

RESEARCH

Open Access



Fibromyalgia syndrome and dental anxiety

Manolya Ilhanli¹ , Mehmet Alptekin Karacesme² , Ilker Ilhanli^{2*} and Peruze Celenk¹

Abstract

Background: Fibromyalgia syndrome (FM) is often accompanied by anxiety. Dental anxiety is common in society and negatively affects the application of patients to the dentist.

Aims: We aimed to examine the presence of dental anxiety in FM patients and to compare it with the non-FM controls. The aim was also extended to examine the relationship between FM disease severity and dental anxiety.

Methods: Sixty-three patients diagnosed with FM and 50 age- and sex-matched non-FM controls were included. All participants were asked to answer the Modified dental anxiety scale (MDAS) and the Hospital Anxiety and Depression Scale (HAD anxiety and HAD depression, respectively). FM patients were also asked to answer the Fibromyalgia impact questionnaire (FIQ).

Results: There were 18 (28.57%) participants in the FM group with an MDAS score of ≥ 16 (anxiety), and 3 (6%) participants in the control group. All 10 participants with MDAS score ≥ 19 (dental phobic) were in the FM group (15.87%). There was a moderate positive correlation between FIQ score and MDAS Score. There were significant positive correlations between the MDAS Score and HAD anxiety and HAD depression scores.

Conclusions: The frequency of dental anxiety may be high in FM patients and disease activity may negatively affect dental anxiety. This is the first study to examine the presence of dental anxiety in fibromyalgia syndrome and its relationship with disease severity. This study draws attention to the presence of dental anxiety, which will negatively affect dental interventions and follow-ups in Fibromyalgia, which is quite common.

Keywords: Dental anxiety, Dental phobia, Disease activity, Fibromyalgia

Background

Fibromyalgia syndrome (FM) is a clinical picture of unknown etiology, characterized by chronic widespread pain, which is usually accompanied by somatic complaints, fatigue, cognitive disorders, sleep disturbance, and where there are painful tender points are detected on palpation on physical examination. There are no disease-specific laboratory findings (Alok et al. 2011).

In studies carried out to date, the cause of widespread pain and sensitivity of pain in FM patients has not been clarified, and although it is thought that genetic and environmental factors, central and peripheral mechanisms may be in the etiopathogenesis, the pathophysiology has

not been fully understood (Alok et al. 2011). Fatigue, stiffness, sleep disturbance, headache, symptoms mimicking Raynaud's disease, paresthesia, depression, and anxiety disorder are the other common features accompanying pain. Fibromyalgia syndrome has common features that overlap with some syndromes that have central sensitivity mechanisms. These are the syndromes like chronic fatigue syndrome, primary dysmenorrhea, irritable bowel syndrome, temporomandibular joint pain, restless legs syndrome and interstitial cystitis (Alok et al. 2011).

The prevalence of FM is reported to be between 3 and 6% (Goldenberg et al. 1990). Although FM is seen in all ages, genders and all ethnic groups, it most commonly affects women between the ages of 40–60 and 85–90% of patients are women. Its incidence is 4–9 times higher in women than in men (Wolfe et al. 2011). In community studies, it has been reported that FM develops more

*Correspondence: ilkerilhanli@hotmail.com

² Department of Physical Medicine and Rehabilitation, Ondokuz Mayıs University, Faculty of Medicine, 55200 Samsun, Turkey
Full list of author information is available at the end of the article

frequently in those with low education and socio-economic status (Bergman et al. 2001; Bergman 2005).

Psychiatric disorders, like depression, post-traumatic stress disorder, anxiety, and panic disorder are commonly found in FM patients, and FM patients have psychiatric disorders three times more than the general population (Buskila and Cohen 2007). Psychiatric disorders accompanying FM were found to be associated with compromised quality of life (Carta et al. 2018; Burke et al. 2017).

Fear of dentist, and especially fear of some treatment modalities, that has been recognized as a problem in clinical dentistry, afflicts a big population of all ages, genders, ethnicity and social classes (Bergius et al. 1997). Irregular dental follow-up or total avoidance of dental treatment may be the results of dental anxiety with various intensity, which has been reported in up to 50% of subjects (Firat et al. 2006). This behavioral problem may deteriorate the dental health.

Theoretically, it can be thought that the frequency of dental anxiety may be high in FM patients in whom anxiety disorder is a part of the disease and is observed frequently. However, in the literature, we could not find any study investigating the presence of dental anxiety in FM patients and examining whether there is an association between FM disease activity and dental anxiety. In this study, we aimed to examine the presence of dental anxiety in FM patients and to compare it with the non-FM control group. The aim was also extended to examine the association between FM disease severity and dental anxiety.

Methods

The number of participants included in the study was determined as 98 for effect size=0.67, $\alpha=0.05$ and power $(1-\beta)=0.95$, 49 from FM and 49 from control group (Albertsen Malt et al. 2000). A total of 113 volunteers, 63 FM patients older than 18 years old who applied to the Physical Medicine and Rehabilitation outpatient clinic between May 2021 and August 2021 and were diagnosed with FM according to American College of Rheumatology (ACR) 2010 criteria and 50 sex- and age-matched non-FM volunteers, participated in the study. The exclusion criteria were determined as not having written consent, being younger than 18 years old, having been diagnosed with another chronic systemic disease that may affect mental health, and having cognitive dysfunction that would prevent them from completing the questionnaires. The study protocol was approved by the Ondokuz Mayıs University Clinical Researches Ethics Committee (No. 2021/148), and written informed consents were obtained from all participants.

The ACR 2010 fibromyalgia diagnostic criteria is consisting of two scales, the Widespread Pain Index (WPI)

and the Symptom Severity (SS) Scale. The Widespread Pain Index questions the presence of pain in 19 different body regions, and each region receives 1 point and a maximum of 19 points can be obtained. On the SS scale, the severity of symptoms including fatigue, waking unrefreshed, and cognitive dysfunction, which are the symptoms accompanying FM, and the amount of accompanying somatic symptoms are scored between 0 and 3, with a maximum score of 12. Patients are diagnosed with FM when $WPI \geq 7$ and $SS \geq 5$ or $WPI = 3-6$ and $SS \geq 9$ (Wolfe et al. 2010). The ACR 2010 fibromyalgia diagnostic criteria were found to be valid and reliable in the Turkish population (Atik 2014).

Age, gender, occupation, education, duration of complaint, oral diseases, dental experience, temporomandibular joint pain, xerostomia, glossodynia, dysgeusia were recorded. All participants were asked to answer the Modified dental anxiety scale (MDAS) and the Hospital Anxiety and Depression Scale (HAD anxiety and HAD depression, respectively). Also, Fibromyalgia impact questionnaire (FIQ) was administered to FM patients.

Dental anxiety was evaluated with the MDAS, which consists of 5 questions scored between 1 and 5. Its Turkish validity and reliability has been proven, and patients with an MDAS score of ≥ 16 indicates anxiety, while patients with a score of ≥ 19 are considered dental phobic (Tunc et al. 2005; Ilgüy et al. 2005).

Anxiety and depression were evaluated with HAD. The Turkish validity and reliability of this scale, which consists of 14 questions scored between 0 and 3, seven of which assess anxiety and seven that assess depression, has been proven (Aydemir et al. 1997). In our study, they were reported as HAD anxiety and HAD depression scores.

The FM disease severity was assessed with the FIQ. In this scale, where a maximum of 80 points can be obtained, a high score indicates high disease severity (Bennett 2005). The Turkish validity and reliability of this scale has been proven (Sarmer et al. 2000).

Statistical analysis

SPSS version 22 was used for statistical analysis (SPSS Inc., IBM Co., and Chicago, IL, USA). Descriptive statistics were performed for all data. Normal distribution was evaluated with the Kolmogorov–Smirnov test. Values which are normally distributed were given as mean \pm standard deviation, and values which are non-normally distributed were given as median (minimum–maximum). In terms of the frequencies of demographic and clinical data, difference between the groups were assessed by the chi-square test. Whether there was a difference between the groups in terms of the scores of the scales evaluating anxiety and depression was evaluated

with the Mann–Whitney *U* test. Correlation between variables was analyzed with Spearman’s test. Significance level was accepted as $p < 0.05$.

Results

The total number of participants in the study was 113 (63 FM patients and 50 controls). The mean age was 44.37 ± 11.39 years in the FM group, while the mean age was 46.94 ± 11.95 years in the control group ($p = 0.256$). There was no significant difference between the groups in terms of demographic data. Demographic data of FM patients and control group and comparison between groups are shown in Table 1. No significant difference was found between the groups for orofacial symptoms, which can be seen more frequently in FM patients than in the control group. The frequency of orofacial symptoms and the comparison results between the groups are shown in Table 2.

The median value of the duration of the complaint of FM patients was 60 (3–240) months. The median value of the FIQ score was 52 (40–76.2).

HAD anxiety, HAD depression and MDAS scores were significantly higher in FM patients than in the controls ($p < 0.001$ for each). Table 3 shows the comparison of the FM group and control group according to the HAD anxiety, HAD depression and MDAS scores.

There were 18 (28.57%) participants in the FM group with an MDAS score of ≥ 16 (anxiety), and 3 (6%) participants in the control group. All of them were female. All 10 participants with MDAS score ≥ 19 (dental phobic) were female and were in the FM group (15.87%).

While 58 (92%) of 63 FM patients had dental experience, 42 (84%) of 50 control group volunteers had dental experience ($p = 0.296$). The dental experience of the participants in FM and control groups is shown in Table 4.

Table 1 Demographic data of Fibromyalgia syndrome patients and control group and comparison between groups

	FM N = 63 (%)	Control N = 50 (%)	p value
<i>Gender</i>			
Female	61 (96.8)	45 (90)	0.135
Male	2 (3.2)	5 (10)	
<i>Education</i>			
Primary	32 (50.8)	23 (46)	0.748
Secondary	17 (27)	12 (24)	
University	11 (17.5)	13 (26)	
Literate	3 (4.8)	2 (4)	
<i>Marital status</i>			
Married	55 (87.3)	47 (94)	0.233
Single	8 (12.7)	3 (6)	

*Significance level $p < 0.05$, FM, fibromyalgia syndrome; N, subject number

Table 2 The frequency of orofacial symptoms and the comparison results between the groups

	FM N = 63 (%)	Control N = 50 (%)	p value
<i>TMJ pain</i>			
Yes	21 (33.3)	11 (22)	0.184
No	42 (66.7)	39 (78)	
<i>Glossodynia</i>			
Yes	4 (6.3)	2 (4)	0.580
No	59 (93.7)	48 (96)	
<i>Dysgeusia</i>			
Yes	5 (7.9)	1 (2)	0.162
No	58 (92.1)	49 (98)	
<i>Xerostomia</i>			
Yes	18 (28.6)	16 (32)	0.693
No	45 (71.4)	34 (68)	

*Significance level $p < 0.05$, FM, fibromyalgia syndrome; N, subject number; TMJ, temporomandibular joint

While there was a significant positive correlation between FIQ score and HAD depression ($r = 0.656$, $p < 0.001$) and HAD anxiety scores ($r = 0.740$, $p < 0.001$), there was a moderate positive correlation between MDAS Score ($r = 0.381$, $p = 0.002$). There were significant positive correlations between the MDAS Score and HAD anxiety ($r = 0.607$, $p < 0.001$) and HAD depression scores ($r = 0.635$, $p < 0.001$). Table 5 shows the correlations between age, duration of complaints, FIQ, MDAS, and scores of anxiety and depression scales in the FM group.

Discussion

We found that the number of those with dental phobia and those with dental anxiety were higher in FM patients than in the controls. The MDAS score, like HAD anxiety and HAD depression scores, was significantly higher in FM patients than in the controls. We found that the FIQ score was correlated with the MDAS score, similar to the HAD anxiety and HAD depression scores. We also found a correlation between HAD anxiety and HAD depression scores and MDAS score. The strongest aspect of our study is that we have not come across any other study investigating the presence of dental anxiety and the association between dental anxiety and disease severity in FM patients, where general anxiety is common. The weakness of our study is that anxiety was not examined specifically for the type of dental treatment applied. Because of some questions of the MDAS asking the experience of the specific dental interventions, despite the number is very low and is similar between groups, participants who have not dental experience may have affected the results of the study. Surprisingly, finding no difference between FM group and control group according to dental experience

Table 3 Comparison of Fibromyalgia syndrome patients and control group in terms of anxiety and depression scale scores

	FM N=63	Control N=50	p value
HAD anxiety median (minimum–maximum)	11 (2–23)	5 (0–19)	<0.001
HAD depression median (minimum–maximum)	9 (3–21)	3.5 (0–12)	<0.001
MDAS median (minimum–maximum)	13 (5–25)	7 (5–18)	<0.001

*Significance level $p < 0.05$, FM, fibromyalgia syndrome; N, subject number; HAD, hospital anxiety and depression scale; MDAS, modified dental anxiety scale

Table 4 The dental experience of the participants in the Fibromyalgia syndrome patients and control group

	FM N=63 (%)	Control N=50 (%)
Dental filling treatment	26 (41.3)	22 (44)
Tooth extraction	10 (15.9)	3 (6)
Dental prosthesis	12 (19)	12 (24)
Dental root canal treatment	8 (12.7)	3 (6)
Dental bridge treatment	1 (1.6)	3 (6)
Dental veneer treatment	1 (1.6)	2 (4)
Dental implant	3 (4.8)	1 (2)
Non	5 (7.9)	8 (16)
Orthodontic treatment	2 (3.2)	0
Periodontal disease	0	1 (2)
Tooth decay	1 (1.6)	0

FM, fibromyalgia syndrome; N, subject number

may suggest that despite the anxiety FM patients suffer, this condition does not prevent them to admit dentist. However, this result does not change the fact that FM patients experience more anxiety than non-FM patients. This bias may be due to the fact that we did not accept lack of dental experience as an exclusion criterion and that the number of participants was not large enough to

represent FM patients and the control group in order to examine the difference between groups in terms of dental experience.

Although it was very difficult to find subjects to include in the control group during the pandemic process, we did not experience the same problem in finding patients with FM. We liken this situation to the fact that the anxiety of patients with FM does not prevent them from applying to the dentist because of the pain and anxiety they experience. For this reason, we think that it may have been easier to find patients with FM compared to the control group during the pandemic process.

At the beginning of the study, we planned to include all FM patients and volunteer controls who met the inclusion criteria, within the period we determined, because we predicted that the drop-out amount of the study might be high due to the pandemic process. Although there was a difference in the number of subjects between the groups, since there was no significant difference between the groups in terms of demographic data in our pioneering statistical analysis, we included all FM patients and volunteer controls that we could identify who met the inclusion criteria in the statistical analysis.

Assessing the FM patients for orofacial pain and oral complaints like xerostomia, glossodynia and dysgeusia

Table 5 Correlations between age, duration of complaints, Fibromyalgia syndrome severity, and scores of dental anxiety, anxiety and depression scales in the Fibromyalgia syndrome patients

	Age	FM duration of complaints	FIQ	HAD anxiety	HAD depression
FM duration of complaints	<i>r</i>	.336**			
	<i>p</i>	.007			
FIQ	<i>r</i>	-.233	-.083		
	<i>p</i>	.066	.516		
HAD anxiety	<i>r</i>	-.259*	-.171	.740**	
	<i>p</i>	.040	.182	.000	
HAD depression	<i>r</i>	-.147	-.189	.656**	.892**
	<i>p</i>	.251	.138	.000	.000
MDAS	<i>r</i>	-.162	-.190	.381**	.607**
	<i>p</i>	.204	.137	.002	.000

r, Spearman correlation coefficient; *p*, *p* value; **Significance level $p < 0.01$; *Significance level $p < 0.05$; FM, fibromyalgia syndrome; FIQ, fibromyalgia impact questionnaire; HAD, hospital anxiety and depression scale; MDAS, modified dental anxiety scale

is recommended (Balasubramaniam et al. 2007). It is known that orofacial pain disorders and oral complaints are common among FM patients (Jeon 2020). The prevalence of Temporomandibular joint (TMJ) disorders was reported 42% to 94% in FM patients (Jeon 2020). FM patients may suffer xerostomia, glossodynia, and dysgeusia. The incidence of xerostomia in FM patients varies from 7 to 71% (Jeon 2020), where this proportion is 33% for glossodynia (Jeon 2020). Dysgeusia is a taste disorder and the frequency of dysgeusia among FM patients was reported as 34.2% (Jeon 2020). In our study, we did not find significant difference between FM patients and controls in terms of TMJ pain and oral complaints. The reason for this may be that such complaints are seen quite frequently in the general population (Furness et al. 2013).

Dental anxiety is commonly measured by rating scales. Previous studies using the MDAS and Dental Fear Scale demonstrated that dental anxiety is common in Turkey (Firat et al. 2006; Tunc et al. 2005). Firat et al. (Firat et al. 2006) reported the rate of dental anxiety among Turkish people as 21,3%.

In a study conducted in the United Kingdom, the MDAS value was reported as $10.39 + 5.36$, and when the cut-off value was ≥ 19 , the proportion of those with dental phobia was 11.6% (Humphris et al. 2009). In some previous studies, prevalence of dental anxiety investigated by MDAS was found 19.5% in Belfast, 8.8% in Jyvaskyla, 6.0% in Dubai (Humphris et al. 2000) and 12.0% in Norway (Haugejorden and Klock 2000). Ilguy et al. (Ilguy et al. 2005) reported the proportion of dental phobic patients in Turkey, identified by MDAS was 8.8%. In our study, the median MDAS value was as 7 in the control group. However, this value was higher in the FM group and was determined as 10. In our study, all of the dental phobic patients were in the FM group and the proportion was 15.87%. The absence of dental phobic patients in the control group may be attributed to the low number of participants in the control group, and the high rate in the FM group can be interpreted as FM patients are prone to dental anxiety. Similar to the literature, we found that the presence of dental anxiety is higher in women than in men (Humphris et al. 2009).

Studies have reported that depression and anxiety scores are higher in FM patients than in controls (Alok et al. 2011; Ucar et al. 2015). In our study, we found higher HAD anxiety and HAD depression scores compared to the control group. In addition, in these studies authors reported that depression and anxiety scores were related to FM disease severity, as in our study, and they reported that there was a significant high correlation between them and the FIQ score (Alok et al. 2011; Ucar et al. 2015). We also found significant positive correlations between FIQ score and HAD anxiety and HAD

depression scores. These results suggest that depression and anxiety increase by the increasing disease activity. In our study, HAD anxiety, HAD depression and FIQ scores showed significant positive correlations in MDAS. This result showed that dental anxiety was associated with depression, anxiety and FM disease severity in FM patients. This result suggests that depression and anxiety increase as well as dental anxiety by the increasing FM disease severity.

Conclusions

The frequency of dental anxiety may be higher in FM patients than in non-FM patients. In addition, high FM disease activity may increase dental anxiety. For this reason, it seems important that dentists have a high awareness of FM. Also, there is a need for future studies on methods that will enable FM patients to be referred to the dentist to cope with their dental anxiety.

Abbreviations

FM: Fibromyalgia syndrome; ACR: American College of Rheumatology; WPI: Widespread Pain Index; SS: Symptom Severity; MDAS: Modified dental anxiety scale; HAD: Hospital Anxiety and Depression Scale; FIQ: Fibromyalgia impact questionnaire; TMJ: Temporomandibular joint.

Acknowledgements

Not applicable.

Authors' contributions

MI, MK, II and PC contributed to the study conception and design, material preparation, data collection and performing analysis. The first draft of the manuscript was written by II and all authors commented on previous versions of the manuscript. All authors have read and approved the final manuscript.

Funding

There was no financial support for this study.

Availability of data and materials

The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the Ondokuz Mayıs University Clinical Researches Ethics Committee with the reference number 2021/148. Written consent was obtained from all participants included in the study. Ethical approval is mentioned in the text.

Consent for publication

Not applicable. This manuscript does not contain data from any individual person.

Competing interests

The authors declare that they have no competing interest.

Author details

¹Department of Dentomaxillofacial Radiology, Ondokuz Mayıs University, Faculty of Dentistry, Samsun, Turkey. ²Department of Physical Medicine and Rehabilitation, Ondokuz Mayıs University, Faculty of Medicine, 55200 Samsun, Turkey.

Received: 19 November 2021 Accepted: 5 March 2022
Published online: 01 April 2022

References

- Albertsen Malt E, Eystein Berle J, Olafsson S, Lund A, Ursin H (2000) Fibromyalgia is associated with panic disorder and functional dyspepsia with mood disorders: a study of women with random sample population controls. *J Psychosom Res* 49(5):285–289
- Alok R, Das SK, Agarwal GG, Salwahan L, Srivastava R (2011) Relationship of severity of depression, anxiety and stress with severity of fibromyalgia. *Clin Exp Rheumatol* 29(69):70–72
- Atik C (2014) Validity and reliability of ACR 2010 diagnostic criteria for Fibromyalgia Syndrome in Turkish population. Dissertation, Ankara University. https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=GburtPA4aswUUMYM-7pGTw&no=WK_z5_v59imoVjvPubDiw
- Aydemir O, Guvenir T, Kuey L, Kultur S (1997) Validity and reliability of Turkish version of hospital anxiety and depression scale. *Turk Psikiyatri Derg* 8(4):280–287
- Balasuubramaniam R, Laudenbach JM, Stoopler ET (2007) Fibromyalgia: an update for oral health care providers. *Oral Radiol Endod* 104:589–602
- Bennett R (2005) The Fibromyalgia Impact Questionnaire (FIQ): a review of its development, current version, operating characteristics and uses. *Clin Exp Rheumatol* 23(39):154–162
- Bergius M, Berggren U, Bogdanov O, Hakeberg M (1997) Dental anxiety among adolescents in St.Petersburg, Russia. *Eur J Oral Sci* 105:117–122
- Bergman S (2005) Psychosocial aspects of chronic widespread pain and fibromyalgia. *Disabil Rehabil* 27:675–683
- Bergman S, Herrström P, Högström K, Petersson IF, Svensson B, Jacobsson LT (2001) Chronic musculoskeletal pain, prevalence rates, and sociodemographic associations in Swedish population study. *J Rheumatol* 28:1369–1377
- Burke NN, Finn DP, Mcguire BE, Roche M (2017) Psychological stress in early life as a predisposing factor for the development of chronic pain: clinical and preclinical evidence and neurobiological mechanisms. *J Neurosci Res* 95:1257–1270
- Buskila D, Cohen H (2007) Comorbidity of fibromyalgia and psychiatric disorders. *Curr Pain Headache Rep* 11:333–338
- Carta MG, Moro MF, Pinna FL, Testa G, Cacace E, Ruggiero V et al (2018) The impact of fibromyalgia syndrome and the role of comorbidity with mood and post-traumatic stress disorder in worsening the quality of life. *Int J Soc Psychiatry* 64:647–655
- Firat D, Tunc EP, Sar V (2006) Dental anxiety among adults in Turkey. *J Contemp Dent Pract* 7(3):75–82
- Furness S, Bryan G, McMillan R, Birchenough S, Worthington HV (2013) Interventions for the management of dry mouth: non-pharmacological interventions. *Cochrane Database Syst Rev* 9:cd009603
- Goldenberg DL, Simms RW, Geiger A, Komaroff AL (1990) High frequency of fibromyalgia in patients with chronic fatigue seen in a primary care practice. *Arthritis Rheum* 33:381–387
- Haugejorden O, Klock KS (2000) Avoidance of dental visits: the predictive validity of three dental anxiety scales. *Acta Odontol Scand* 58:255–259
- Humphris GM, Freeman R, Campbell J, Tuutti H, D'Souza V (2000) Further evidence for the reliability and validity of the Modified Dental Anxiety Scale. *Int Dent J* 50(6):367–370
- Humphris GM, Dyer TA, Robinson PG (2009) The modified dental anxiety scale: UK general public population norms in 2008 with further psychometrics and effects of age. *BMC Oral Health* 26(9):20
- Ilgüyü D, Ilgüyü M, Dinçer S, Bayirli G (2005) Reliability and validity of the Modified Dental Anxiety Scale in Turkish patients. *J Int Med Res* 33(2):252–259
- Jeon Y (2020) Fibromyalgia: practical considerations for oral health care providers. *J Dent Anesth Pain Med* 20(5):263–269
- Sarmer S, Ergin S, Yavuzer G (2000) The validity and reliability of the Turkish version of the Fibromyalgia Impact Questionnaire. *Rheumatol Int* 20:9–12
- Tunc EP, Firat D, Onur OD, Sar V (2005) Reliability and validity of the Modified Dental Anxiety Scale (MDAS) in a Turkish population. *Commun Dent Oral Epidemiol* 33:357–362
- Ucar M, Sarp U, Karaaslan O, Gul AI, Tanik N, Arik HO (2015) Health anxiety and depression in patients with fibromyalgia syndrome. *J Int Med Res* 43(5):679–685
- Wolfe F, Clauw DJ, Fitzcharles MA, Goldenberg DL, Katz RS, Mease P et al (2010) The American College of Rheumatology preliminary diagnostic criteria for fibromyalgia and measurement of symptom severity. *Arthritis Care Res (hoboken)* 62(5):600–610
- Wolfe F, Hassett AL, Walitt B, Michaud K (2011) Mortality in fibromyalgia: a study of 8,186 patients over thirty-five years. *Arthritis Care Res (hoboken)* 63(1):94–101

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Submit your manuscript to a SpringerOpen® journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► [springeropen.com](https://www.springeropen.com)