RESEARCH ARTICLE

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Sleep quality in fibromyalgia patients and its association with disease severity, pain, depression and fatigue

Fibromiyalji hastalarında uyku kalitesi ve hastalık şiddeti, ağrı, depresyon ve yorgunlukla ilişkisi

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ABSTRACT

Introduction: In this cross-sectional study, we aimed to investigate sleep quality in the patients with fibromyalgia (FM), to determine the association of sleep disorders with disease severity, tender point count, severity of pain, fatigue and depression and as well as to assess the impact of poor sleep quality on quality of life.

Materials and Methods: A total of 100 FM patients and 70 age and sex-matched healthy controls were included in the study. Sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI). Fibromyalgia Impact Questionnaire (FIQ) was used for determining disease severity. Quality of life was evaluated by using Nottingham Health Profile (NHP) and severity of pain by Visual Analog Scale (VAS).

Results: FM patients scored significantly higher in all subgroups of PSQI when compared with the controls ($p< 0.01$). PSQI was correlated with FIQ, tender point count, VAS, and pain and sleep subgroups of NHP ($p< 0.05$). Emotional reaction subgroup of NHP was correlated with all PSQI subgroups except sleep latency and use of sleep medicine ($p< 0.01$). No statistically significant correlation was foundbetween PSQI and social isolation, energy and physical mobility subgroups of NHP ($p> 0.05$). FSS was correlated with sleep disturbance subgroup of PSQI ($p< 0.05$). BDS scores were correlated with sleep disturbance and global scores of PSQI ($p< 0.05$).

Conclusion: FM patients have poor sleep quality when compared to healthy controls. Sleep quality is associated with disease severity, pain, depression and fatigue and it has a negative impact on quality of life in FM patients.

Keywords: *Fatigue, fibromyalgia, sleep disorders, pain*

ÖZ

Giriş: Bu kesitsel çalışmada, fibromiyalji (FM) hastalarında uyku kalitesini araştırmayı, uyku bozukluğunun hastalık şiddeti, hassas nokta sayısı, ağrı şiddeti, yorgunluk ve depresyon ile ilişkisini saptamak ve bunun yanında kötü uyku kalitesinin yaşam kalitesi üzerine etkisini değerlendirmeyi amaçladık.

Materyal ve Metod: Çalışmaya toplam 100 FM hastası ve 70 yaş ve cinsiyet uyumlu kontrol dahil edildi. Uyku kalitesi Pittsburgh Uyku Kalitesi İndeksi (Pittsburgh Sleep Quality Index-PSQI) ile değerlendirildi. Fibromiyalji Etki Ölçeği (Fibromyal gia Impact Questionnaire-FIQ) hastalık şiddetini saptamada kullanıldı. Yaşam kalitesi Nottingham Sağlık Profili (Nottingham Health Profile-NHP) ile ve ağrı şiddeti ise Görsel Analog Skala [Visual Analog Scale (VAS)] ile değerlendirildi.

Bulgular: FM hastaları kontrollerle karşılaştırıldıklarında PSQI tüm alt gruplarında yüksek skorlama gösterdiler ($p< 0.01$). PSQI; FIQ, hassas nokta sayısı, VAS ve NHP ağrı ve uyku alt grupları ile koreleydi ($p< 0.05$). NHP emosyonel reaksiyon alt grubu, uyku latansı ve uyku ilacı kullanımı alt grupları dışında tüm PSQI alt grupları ile koreleydi ($p< 0.01$). PSQI ile NHP sosyal izolasyon, enerji ve fiziksel mobilite alt grupları arasında istatistiksel olarak anlamlı korelasyon bulunmadı ($p> 0.05$). Fatigue Severity Scale (FSS), PSQI uyku bozukluğu alt grubu ile koreleydi ($p< 0.05$). BDS skorları, PSQI uyku bozukluğu ve global skorları ile koreleydi ($p< 0.05$).

Sonuç: FM hastalarında sağlıklı kontrollerle kıyaslandığında kötü uyku kalitesi mevcuttur. Uyku kalitesi hastalık şiddeti, ağrı, depresyon ve yorgunluk ile ilişkilidir ve FM hastalarında yaşam kalitesi üzerinde negatif etkisi vardır.

Anahtar Kelimeler: *Yorgunluk, fibromiyalji, uyku bozuklukları, ağrı*

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INTRODUCTION

Fibromyalgia (FM) is a common disorder characterized by widespread pain, fatigue, sleep disturbance, increased pain to pressure and mood disorders (1). It is also associated with decreased pain threshold and frequent additional comorbidities like sleep disturbances, low back pain, recurrent headaches, muscle spasms, arthralgia, restless leg, tingling, balance disorders, irritable bowel syndrome, bladder problems and skin rashes (2-4).

The pathogenesis of FM is not well understood. It has been hypothesized as an altered processing of pain arising from neuroendocrine, neurotransmitter and sleep physiology disturbances (5,6). Polysomnographic studies have demonstrated that FM patients have diminished slow-wave sleep and alpha waves throughout non-rapid eye movement (7).

Impaired sleep quality is a common problem in the patients with FM (7,8). Prior studies have reported difficulty in falling a sleep, night-time awakenings, waking up too early in the mornings, and tiredness in the mornings despite sleeping during the night among the patients with FM (7,9). Also it has been reported that poor sleep quality has a detrimental effect on quality of life (QoL) in FM patients (10).

The main objectives of this cross-sectional study were i) to assess sleep quality in the patients with FM; ii) to determine the association of sleep disorders with disease severity, tender point count (TPC), severity of pain, fatigue and depression; iii) to analyze the impact of poor sleep quality on QoL.

MATERIALS and METHODS

A total of 100 patients with FM aged between 20 and 50 were selected from those who were followed at the outpatient physical medicine and rehabilitation clinics of two hospitals in Turkey. FM was diagnosed based on 1990 American College of Rheumatology (ACR) diagnostic criteria: 1) chronic generalized pain in both sides of the body, both axial and peripheral, below and above the waist; 2) the presence of at least 11 of 18 tender points on digital palpation with a pressure of approximately 4 kg/cm^2 (11). Tender point count (TPC) was measured by the same physician. Control group comprised 70 age and sex-matched healthy subjects. Exclusion criteria for both patient and controls were rheumatic diseases such as rheumatoid arthritis, ankylosing spondylitis and endocrine diseases such as diabetes mellitus, thyroid and parathyroid disorders. Disease severity was determined by using Fibromyalgia Impact Questionnaire (FIQ) (12). QoL was evaluated by using Nottingham Health Profile (NHP) (13). Severity of pain was measured by using 10 cm Visual Analog Scale (VAS)-pain(14).

Assessment of Sleep Quality

Sleep quality was assessed by using Pittsburgh Sleep Quality Index (PSQI). PSQI was developed by Buysse et al. in 1989 to be used in clinical practice and trials for evaluating the sleep quality (15). It was adapted to Turkish population by Agargun et al. in 1996. It consists of sevensubgroups including sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication and daytime dysfunction (16). The total score is obtained by summing these sub scores and ranges between 0 and 21. Scores > 5 indicate poor sleep quality.

The study protocol was approved by the Medical Research Ethics Committee of medical faculty. The study conforms to the provisions of the World Medical Association's Declaration of Helsinki.

Statistical Analyses

Descriptive statistics [mean, median, SD (Standard deviation), minimum, maximum and frequencies] were used for assessing the demographics and clinical parameters. Differences among groups were evaluated by using independent samples T-test. The presence of correlation was determined by Pearson's correlation coefficient. A value of $p< 0.05$ was accepted as statistically significant. All analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) for Windows, Version 21.0 (Armonk, New York, USA).

RESULTS

Demographic and Clinical Characteristics of the Patients

A total of 100 patients (84 women, 16 men) and 70 controls (62 women, 8 men) were included in the study. Mean age was 33.24 ± 7.65 (20-50) in the patient group and 34.21 ± 7.77 (20-50) in the control group. Age did not significantly differ among the groups ($p= 0.41$). Scores of TPC, FIQ, FSS, BDS and subgroups of NHP, and demographics and clinical data are summarized in Table 1.

The Comparison of PSQI Between the Patients and the Control Group

FM patients scored significantly higher in all subgroups of PSQI when compared with the controls ($p< 0.01$) (Table 2).

The Relation of PSQI with Disease Severity, Pain, Depression, Fatigue and Quality of Life

PSQI was found to be correlated with FIQ, TPC, VAS-pain, and pain and sleep subgroups of NHP ($p< 0.05$). Emotional reaction subgroup of NHP was correlated with

Table 1. Demographic and clinical patient data

	Minimum	Maximum	Mean	Standard deviation
Age (years)	20	50	33.24	7.65
VAS-pain	4	10	7.36	1.63
TPC	11.00	18.00	14.31	2.59
FIQ	44.00	100.00	78.00	15.03
FSS	0.00	63.00	36.08	18.77
BDS	7.00	63.00	32.66	19.39
NHP-pain	42.85	100.00	78.42	16.81
NHP-physical mobility	0.00	100.00	15.25	19.35
NHP-energy	0.00	100.00	36.30	40.01
NHP-sleep	40.00	100.00	74.29	15.98
NHP-social isolation	0.00	100.00	8.40	19.31
NHP-emotional reactions	0.00	100.00	71.37	25.01

VAS-pain: Visual Analog Scale-pain, TPC: Tender point count, FIQ: Fibromyalgia Impact Questionnaire, FSS: Fatigue Severity Scale,BDS: Beck Depression Scale, NHP: Nottingham Health Profile.

Table 2. The comparison of sleep quality between the patients and the control group

	FM group (n= 100) mean ± standard deviation	Control group (n= 35) mean ± standard deviation	p value
PSQI-sleep quality	1.44 ± 1.03	0.72 ± 0.11	< 0.00001**
PSQI-sleep latency	1.28 ± 1.14	0.38 ± 0.28	< 0.00001**
PSQI- sleep duration	2.06 ± 1.17	0.37 ± 0.09	< 0.00001**
PSQI-habitual sleep efficiency	1.66 ± 1.20	0.58 ± 0.12	< 0.00001**
PSQI-sleep disturbance	1.58 ± 1.03	0.22 ± 0.06	< 0.00001**
PSQI-use of sleep medication	1.43 ± 1.26	0.28 ± 0.08	< 0.00001**
PSQI-daytime dysfunction	1.69 ± 1.15	0.63 ± 0.35	< 0.00001**
PSQI-global	9.47 ± 3.36	2.57 ± 1.99	< 0.00001**

FM: Fibromyalgia, PSQI: Pittsburgh Sleep Quality Index,
** p< 0.05 (significant),*
*** p< 0.01 (highly significant).*

all PSQI subgroups except sleep latency and use of sleep medicine (p< 0.01). There was no statistically significant correlation between PSQI and social isolation, energy and physical mobility subgroups of NHP (p> 0.05). FSS was correlated with only sleep disturbance subgroup of PSQI (p< 0.05) and BDS with only sleep disturbance and global subgroups of PSQI (p< 0.05).

DISCUSSION

Despite the fact that pain is thought to be the core feature of FM, patients also suffer from other symptoms such as sleep disturbance, fatigue, depression, stiffness and cognitive dysfunctions (17). Sleep disturbance affects approximately 90% of FM patients (8).

In our study, patients with FM scored significantly higher in all PSQI subgroups including sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication and daytime dysfunction. Sleep disorders in FM patients was previously reported in the study of Wagner et al. where sleep disorders were assessed according to sleep disturbance symptoms such as difficulty in falling asleep, staying asleep, waking too early, and insomnia (9). Similarly, in the study conducted in 40 Turkish FM patients, Ulus et al. found poor sleep quality, daytime dysfunction and worse habitual sleep efficiency in FM patients compared to controls (18). On the other hand, in the study of Munguia-Izquierdo et al., all PSQI subscores except sleep duration were higher in Spanish FM patients (19). In the study of Osorio et al. Brazilian patients with FM scored higher in all PSQI domains except use of sleep medicine (20).

Pain, depression and fatigue resulting from FM may cause poor sleep quality in the patients. For this reason, we examined the relation of PSQI with these parameters. We found that poor sleep quality was associated with severity of pain. Our results were in accordance with previous studies in the literature. Ulus et al. reported

Table 3. The relation of PSQI with disease severity, pain, depression, fatigue and quality of life

		PSQI-sleep quality	PSQI-sleep latency	PSQI- sleep duration	PSQI-habitual sleep efficiency	PSQI-sleep disturbance	PSQI-use of sleep medication	PSQI-daytime dysfunction	PSQI-total
VAS-pain	r	0.517**	0.519**	0.713**	0.565**	0.662**	0.536**	0.557**	0.926**
	p	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
FIQ	r	0.449**	0.344**	0.423**	0.437**	0.538**	0.371**	0.447**	0.843**
	p	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
TPC	r	0.278**	0.312**	0.343**	0.373**	0.427**	0.261**	0.351**	0.674**
	p	0.005	0.002	< 0.00001	< 0.00001	< 0.00001	0.009	< 0.00001	< 0.00001
BDS	r	0.187	0.191	0.195	0.171	0.0213*	-0.001	0.140	0.302**
	p	0.063	0.058	0.052	0.063	0.033	0.989	0.165	0.002
FSS	r	0.151	-0.79	0.071	-0.023	0.217*	-0.092	0.155	0.054
	p	0.133	0.432	0.485	0.822	0.030	0.362	0.123	0.593
NHP-pain	r	0.417**	0.309**	0.353**	0.445**	0.510**	0.298**	0.344**	0.763**
	p	< 0.00001	0.002	< 0.00001	< 0.00001	< 0.00001	0.003	< 0.00001	< 0.00001
NHP-physical mobility	r	0.084	-0.115	0.082	-0.078	-0.024	0.029	-0.194	0.032
	p	0.407	0.256	0.418	0.438	0.815	0.778	0.054	0.75
NHP-energy	r	0.023	0.102	0.171	-0.081	0.006	-0.044	0.104	0.041
	p	0.824	0.312	0.089	0.425	0.953	0.663	0.302	0.687
NHP-sleep	r	0.250*	0.298**	0.289**	0.317**	0.446**	0.328**	0.266**	0.656**
	p	0.012	0.003	0.003	0.001	< 0.00001	0.001	0.007	< 0.00001
NHP-social isolation	r	-0.005	-0.153	0.112	-0.127	0.047	-0.116	0.036	-0.055
	p	0.962	0.129	0.269	0.206	0.644	0.250	0.719	0.586
NHP-emotional reactions	r	0.480**	0.089	0.262**	0.301**	0.282**	0.149	0.364**	0.496**
	p	< 0.00001	0.381	0.008	0.002	0.005	0.138	<0.00001	<0.00001

VAS: Visual analog scale, FIQ: Fibromyalgia Impact Questionnaire, TPC: Tender point count, BDS: Beck Depression Scale, FSS: Fatigue Severity Scale, NHP: Nottingham Health Profile.
** p< 0.05 (significant),*
*** p< 0.01 (highly significant).*

that disturbed sleep was related with pain severity and suggested that pain might have a negative impact on sleep quality (18). Similarly, Consoli et al. found higher pain levels in FM patients with difficulty in falling asleep than those without sleeping problems (10).

In our study, all PSQI subscores were associated with FIQ and TPC which indicate FM disease severity. These findings were previously reported by Wolfe et al. who reported a correlation between TPC and Sleep Disturbance Scale (21). On the other hand, Munguia-Izquierdo et al. reported that FIQ was correlated with PSQI subcategories (19). They suggested that this finding was not surprising owing to the fact that FIQ score was indicative of severity of FM symptoms including sleep disturbance, depression, pain and fatigue. Similarly, Ulus et al. confirmed the association between poor sleep quality and FM disease severity (18).

Recent epidemiologic surveys have reported the prevalence of depression in fibromyalgia between 22-55% depending on the scale used (22). In the present study, we found that BDS was associated with sleep disturbance and total subgroups of PSQI. We thought that sleep disturbance might result from depressive mood due to FM. Relationship between poor sleep quality and depression was reported previously by Ulus et al. in the study where sleep quality was assessed by PSQI and depression by BDS (18). On the other hand, Munguia-Izquierdo et al. and Bigatti et al. reported similar association between depressive symptoms and sleep difficulty; however Bigatti et alsuggested that sleep disturbance might play a role in exacerbating FM symptoms such as pain and depression (19,23).

Fatigue seems to be more frequent in FM than in other rheumatic diseases. Its prevalencein FM patients has been suggested between 78-94% in prior studies (24). We found an association between fatigue and sleep disturbance subgroup of PSQI which assesses having trouble sleep and waking up in the middle of the night or early morning. Nicassio et al. reported that sleep disturbance evaluated by Sleep Subscale of Fibromyalgia Impact Assessment Questionnaire was correlated with severity of pain and fatigue; and suggested that dysfunctional, cyclical pattern of increased pain and non-restful sleep might result in fatigue (24).

We also assessed the impact of poor sleep quality on QoL in terms of pain, vitality, physical, social and emotional functioning. We found a relationship between PSQI and pain and sleep subgroups of NHP. There was no statistically significant correlation between PSQI and social isolation, energy and physical mobility subgroups of QoL. In the study of Wagner et al. reported that sleep disturbance symptoms were associated with poor physical and mental QoL domains of Medical Outcomes Study Short Form-12. Similarly Consoli et al. reported lower QoL in Italian patients with FMF in the study where QoL was assessed by Short Form 36 (9,10).

To our knowledge, this is the first study to demonstrate that poor sleep quality is strongly correlated with four important items: disease severity, pain, depression and fatigue; and it has a negative impact on QoL in the patients with FM. However it is a matter for discussion whether sleep disturbance causes pain, depression and fatigue or it is consequence of increased disease activity associated with pain, depression and fatigue. Further and larger studies are needed to clarify this.

CONFLICT of INTEREST

None declared.

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