The Relationship Between Cognitive Functions and Pain Intensity in Patients with Fibromyalgia

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ABSTRACT

Objective: This study aimed to determine the cognitive functions in patients with fibromyalgia and healthy control group and compare the relationship of cognitive dysfunction with pain severity.

Methods: This study evaluated the cognitive functions and pain severity of 93 patients and 93 healthy controls who were diagnosed with fibromyalgia in the physical medicine and rehabilitation clinic and referred to our outpatient psychiatry clinic for consultation. Sociodemographic data form, Montreal Cognitive Assessment (MOCA) scale for cognitive functions, Mini-Mental test, Hamilton Depression scale, and visual analogue scale (VAS) for pain severity were applied to the patients. Consent was obtained from the patient and the control groups.

Results: The total points of MOCA, attention, visuospatial, naming, language, abstraction, orientation, and delayed memory subscores of the fibromyalgia group were significantly lower than the healthy control group. This result revealed a significant level of mild deterioration in cognitive functions in the fibromyalgia group (p<0.005). Additionally, the VAS pain score was significantly higher in patients with fibromyalgia having cognitive impairment (p<0.005).

Conclusion: Pain and psychiatric symptoms are quite frequently seen in patients with fibromyalgia; however, they are accompanied by cognitive dysfunction. Dysfunction in attention, visualization, naming, language, abstraction, orientation, and delayed memory increase the severity of pain. Therefore, we think that it will also affect the functionality in the future. Additionally, cognitive dysfunction identification and cognitive-behavioral treatments should be added to the current fibromyalgia treatment.

Keywords: Cognitive functions, fibromyalgia, attention, pain intensity

ÖZ

Amaç: Amacımız fibromiyaljişi olan hastalarda ve sağlıklı kontrol grubunda bilişsel fonksiyonları tanımlamak ve bilişsel fonksiyonlardaki bozukluğun ağrı şiddetide ile olan iliskisini incelектir.

Gereç ve Yöntem: Fizik tedavi kliniğinde fibromiyalji tanısı konularak konsültasyon amaci ile ayaktan psikiyatri poliklinigimize gönderilen toplam 93 hasta ve 93 sağlıklı kontrol hastasının bilişsel fonksiyonları ve ağrı şiddetleri değerlendirildi. Bu amaçla hastalara sosyodemografik veri formu kognitif fonksiyonlar için Montreal Kognitif Değerlendirme (MOBİD) ölçüsü, Mini-Mental test, Hamilton Depresyon ölçüsü ve ağrı şiddetini için vizüel analog skala (VAS) uygulanmıştır. Hasta ve kontrol grubundan onam alınmıştır.

Bulgular: Fibromiyaljişi grubunun MOBİD toplam, dikkat,vizyospasiyal, adlandırmına, diller, soytulumaya, orentasyon ve geçkemeli hafıza skorları sağlıklı kontrol grubuna göre anlamli düzeyde daha düşük bulunmuştur. Bu sonuç fibromiyaljişi grubunda anlamli düzeyde kognitif fonksiyonlar hafif bozulma olduğunu göstermiştir (p<0,005). Ayrıca kognitif bozulukRAPıtan fibromiyaljişi hastalardında VAS ağrı skorunda anlamli oranda yüksek bulunmuştur (p<0,005).

Sonuç: Fibromiyaljişi hastalarda ağrı ve psikiyatrik belirtiler oldukça sık oranda görülülece beraber kognitif bozukluklarda eşlik etmektedir. Dikkat, vizyospasiyal, adlandırmına, diller, soytulumaya, orentasyon ve geçkemeli hafıza anlamındaki bozukluklar ağrı şiddetini artırmaktadır. Sonuç olarak bulunuların neden ve silahızda ekleyicini değiştirireceği düşündüktedir. Bu sepele kognitif bozuklukların belirlenmesi ve bilişsel davranışsal tedaviler fibromiyaljişi guncel tedavisine eklenmelidir.

Anahtar Kelimeler: Kognitif bozuluk, fibromiyaljişi, dikkat, ağrı yoğunluğu

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INTRODUCTION

Fibromyalgia syndrome is a chronic disease that is accompanied by many psychiatric symptoms, such as sleep disorder, cognitive dysfunction, and depression, as well as severe pain and fatigue (1). The population prevalence of fibromyalgia ranges from 2% to 8%, and the prevalence increases with increasing age. Studies revealed that female gender, socioeconomic status, and low educational level increase the risk of disease (2). It is common in women aged 40-60 years. Its etiology and pathogenesis are still unknown but are thought to be multifactorial. Neural activity changes in the central nervous system, abnormality of metabolism in some biogenic amines, and immunological events may lead to disease development. Fibromyalgia syndrome complaints are mostly subjective. Distinguishing the disease from psychosomatic diseases is difficult (3).

Fibromyalgia is defined as a disease, in which chronic widespread muscle pains that cannot be explained by another disease are accompanied by fatigue, sleep disturbance, and various somatic symptoms. Psychiatric disorders that occur in patients with fibromyalgia are among the factors that seriously affect the quality of life of the person. These patients have a high rate of lifelong psychiatric disorders and psychiatric disorders even before the disease onset (4). Psychiatric disorders often accompany fibromyalgia. The most common accompanying psychiatric disorder is depression, which is seen in approximately 20-80% of patients with fibromyalgia. This is followed by psychiatric disorders, such as anxiety, somatization, and obsessive-compulsive (4).

Two factors are considered in the development of high rates of depression in patients with fibromyalgia. Common genetic predispositions and triggering factors increase the risk of depression (5). Studies of patients with depression level and pain severity reported not only the common pathophysiological processes between pain and depression but also the low pain threshold, which is shaped by structure deformation, such as the amygdala and hippocampus, is important (6). Factors that increase the pain of people should be considered to understand the nature of depression that occurs in patients with fibromyalgia. One of them is cognitive processes. According to the latest obtained data, as the level of pain perceived by the person increases, the level of depression also increases. Based on this connection, the reason for intense negative orientation towards painful stimuli is cognitive distortions defined as catastrophizing (6).

In recent years, especially in developed countries, fibromyalgia has emerged as a serious functionality problem by reducing the workforce and quality of life. Cognitive dysfunction seen in fibromyalgia is now considered a separate clinical condition. Thus, cognitive dysfunctions can cause depression, anxiety, sleep disorders, and an increased pain level. Previous studies revealed an inverse relationship between obesity and cognitive dysfunction (7).

Despite all the obtained information, the treatment of choice for fibromyalgia was not achieved. Cognitive complaints are seen up to 95% in fibromyalgia; however, they are not adequately recognized by clinicians, and patients are left untreated. Subjective cognitive complaints are quite high in fibromyalgia patients, but the number of studies that use objective tests is very few. Therefore, this study aimed to examine the cognitive functions and the relationship between these functions and pain intensity in patients with fibromyalgia.

METHODS

This study evaluated the cognitive functions and pain severity of 93 patients and 93 healthy control who were diagnosed with fibromyalgia in the physical therapy clinic and referred to our outpatient psychiatry clinic for consultation. Sociodemographic data form, Montreal Cognitive Assessment (MOCA) scale for cognitive functions, Mini-Mental test (MMT), Hamilton Depression scale (HAM-D), and visual analogue scale (VAS) for pain severity were applied to patients and healthy control group. Consent was obtained from the patient and the control groups. Approval was obtained from the Clinical Research Ethics Committee of University of Health Sciences Turkey, Istanbul Training and Research Hospital for our study (decision no: 2936, date: 08.10.2021).

The sociodemographic data form included patients’ gender, age, educational status, functionality, marital status, number of children, and duration of a fibromyalgia diagnosis.

VAS was used to measure the pain severity on the scale, which is prepared to convert some values that cannot be numerically measured. Patients are requested to mark the pain severity by showing a line with the words “0 (no pain)” at one end and “10 (severe pain)” at the other end (8).

The MMT is used to detect severe cognitive impairment and monitor treatment responses. The total score is calculated out of 30. The threshold value is accepted as 23/24 (23 and below points of cognitive dysfunction) (9).

The MOCA was developed to distinguish healthy individuals from those with mild cognitive impairment. It consists
of questions that assess attention and concentration, executive functions, memory, language, visuospatial skills, abstract thinking, calculation, and orientation. It can be applied in 10 minutes. The total score is calculated out of 30. The threshold value is 21 (20 and below points of cognitive dysfunction). Turkish validity and reliability study was made by Selekl er et al. (10). The MOCA scale can detect cognitive impairment in milder stages, whereas the MMT is useful in more advanced stages (10).

Statistical Analysis
Statistical analyses were carried out using the Statistical Package for the Social Sciences version 17.0 program. The suitability of variables to the normal distribution was examined with histogram graphs and the Kolmogorov-Smirnov test. Average, standard deviation, and median values were used to present descriptive analyses. Categorical variables were compared with the Pearson Square test. The Mann-Whitney U test was used to evaluate nonparametric groups that did not show normal distribution. Spearman correlation test was used in the analysis of measuring data with each other. P-values of <0.05 were evaluated as statistically significant results.

RESULTS
A total of 186 people participated in the study, including 93 with fibromyalgia and 93 healthy controls. Of the participants, 64 (68.82%) were females and 29 (31.18%) were males; 32 (34.41%) are in primary education, 36 (38.71%) in high school, and 25 at university (26.88%); 58 (62.37%) are single and 8% (8.60%) are widows; 38 (40.86%) are working and 55 (59.14%) are not. The mean age of the participants was 38.33±8.23 years. The mean duration of fibromyalgia diagnosis of the fibromyalgia group is 3.40±1.71 years. No significant difference was found between the control group and the sociodemographic data of the fibromyalgia group (Table 1).

The mean MMT was 26.46±1.57 (median: 27.00) of the fibromyalgia group. According to this result, severe cognitive impairment was not detected in patients with fibromyalgia.

The average HAM-D results in the fibromyalgia group were 5.15±1.02 (median: 5.00), whereas 5.10±0.72 (median: 5.00) in the healthy control group (p=0.201). Thus, depression was not detected in both groups.

The total MOCA, attention, visuospatial, naming, language, abstraction, orientation, and delayed week scores of the control group were significantly higher than the fibromyalgia group. This result showed significant mild cognitive impairment in the fibromyalgia group (p<0.005) (Table 2).

For the cognitive impairment status in the fibromyalgia group, the MOCA scale and VAS scores were compared, which revealed significance (p<0.005). This result revealed that pain score was significantly higher in patients with fibromyalgia with cognitive impairment (Table 3).

DISCUSSION
This study aimed to evaluate the cognitive functions in patients with fibromyalgia without depression and the relationship between pain severity and mild cognitive impairment. Our study used the MOCA scales for cognitive functions, which revealed a statistically significant cognitive impairment compared to the healthy controls. The decreased visuospatial area, attention, naming, language orientation, and delayed memory areas were statistically significant, but the decreased abstraction area was not statistically significant. Pain intensity was also significantly higher in the group with mild cognitive retardation. This result shows that mild cognitive impairment in fibromyalgia causes pain to be felt more severely.

Fibromyalgia syndrome is a long-term syndrome that is characterized by pain, severe fatigue, sleep disturbances, and cognitive and emotional disturbances. The main symptom of fibromyalgia includes chronic and widespread pain accompanied by light sensitivity, as well as secondary complaints, such as decreased concentration and memory (11). Most reported is mild cognitive impairment. Especially in patients with occupations that require high concentration, cognitive impairments are likely to affect their performance. This condition is often included under the terms “cognitive dysfunction” and “fibrofog” in the medical literature and is being diagnosed with increasing frequency (12).

Cognitive problems are frequently encountered in studies that conducted objective tests (conceptual memory, daily attention, and selective attention) in patients with fibromyalgia. These patients experience serious memory problems in complex and demanding tasks (13). Studies revealed that cognitive impairment is experienced by 95% of patients with fibromyalgia (14). Further, depression is a disease that causes cognitive impairment. Thus, patients with fibromyalgia with depression were excluded from our study, as well as cognitive impairment due to depression.
Cognitive dysfunction is thought to be associated with an increased intensity of fibromyalgia symptoms, mental health deterioration, and reluctance (15). Making the differential diagnosis of cognitive dysfunction from real brain damage, such as organic origin, is necessary for patients with fibromyalgia. Todd has argued that pain in patients with fibromyalgia may be related to patient phobias. The response to the onset or increased intensity of pain and the weak effort on neuropsychological tasks translates into a concept they call “overthinking and causing pain.” This theory is called

| Table 1. Sociodemographic variables | Fibromyalgia | Controls | p-value |
|------------------------------------|-------------|----------|---------|
|                                    | n         | %        | n      | %        |         |
| Sex                                |            |          |        |          |         |
| Female                             | 64        | (68.82)  | 60     | (66.66)  | 0.250   |
| Male                               | 29        | (31.18)  | 33     | (36.66)  |         |
| Education                          |            |          |        |          |         |
| Primary school                     | 32        | (34.41)  | 34     | (36.56)  | 0.580   |
| High school                        | 36        | (38.71)  | 40     | (43.01)  |         |
| University                         | 25        | (26.88)  | 19     | (20.43)  |         |
| Marital status                     |            |          |        |          |         |
| Married                            | 58        | (62.37)  | 41     | (44.09)  | 0.036   |
| Single                             | 27        | (29.03)  | 43     | (46.24)  |         |
| Divorced                           | 8         | (8.60)   | 9      | (9.68)   |         |
| Occupation                         |            |          |        |          |         |
| Worked                             | 38        | (40.86)  | 46     | (49.46)  | 0.239   |
| No work                            | 55        | (59.14)  | 47     | (50.54)  |         |
| Age                                | 38.33±8.23|          | 40.33±8.43|         |         |
| Ki-kare test                       | -         |          | -      |          |         |

| Table 2. MOCA scores in the fibromyalgia and control groups | Fibromyalgia | Controls | p-value |
|-------------------------------------------------------------|-------------|----------|---------|
|                                                             | Average    | SD       | Median  | Average | SD      | Median  |         |
| MOCA total                                                  | 19.45      | ±1.91    | 19.00   | 27.08   | ±2.14   | 27.00   | <0.001  |
| Attention                                                   | 3.84       | ±1.35    | 4.00    | 5.37    | ±0.67   | 5.00    | <0.001  |
| Visuospatial                                                | 4.18       | ±0.61    | 4.00    | 4.82    | ±0.44   | 5.00    | <0.001  |
| Naming                                                      | 1.86       | ±0.62    | 2.00    | 2.65    | ±0.50   | 3.00    | <0.001  |
| Language                                                    | 1.73       | ±0.51    | 2.00    | 2.52    | ±0.54   | 3.00    | <0.001  |
| Abstrational                                                | 1.26       | ±0.44    | 1.00    | 1.45    | ±0.50   | 1.00    | 0.006   |
| Orientation                                                 | 3.38       | ±1.20    | 4.00    | 5.45    | ±0.76   | 6.00    | <0.001  |
| Delayed recall                                              | 3.06       | ±1.25    | 3.00    | 4.81    | ±0.40   | 5.00    | <0.001  |
| Mann-Whitney U test                                         | -          | -        | -       | -       | -       | -       |         |

SD: Standard deviation, MOCA: Montreal Cognitive Assessment

| Table 3. The relationship between cognitive dysfunctions and pain scales | Cognitive dysfunctions (MOCA scores 20 and below points) | p-value |
|------------------------------------------------------------------------|---------------------------------------------------------|---------|
| Fibromyalgia groups                                                   | No | Yes | No | Yes | No | Yes |         |
| VAS scale                                                             | 4.04| ±0.81| 4.00| 9.78| ±0.94| 9.00| <0.001  |
| Mann-Whitney U test                                                   | -  | -   | -  | -   | -  | -   |         |

SD: Standard deviation, MOCA: Montreal Cognitive Assessment, VAS: Visual analogue scale
“kinesophobia,” this results in patients with pain being overly anxious about re-experiencing or exacerbating the pain and avoiding physical activities. Thus, the concept of cognitive phobia has received little attention but is a topic that will take place in future studies, which more likely supports this hypothesis (16,17).

CONCLUSION

Fibromyalgia is one of the most important health problems in developed countries, especially in recent years, which causes serious loss of workforce and a decreased quality of life. In these patients, difficulty in performing daily activities, widespread musculoskeletal pain, stiffness, and other symptoms, such as fatigue, sleep disorders, cognitive dysfunction, and mood disorders, are frequently encountered. Cognitive complaints are seen in functions, such as tasks that require attention, short-term memory, and decision-making functions, which are often neglected by clinicians. Standardized tests are insufficient to diagnose the cognitive dysfunction and determine the treatment strategy, thus most patients remain untreated.

Our study recommends including cognitive-behavioral treatments in addition to pharmacological treatment. The concept of kinesophobia will take place more in future studies. There, the functionality of patients will increase due to a multidisciplinary approach.

ETHICS

Ethics Committee Approval: Approval was obtained from the Clinical Research Ethics Committee of University of Health Sciences Turkey, Istanbul Training and Research Hospital for our study (decision no: 2936, date: 08.10.2021).

Informed Consent: Consent was obtained from the patient and the control groups.

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