



The Relationship Between Functional Status, Fatigue, and Insomnia in Patients with Fibromyalgia

Fibromiyalji Görülen Hastalarda Fonksiyonel Durum, Yorgunluk ve Uykusuzluk Arasındaki İlişki

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ABSTRACT

Objective: The aim of our study is to investigate the relationship between functional status, fatigue and insomnia in patients with fibromyalgia syndrome (FMS). **Methods:** Demographic data, marital status, educational status, smoking, presence of additional disease and exercise habits of the patients participating in the study were collected. Fibromyalgia functional status was assessed with the Fibromyalgia Impact Questionnaire, fatigue assessment with the 'Functional Assessment of Chronic Disease Treatment-Fatigue', and insomnia with the "Insomnia Severity Index". **Results:** The study was completed with a total of 64 patients (age=45.06±12.98 years, body mass index=26.84±4.67kg/m²). 76.6% (n=49) of the patients were women. The mean functional status score of the patients was 58.36±6.81, the mean fatigue score was 26.07±5.70, and the mean insomnia score was 12.64±3.59. Insomnia scores of female patients were significantly higher than those of males (p=0.016). The insomnia score of those with a body mass index (BMI) above normal (≥25) was also significantly higher than those within the normal range (p=0.007). No correlation was found between the functional status of FMS patients and fatigue and insomnia (p>0.05). **Conclusion:** The majority of FMS patients is at the lower threshold of insomnia and their functions are mildly adversely affected. The effect of insomnia in women is greater than in men, especially with an increased BMI identified as one of the predisposing factors for insomnia.

Keywords: Fatigue, Fibromyalgia, Insomnia

ÖZET

Amaç: Çalışmamızın amacı fibromiyalji sendromu (FMS) görülen hastalarda fonksiyonel durum, yorgunluk ve uykusuzluk arasındaki ilişkiyi araştırmaktır. **Gereç ve Yöntem:** Çalışmaya katılan hastaların demografik verileri, medeni durumu, eğitim durumu, sigara kullanımı, ek hastalık varlığı ve egzersiz alışkanlığı sorgulandı. Fibromiyalji fonksiyonel durumu, Fibromiyalji Etki Anketi ile; yorgunluk değerlendirmesi 'Kronik Hastalık Tedavisinin Fonksiyonel Değerlendirmesi-Yorgunluk' ile; uykusuzluk Uykusuzluk Şiddeti İndeksi ile değerlendirildi. **Bulgular:** Çalışma toplam 64 hasta (yaş=45,06±12,98 yıl, vücut kitle indeksi: 26,84±4,67kg/m²) ile tamamlandı. Hastaların %76,6'sı (n=49) kadın idi. Hastaların fonksiyonel durum skoru ortalaması 58,36±6,81, yorgunluk skoru ortalaması 26,07±5,70, uykusuzluk skoru ortalaması ise 12,64±3,59 olarak hesaplandı. Kadın hastaların uykusuzluk skoru erkeklerinkine göre anlamlı derecede yüksekti (p=0,016). Vücut kitle indeksi (VKİ) normalin üstünde (≥25) olanların uykusuzluk skoru, normal sınırlarda olanlara göre anlamlı derecede yüksekti (p=0,007). FMS hastalarının fonksiyonel durumları ile yorgunluk ve uykusuzluk arasında herhangi bir ilişki saptanamadı (p>0,05). **Sonuç:** FMS hastalarının büyük çoğunluğu uykusuzluk alt eşikindedir ve fonksiyonları hafif şiddette olumsuz yönde etkilenmiştir. Kadınlardaki uykusuzluk etkilenimi erkeklerden fazla olup, özellikle artmış VKİ uykusuzluğun predispozanlarından biri olarak saptanmıştır.

Anahtar Kelimeler: Fibromiyalji, Uykusuzluk, Yorgunluk

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INTRODUCTION

Fibromyalgia syndrome (FMS) is a long-lasting pain disorder impacting approximately 6.6% of the general population, characterized by persistent discomfort affecting physical, emotional, and social well-being, despite the absence of detectable tissue damage (Gostine et al., 2018). The International Statistical Classification of Diseases and Related Health Problems (ICD) codes, specifically in ICD-11, categorize chronic pain as a foundational code, with chronic primary pain being a subset that can manifest in various bodily locations independently of identifiable biological or psychological causes (Nicholas et al., 2019). Understanding, diagnosing, and treating chronic pain conditions, particularly those lacking clear evidence of tissue damage, pose significant challenges. Limited comprehension of the underlying mechanisms has resulted in the classification of FMS as a central sensitization syndrome and more recently as a nosioplasic condition (Cohen, 2022).

The primary symptom of FMS is pain, characterized by sensations such as burning, throbbing, and tingling felt across the body. Alongside pain, individuals may experience morning stiffness, profound fatigue, heightened sensitivity to pain (hyperalgesia) and/or pain from non-painful stimuli (allodynia), tender areas, gastrointestinal and urogynecologic issues, mood disturbances like anxiety or depression, reduced quality of life and daily functioning, and sleep disturbances (Demiray and Alpözgen, 2022). There exists a correlation between sleep disturbances and musculoskeletal pain among those with FMS. In individuals with FMS, contrary to the expected decrease in electrical brain activity during non-REM sleep, research indicates a persistent high level of activity, resulting in a sleep disorder termed alpha delta sleep anomaly. This condition contributes to insomnia among FMS patients, which in turn exacerbates symptoms such as pain, fatigue, and psychological distress. Furthermore, insomnia can lead to reduced physical activity, limitations in daily tasks, diminished physical capabilities, and difficulties in social adaptation (Yılbaş and Turgay, 2022; Roizenblatt et al., 2011).

While existing research has primarily examined the connection between pain and FMSa, there's a gap regarding the correlation between various symptoms. Our objective in this study was to explore how functional status, fatigue, and insomnia interrelate among individuals diagnosed with FMS. Our hypothesis is; in patients with FMS, functional status impairment is positively associated with increased levels of fatigue and insomnia.

METHODS

Participants

It took place at the same hospital over the period of June to December 2023, adhering to the principles outlined in the Declaration of Helsinki. Prior to the study, approval was obtained from the Health Sciences University Diyarbakır Gazi Yaşargil Training and Research Hospital (number: 86, date: 06.05.2022), and the individuals were informed as necessary. Prior to the commencement of the study, all participants received detailed information about the research aims, and their consent was obtained. Eighty patients diagnosed with fibromyalgia were initially approached for interviews. However, six individuals who had undergone upper extremity surgery within the past two years, as well as ten patients using sleeping pills or antidepressants, were excluded from the study. Ultimately, data collection involved 64 FMS patients who met the inclusion criteria: being diagnosed by a specialist physician according to the American League Against Rheumatism 2019 classification criteria, aged 18 or above, willing to

participate, free from recent upper extremity surgeries, devoid of systemic diseases such as heart, liver, or kidney conditions that could contribute to fatigue, and not currently using sleeping pills or antidepressants.

The exclusion criteria encompassed individuals who did not volunteer for participation, those with mental cognitive impairments, individuals with musculoskeletal disorders apart from fibromyalgia, users of sleeping pills or antidepressants, and those who had undergone upper extremity surgery within the previous six months, those who have other chronic pain syndromes or rheumatological diseases other than fibromyalgia, Those who are pregnant or breastfeeding, Those who have recently participated in another physiotherapy or exercise program (last 3 months). Following the study, a power analysis conducted using the G*power 3.1 program revealed a study power ($1-\beta$) of 95%, with a 95% confidence level, a margin of error of 5%, and an effect size (ρ) of 0.577.

Data Collection Tools

Various demographic details such as age, height, weight, body mass index (BMI), and gender were documented. Additionally, participants were asked about their marital status, level of education, smoking habits, presence of any concurrent medical conditions, and exercise routines. To evaluate fibromyalgia functional status, the Fibromyalgia Impact Questionnaire was employed, while fatigue levels were assessed using the 'Functional assessment of chronic disease treatment - fatigue' tool. Insomnia severity was measured utilizing the Insomnia Severity Index.

The Fibromyalgia Impact Questionnaire was developed by Burchardt et al. to assess the functional status of fibromyalgia patients and was validated in Turkish by Sarmer et al. (Bennett, 2005; Sarmer et al., 2000). The scale assesses 10 characteristics including inability to go to work, difficulty at work, fatigue, pain, stiffness, morning fatigue, feeling well, anxiety, depression and physical function. The maximum score for each item is 10 and a maximum of 100 points can be obtained from the questionnaire. High scores indicate poor functional status. An average FMS patient scores 50, while more severely affected patients score above 70. In our study, a score between 50-70 points was considered "mild" and a score above 70 points was considered "severe" functional impairment.

Fatigue assessment was performed with the Functional Assessment of Chronic Disease Treatment - Fatigue Questionnaire (Tennant, 2015). The Turkish validity and reliability of the questionnaire was performed by Çınar and Yava (Cinar and Yava, 2018). The questionnaire, which consists of 13 questions, evaluates the level of fatigue in physical activities performed in the last 7 days. A minimum score of 0 and a maximum score of 52 can be obtained from the questionnaire. Higher scores indicate less fatigue. In our study, 26 points and below, which is the mean value of the scale, was considered as "very" fatigued and above 26 points was considered as "slightly" fatigued.

Insomnia was assessed with the Insomnia Severity Index. (Bastien et al., 2001). The questionnaire consists of 17 questions. A maximum score of 28 points is obtained from the questionnaire. A score between 0 and 7 indicates insignificant insomnia, between 8 and 14 indicates insomnia subthreshold, between 15 and 21 indicates moderate insomnia, and between 22 and 28 indicates severe insomnia. The questionnaire has Turkish validity (Boysan et al., 2010).

Statistical Analysis

Statistical analysis IBM SPSS Statistics24.0 (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version24.0. Armonk, NY: IBM Corp.) package program was used. Frequency tables and descriptive statistics were used to interpret the findings. The conformity of the variables to normal distribution was examined by visual (histogram and probability plots) and analytical (Shapiro-Wilk test) methods. Descriptive statistics were expressed as mean±standard deviation for normally distributed numerical data, median (minimum-maximum) for non-normally distributed numerical data and frequency (%) for categorical data. Mann Whitney u test, t-test and analysis of variance (ANOVA) were used to compare group means. Pearson and Spearman correlation tests were used to analyze whether the data were normally distributed or not. The p significance value in all statistics was accepted as $p < 0.05$.

RESULTS

The study was completed with a total of 64 patients (age=45.06±12.98 years, BMI: 26.84±4.67kg/m²). 23.4% (n=15) were male and 76.6% (n=49) were female (Table 1).

Table 1. Demographic Information of the Patients

	X±SD	Median (min-max)
Age (year)	45.06±12.98	49 (20-65)
Height (cm)	163.87±7.06	163(154-189)
Weight (kg)	71.81±11.31	70.75(50-105)
BMI (kg/m²)	26.84±4.67	26.57(18.48-39.04)
Parameters		n (%)
Gender	Male	15 (%23.4)
	Woman	49 (%76.6)
Marital Status	Single	8(12.5)
	Married	56(87.5)
Education Status	Illiterate	1 (%1.6)
	Primary education	36 (%56.3)
	High School	14 (%21.9)
	University	13 (%20.3)
Employment Status	Employee	26 (%40.6)
	Not working	38 (%59.4)
Cigarette	Dropped out	6 (%9.4)
	Yes	13 (%20.3)
	No.	45 (%70.3)
Diseases	Diabetes	3 (%4.7)
	Hypertension	11 (%17.2)
	Cardiovascular Disease	3 (%4.7)
	Thyroid	10 (%15.6)
	No	37 (%57.9)
Exercise Habits	Yes	14 (%21.9)
	No	50 (%78.1)

cm: centimeter, kg: kilogram, m: meter, X: mean, SD: Standard Deviation, n: number of participants, min: minimum, max: maximum, %: percentage

The mean functional status score was 58.36±6.81, the mean fatigue score was 26.07±5.70, and the mean insomnia score was 12.64±3.59 (Table 2).

Table 2. Functional Status, Fatigue, Insomnia Values of the Patients

	X±SD	Median (min-max)	n	%
Functional Status	58.36±6.81	58.32 (46.01-70.41)		
Light			63	98.4
Severe			1	1.6
Fatigue	26.07±5.70	26 (13-39)		
Very much			46	71.9
Less			18	28.1
Insomnia	12.64±3.59	12.63 (4-19)		
Unimportant			6	9.4
Insomnia lower threshold			39	60.9
Moderate insomnia			19	29.7

X: mean, SD: Standard Deviation, n: number of participants, min: minimum, max: maximum, %: percentage

Insomnia scores of female patients were significantly higher than those of male patients ($p=0.016$). Again, the insomnia score of those with a $BMI \geq 25$ was significantly higher than those with a $BMI < 25$ ($p=0.007$). No significant difference was found in other parameters ($p > 0.05$) (Table 3).

Table 3. Comparison of Functional Status, Fatigue and Insomnia Scores According to Demographic and Clinical Characteristics of Patients

		Fatigue		Functional Status		Insomnia	
		X±SD	z/t/F;p	X±SD	z/t/F;p	X±SD	z/t/F;p
Gender	Male (n=15)	26.33±7.00	-0.497; 0.619	61.01±7.38	-1.958; 0.050	10.80±3.3	- 2.415; 0.016
	Female (n=49)	26±5.32		57.55±6.49		13.20±3.5	
Education Status	Primary education (n=36)	26.69±5.09		58.79±7.24		12.33±3.8	
	High school (n=14)	26.07±6.66	0.605; 0.895	60.23±5.86	6.606; 0.093	13.14±2.7	1.920; 0.589
	Illiterate (n=1)	26		67.31		17	
	University (n=13)	24.38±6.52		54.48±5.09		12.61±3.7	
Marital status	Single (n=8)	27.12±3.04	0.708; 0.479	55.63±6.66	-1.239; 0.215	11.12±3.7	- 1.276; 0.202
	Married (n=56)	25.92±5.99		58.75±6.80		12.85±3.5	
Diseases	Diabetes (n=3)	25.66±2.51		59.59±11.6		12.33±5.0	
	Hypertension (n=11)	29.27±6.85		55.65±6.73		13.54±2.6	
	Cardiovascular Disease (n=3)	26.66±7.37	1.977; 0.740	58.44±6.95	2.231; 0.693	15.33±2.3	3.650; 0.455
	Thyroid (n=10)	26±3.46		59.64±8.36		11.5±4.85	
	None (n=37)	25.13±5.77		58.72±6.16		12.48±3.4	

Table 3 (Continued). Comparison of Functional Status, Fatigue and Insomnia Scores According to Demographic and Clinical Characteristics of Patients

		Fatigue		Functional Status		Insomnia	
		X±SD	z/t/F;p	X±SD	z/t/F;p	X±SD	z/t/F;p
Exercise Habits	Yes (n=14)	25±7.60	-0.952; 0.341	55.11±6.50	-1.893; 0.058	12.57±3.8	- 0.123; 0.902
	No (n=50)	26.38±5.10		59.28±6.68		12.66±3.5 7	
Employment Status	Employee (n=26)	25±6.03	-0.905; 0.365	57.44±7.21	-0.800; 0.424	12.46±3.8	- 0.488; 0.625
	Not working (n=38)	26.81±5.42		58.99±6.55		12.76±3.4 5	
Age Range	20-34 (n=20)	24.95±6.61	1.002; 0.606	56.8±5.84	2.328; 0.312	11.8±3.15	2.058; 0.357
	35-49(n=14)	26.71±4.68		60.71±7.43		12.64±3.1 2	
	50-65(n=30)	26.06±4.57		58.31±7.02		13.2±4.04	
BMI(kg/m²)	<25(n=28)	26.32±6.32	-0.323; 0.746	57.97±6.68	-0.345; 0.730	11.25±3.3	- 2.675; 0.007
	≥25(n=36)	25.50±4.34		58.67±7		13.72±3.4 6	

X: mean, SD: Standard Deviation, n: number of participants, min: minimum, max: maximum, BMI: Body Mass Index, kg: kilogram, m: meter, z: Mann Whitney U Test, t: t Test, F: analysis of variance (ANOVA), p<0.05

No correlation was found between the functional status of the patients and fatigue and insomnia (p>0.05) (Table 4).

Table 4. The Relationship Between Patients' Functional Status and Fatigue and Insomnia

		Fatigue	Insomnia
Functional Status	r	0.027	0.188
	p	0.834	0.138

r: correlation coefficient, p<0.05

DISCUSSION and CONCLUSION

Our study findings reveal that a significant portion of FMSia patients seen in the clinic experience insomnia at a subthreshold level, with mild impairment in functioning. Fatigue emerges as a notable symptom affecting over 70% of patients irrespective of gender. Interestingly, FMS appears to have a greater impact on functional status among men compared to women, whereas sleep disturbances are more prevalent among women. Additionally, BMI emerges as a significant factor contributing to sleep issues, particularly impacting patients with a BMI exceeding 25.

Fatigue is the body's natural response to physical and mental strain, typically not hindering daily activities. While in healthy individuals fatigue often diminishes with rest, for FMS patients, it persists despite rest and can impact daily functioning, particularly later in the day (Alvarez et al., 2022). Our study confirmed that fatigue is a significant factor in both male and female FMS patients. Given the association between FMS and sleep disturbances, it's unsurprising that patients experience fatigue following restless nights. Previous research has

linked shorter sleep duration and difficulty falling asleep to higher body mass index in FMS patients (Okifuji et al., 2009). Similarly, Migliorini et al. noted that a higher body mass index is an adverse prognostic factor in FMS patients (Migliorini et al., 2021).

Fibromyalgia sufferers often report disrupted sleep patterns characterized by reduced depth and increased awakenings attributed to disturbances in alpha-delta waves during sleep cycles. Compared to those without the condition, REM sleep is irregular and less restorative in FMS patients. Their sleep cycles exhibit significant abnormalities (Branco et al., 1994). Bigatti et al. demonstrated, through a one-year follow-up study, that the heightened prevalence of sleep issues among FMS patients plays a crucial role in worsening their symptoms. They argue that these sleep disturbances serve as triggers for pain and contribute to physical dysfunction (Bigatti et al., 2008). When FMS patients manage to sleep, albeit infrequently, they observe a notable reduction in pain and fatigue the following day. Moldofsky's research findings indicate an increase in sympathetic activity during the night, contrary to the normal decrease observed during sleep, as revealed in electrocardiographic analyses of FMS patients (Moldofsky, 2002). Our study results are in line with existing literature; patients experienced moderate to mild symptoms of sleep disturbance, yet this did not significantly impair their function.

Women with FMS exhibit lower functional capacity for daily activities compared to women of similar age in the general population. Additional symptoms and conditions associated with FMS further contribute to functional limitations (Jones et al., 2008). Rutledge and colleagues discovered a significant positive impact of male gender on physical function and activities among FMS patients, with males being nearly five times more active than females (Rutledge et al., 2007). However, existing literature presents inconsistent findings regarding the influence of gender on FMS. In contrast to previous studies, our research revealed higher functional levels among females. Several factors may contribute to this difference, including exercise habits, occupational disparities, age, presence of chronic illnesses, and societal expectations.

Limitations

All voluntary participants diagnosed during the study period were included in the study without any gender discrimination in the inclusion criteria. Since the number of women who applied to the clinic during this period was higher than the number of men, homogeneity could not be ensured.

Fibromyalgia impacts individuals' functional status, with men experiencing greater effects than women. Fatigue emerges as a significant factor, influencing all patients regardless of gender. A considerable portion of patients grapple with insomnia, particularly prevalent among women, with increased BMI identified as a predisposing factor. Those with FMS have the opportunity to transition from sedentary lifestyles to embracing activities conducive to daily functionality. They can enhance these lifestyles through regular exercise, incorporating physical activity, taking frequent rest breaks throughout the day, and improving sleep quality.

Conflict of Interest Statement

There is no conflict of interest among the authors.

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Author Contributions

Research Idea/Concept: MA, EDD, EC, CŞP

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Supervision/Consultancy: MA, EDD, EC, CŞP

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