyettir. Diyetin KOAH üzerindeki etkilerinin bilinmesi, sağlık profesyonellerine hastalara akciğer sağlığını iyileştirme yönünde daha iyi danışmanlık yapmaları için kanıta dayalı bir yaşam tarzı yaklaşımı sağlayabilir.
Hastalar ve Yöntem: Çalışmamıza 49 KOAH hastası dahil edilmiştir. Bilişsel performans Montreal Bilişsel Değerlendirme ile depresyon ise Beck Depresyon Envanteri ile bir nörolog tarafından değerlendirilmiştir. Tüm hastalar Türkçeye uyarlanmış Akdeniz Diyetine Uyum Ölçeği ile değerlendirilmiştir.
Bulgular: Çalışmaya 49 hasta dahil edilmiştir. Çalışmamızda bilişsel işlev bozukluğu sıklığı %73.4, depresyon sıklığı %35 olarak bulunmuştur. Akdeniz Diyetine Uyum Ölçeği ile Montreal Bilişsel Değerlendirme testi sonuçları arasındaki korelasyonu analizinde Akdeniz Diyetine Uyum Ölçeğine uyumu yüksek olan hastaların Montreal Bilişsel Değerlendirme testi skorlarının da anlamlı derecede yüksek olduğu görülmüştür.
Sonuç: Akdeniz Diyetine yüksek düzeyde uyum gösteren KOAH hastalarında bilişsel işlev bozukluğu gelişme riski daha düşüktür.

Anahtar Kelimeler: KOAH, akdeniz diyeti, bilişsel fonksiyon

Abstract

Aim: Chronic obstructive pulmonary disease is one of the leading causes of morbidity and mortality worldwide. Cognitive dysfunction is one of the most common comorbid conditions with disease progression. As the development of cognitive dysfunction complicates the treatment management of the disease, the process becomes more difficult for healthcare professionals and patients. The Mediterranean diet is a diet suitable for antioxidant nutrition. Knowledge of the effects of diet on COPD may provide health professionals with an evidence-based lifestyle approach to better counsel patients to improve lung health.
Patients and Methods: 49 COPD patients included to our study. Cognitive performance was assessed using Montreal Cognitive Assessment and depression was assessed Beck Depression Inventory by a neurologist. All patients were assessed with Turkish-adapted Mediterranean Diet Adherence Scale.
Results: The study included 49 patients. In our study, the prevalence of cognitive dysfunction was 73.4% and the prevalence of depression was 35%. In the analysis of the correlation between the results of the Mediterranean Diet Adherence Scale and the Montreal Cognitive Assessment test, it was observed that patients with high adherence to the Mediterranean Diet Adherence Scale also had significantly higher Montreal Cognitive Assessment test scores.
Conclusion: The risk of developing cognitive dysfunction is lower in patients with COPD who have high adherence to the Mediterranean Diet Adherence.

Keywords: COPD, mediterranean diet, cognitive function

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INTRODUCTION

According to the latest GOLD 2023 guidelines, chronic obstructive pulmonary disease is a mortality-causing disease. The most common symptoms of the disease are dyspnea, chronic cough and accompanying sputum. The disease is diagnosed with a post-bronchodilator FEV1/FVC ratio < 70 in patients with these complaints (1).

The most important known risk for developing COPD is smoking. However, smoking is not the only known risk factor. Indoor and outdoor air pollution, occupational exposure, previous infections, passive exposure to cigarette smoke are other risk factors that may lead to the development of COPD. COPD may also develop in some genetic pathologies such as alpha1-antitrypsin deficiency (2). In case of complaints in patients, COPD is diagnosed if FEV1 /FVC < 0.7 in spirometry measurement after bronchodilation test. Patients with COPD most commonly complain of shortness of breath and cough with or without sputum. The disease is characterised by exacerbations. Since chronic inflammation and hypoxia are also common in patients with COPD, other comorbid conditions are often present. In the treatment management of the disease, comorbid conditions should be treated together. Because incomplete treatment of comorbid conditions may lead to exacerbation to worsen (3).

The development of oxidative stress can directly lead to lung injury, but it can also initiate an inflammatory response through the degradation of lung tissue. NF-κB, which plays the most important role in the inflammatory response, is involved in the initiation of lung infiltration by proinflammatory cytokines and chemotactic factors. Fibrosis developing at the end of inflammation leads to progressive deterioration in lung function. Increased oxidative, endogenous antioxidant defence in COPD also leads to a decrease in endogenous antioxidant defence (4).

While oxidative stress directly affects lung damage in COPD patients, it also leads to the progression of comorbidities with its systemic effect. Studies have been conducted to reduce oxidative stress in animal experiments in COPD, but the number of clinical studies is very few. Although antioxidant drugs are the most clinically tested drugs, there are studies showing that they can be more effective than bronchodilators and ICS. It has been shown that it can prevent exacerbations of patients, but its effect on quality of life and symptoms is unclear (5).

Diet is considered as a modifiable risk factor for disease control in chronic diseases. Recent studies also support that it may influence many chronic diseases, including COPD (6-8). When we compared healthy controls and COPD patients, it was observed that COPD patients had diets with less fruit and vegetable intake than healthy controls. It is thought that this, together with less antioxidant content, leads to deterioration in lung function and COPD progression (9-10).

Many studies have focused on the effect of nutrients on respiration. However, the effect on respiratory health may not be fully determined, as the effect of nutrients may change with the intake of individual or combined nutrients. However, when looking at the diets of populations in general, changes in diet in the last few decades in developing countries have contributed to the increase in the prevalence of chronic diseases, including COPD (11).

The Mediterranean Diet (MedDiet) was first presented in the 1950s as the Seven Country Study. In the study, the Southern European population, which is located in the country where the olive tree grows naturally, was examined. It was observed that diseases with a high risk of death such as coronary heart disease (CHD) and cancer were significantly less common in this region compared to other countries in the world (12).

The type of diet today called the MedDiet is actually a plant-based diet. Olive oil is the main ingredient as an oil for cooking or using raw. Apart from this, adding plenty of seasonal vegetables to the diet, regular consumption of nuts and seeds, consumption of legumes several times a week, daily whole grains, consumption of fish portions two to three times a week, limited quantities of milk (yogurt, milk, cheese), flavor recipes It is recommended to consume spices and herbs, sweets several times a week, small amounts of red and processed meat, three to four eggs a week, wine in moderation (13). Prevention and treatment management of COPD is an important health problem with important social and economic problems. Comorbidities such as heart disease, osteoporosis, type 2 diabetes mellitus, lung cancer and cognitive impairment are most common in patients with COPD (14).

Cognitive assessment involves different processes that can be divided into six main neuropsychological domains: learning and memory, visuospatial and motor function, attention/concentration, language, social cognition/emotions and executive functions (15). Cognitive impairment can present with many clinical manifestations in a variety of patients. Hypoxemia

affects oxygen-dependent enzymes in COPD patients. Thus, the ground for the development of cognitive impairment is formed (16). In COPD patients, it is associated with treatment non-adherence and increased attacks, leading to increased mortality. In addition to patients' compliance with treatment, it also negatively affects their social life and has a negative impact on quality of life (17).

PATIENTS AND METHODS

Forty-nine patients were recruited to our study in our clinic. Patients diagnosed with COPD and followed up from June 2023 to August 2023 in the Chest Diseases Clinic. Routine examinations of all patients were performed. COPD diagnosis was made according to the symptoms, physical examination, laboratory findings and pulmonary function test parameters according to the GOLD guideline. Oxygen saturation was evaluated with pulse oximetry. Patients with a score of 92% and above were included in the study. Approval was obtained from the Local Ethics Committee (Number: 2023/014). To all participants information about the study was given and written consent was obtained.

Cerebrovascular disease, diabetes, uremia and other metabolic-endocrine disorders, patients with a diagnosis and other psychiatric diseases, head trauma, interstitial lung disease, alcohol users, taking antioxidant agents, and using drugs that may affect cognitive performance were not included in the study.

In our study, the Mediterranean Dietary Adherence Scale (MEDAS) questionnaire adapted to Turkish was administered to COPD patients. MEDAS is a questionnaire consisting of 14 questions in total. Patients can score 0 or 1 point from each question. Accordingly, the highest score that can be obtained in total is 14. Patients with a score of seven or eight on the questionnaire are considered to have acceptable MEDAS adherence, while a score of nine or more is considered to have high adherence to MEDAS (18, 19). The Montreal Cognitive Assessment (MoCA) test is used to detect Mild Cognitive Impairment (MCI) and Alzheimer's disease. It consists of 11 subgroup assessments in total. These subgroups assess attention, memory, visual structural skills, executive functions, language, and orientation. The test is scored between 0 and 30. Although the highest score is 30, scores below 21 indicate cognitive impairment (20). In order to measure the rate of depression in the patients we included in the study, we asked the patients to do the Beck Depression Inventory (BDI) (21). All cognitive and depression tests were administered to all patients by a neurologist to evaluate cognitive functions.

Statistical Analysis

Data were analyzed using IBM SPSS Data Collection Version 6.0 and IBM SPSS Statistics Version 19. Quantitative variables are presented as mean standard deviation. $p < 0.05$ was considered statistically significant. Descriptive statistics are reported as mean ± SD for continuous variables and n (percent frequency) for discrete variables. Differences between groups for continuous variables were assessed by Mann-Whitney test when appropriate.

RESULTS

Forty-nine patients were included in the study. Table 1 shows mean values of our dataset.

In the results of our study, the mean age of our patients was calculated as 74.04 ± 8.4. 26 % of our patients were female . Of the patients included in the study, 3 were under 65 years of age and 46 were over 65 years of age. According to our country's validity questionnaire, cognitive dysfunction is considered in patients with a MoCA test score of 21 and below (22). In our study, 73.4% of our patients had cognitive dysfunction according to this score. 16 of the patients were female and 33 were male. There was no significant relationship between gender and cognitive dysfunction. We administered the Beck Depression Inventory to evaluate depression in our patients. The mean questionnaire score was 9.51 ± 6.52.

In our study, the frequency of depression was found to be 35%. We found the average score to be 6.9 ± 2.13. MEDAS score was found to be greater than 7 in %48.9 of our patients.

Table 1. Descriptive Statistics

	Mean	Std. Deviation	N
AGE	74,04	8,443	49
BDI	9,51	6,529	49
MEDAS	6,90	2,134	49
MoCA	11,55	6,624	49

BDI; Beck Depression Inventory, MEDAS; Mediterranean Diet Adherence Scale, MoCA; Montreal Cognitive Assessment

Table 2. Correlation for MEDAS

		N	Mean	Sum	P value
MoCA	MEDAS <7	26	17,34	433,50	<0,05
	MEDAS >7	24	27,08	791,50	
BDI	MEDAS <7	25	27,38	684,50	<0,05
	MEDAS >7	24	22,52	540,50	
AGE	MEDAS <7	25	27,14	678,50	>0,05
	MEDAS >7	24	22,77	546,50	

BDI; Beck Depression Inventory, MEDAS; Mediterranean Diet Adherence Scale, MoCA; Montreal Cognitive Assessment.

In table 2, we evaluated the relationship between MEDAS results and cognitive tests. In the results of our study, we found that as the patients' adherence to the Mediterranean diet increased, their depression scores also decreased significantly.

The results of our study also support this. When we looked at the relationship between MEDAS results and age, no significant relationship was found in both subgroups.

We analyzed the correlation between adherence to a MEDAS and MoCA test results. As a result, it was found that patients with high adherence to a MEDAS also had significantly higher MoCA test scores. When we analyzed the patients in two subgroups as those with and without mild cognitive impairment (MoCA score < 21), the association of each group with MEDAS was found to be significant (p<0,01).

DISCUSSION

Chronic obstructive pulmonary disease is a respiratory disease in which patients constantly describe shortness of breath and persistent obstruction is detected in pulmonary function tests. Extrapulmonary findings are also common in COPD. Diabetes, hypertension, heart failure and osteoporosis are the most common comorbid conditions in COPD patients, but cognitive dysfunction is also a common comorbidity that complicates compliance with treatment (23).

Hypoxia refers to a condition in which there is a lack of oxygen in the tissues. Hypoxia may occur in COPD patients with impaired lung function and due to emphysema. Thus, patients may present with symptoms such as shortness of breath, fatigue, tachycardia, and bluish discoloration of the lips and skin. In COPD, hypoxemia may occur during exertion and at rest. Hypoxemia occurring at rest indicates that the disease is serious. There is no definite information about how hypoxemia leads to cognitive dysfunction. Although the common finding in most studies is that cognitive functions are affected in stable COPD patients with hypoxemia, some studies show that hypoxemia alone may not be responsible for cognitive dysfunction (24).

Cognitive functions normally deteriorate with aging, but this process develops more rapidly and severely in COPD patients (25). Early diagnosis of cognitive impairment may be effective in preventing the transition to dementia (26). In our study, we aimed to evaluate dietary habits in COPD patients to prevent cognitive dysfunction in the early period.

Cognitive dysfunction is a complex process that may include many findings such as clinical signs of depression (27). Therefore, in our study, we applied the Beck Depression Inventory to our patients to examine the relationship between diet and depression in our patients. We found that the tendency to depression was higher in patients with low MEDAS adherence.

It is known that the oxidative stress process and chronic inflammation have an effect on COPD progression. Antioxidants are molecules that protect the body against free radicals. In the treatment of COPD, bronchodilators and anti-inflammatory drugs are in the first place. Some studies have investigated the potential benefits of antioxidants in the treatment of COPD. It has been determined that antioxidant nutrition will prevent the progression of COPD with its anti-inflammatory effect, and thus many comorbid conditions such as cognitive dysfunction can be prevented in patients (28).

Based on the hypothesis that antioxidation would prevent the progression of COPD, we investigated the effect of this type of diet on the development of cognitive dysfunction in patients. Mediterranean-type diet is one of the most commonly practiced diets with high antioxidant content. Looking at the MEDAS compliance in our country, it was found that the average score was 6.83 ± 3.34 (29). In our study, the mean value was 6.90 ± 2.13. As a result of the tests, we applied to the patients, we found that the relationship between the Mediterranean-type diet and the MoCA test measuring cognitive dysfunction and the BDI assessing depressive status was significant.

In COPD patients, exacerbations progress the

disease. With the development of chronic inflammation and hypoxia in patients, the management of comorbid conditions may also become difficult. The management of the disease enters a vicious circle, as the management of the treatment will become difficult in patients with the deterioration of cognitive functions. Therefore, stable management of the disease is effective in preventing the progression of comorbid conditions. In our study, we thought that in addition to the regular use of medical treatment, antioxidant nutrition may have a positive effect on the process. Patients can prevent the progression of COPD and common comorbidities such as cognitive dysfunction by eating an antioxidant diet together with the Mediterranean type diet, which is the closest to the diet type in our country.

When we reviewed the literature, there were studies investigating the effect of Mediterranean type diet on cognitive functions. In the studies, cognitive functions were found to be more successful in Mediterranean type nutritionists. However, we could not find any similar studies in the literature examining the effect of nutrition on cognitive functions in COPD patients. Therefore, we think that it will be guiding for future studies. As in many studies, there are deficiencies in our study. The missing aspect of our study is the small number of patients.

CONCLUSION

As a result, we determined that the Mediterranean type diet, which is an antioxidant diet, is effective on cognitive dysfunction in COPD patients. Antioxidant nutrition may prevent the progression of many pathologies in COPD patients in the long term, but although antioxidants show promise, they cannot be recommended as a substitute for standard COPD treatments prescribed by healthcare professionals. Further studies are needed to investigate this relationship in COPD patients.

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