

Cross-Sectional Study

e Pain Characteristics of Patients With Fibromyalgia: A Comparison Between Gender and Different Emotional States

Dongfeng Liang, MD¹, Xiaojie Guo, PhD², Jie Zhang, MM¹, and Ronghuan Jiang, MD, PhD²

From: ¹Department of Rheumatology and Immunology, the First Medical Center, Chinese PLA General Hospital, Beijing, P.R. China; ²Department of Medical Psychology, the First Medical Center, Chinese PLA General Hospital, Beijing, P.R. China

Address Correspondence: Ronghuan Jiang MD, PhD
The First Medical Center, Chinese PLA General Hospital
Beijing 100853, P.R. China
E-mail: jiangrh55@126.com

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Background: Generalized pain is the core symptom of fibromyalgia (FM). Few studies have described FM's different pain characteristics under various conditions.

Objective: To explore the pain characteristics of patients with FM of different gender and emotional states.

Study Design: A cross-sectional study.

Setting: A medical center in Beijing, People's Republic of China.

Methods: A total of 197 patients with FM were recruited from an outpatient clinic. Three distinct instruments were used to assess their pain characteristics: the Numeric Rating Scale (NRS-11) to assess pain severity, the Widespread Pain Index (WPI) to assess the number of pain regions, and the Short Form-McGill Pain Questionnaire-2 (SF-MPQ-2) to assess pain qualities. The Zung Self-Rating Anxiety Scale and Zung Self-Rating Depression Scale were used to assess patients' emotional states. An independent 2-sample t test, χ^2 test, and Mann-Whitney U test were used to analyze gender pain characteristics differences and different emotional states (with/without anxiety, with/without depression).

Results: Pain severity on the NRS-11 was 7 (5–8), the number of pain regions determined by WPI was 13 (10–16), and the total score of different pain qualities from the SF-MPQ-2 was 2.36 (1.68–3.73) in all patients with FM. The most frequently reported regions of pain were the right shoulder girdle (89.34%), left shoulder girdle (88.32%), upper back (85.28%), and neck (81.73%). The most frequently reported pain qualities were tiredness/exhaustion (97.46%), aching pain (94.42%), numbness (78.68%), cold/freezing pain (75.63%), and tenderness (75.13%). Women patients reported more severe pain and numbness, less frequent chest pain, and shooting pain than men patients did. Patients with FM and anxiety experienced more frequent and more severe feelings of punishing/cruel thoughts, fearfulness, sickening, and tenderness; more frequent jaw pain and cold-freezing pain; more severe pain caused by light touch and tiredness/exhaustion; less frequent lower leg pain than those without anxiety did. Patients with FM and depression reported more frequent and more severe pain caused by light touch; more frequent tenderness; more severe feelings of tiredness/exhaustion, sickening, fearfulness, and punishing/cruel thoughts; and less frequent and less severe piercing pain than those without depression did.

Limitations: The limitations of this study are its single-center design and lack of objective pain indicators.

Conclusion: Gender significantly affected pain severity, chest pain, numbness, and shooting pain. Jaw pain, lower leg pain, cold/freezing pain, tenderness, pain caused by light touch, piercing pain, and pain-affective descriptors are closely related to emotional states in FM. A comprehensive understanding of pain characteristics in patients with FM would be helpful for disease education, diagnosis, and treatment.

Key words: Fibromyalgia, men, women, anxiety, depression, pain severity, pain regions, pain quality

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Fibromyalgia (FM) is characterized by widespread chronic pain, fatigue, sleep disturbance, and functional symptoms (1). Its prevalence has been estimated to be 0.2% – 6.6% in the general population and 2.4% – 6.8% in women (2). Notably, FM treatment has high direct and indirect costs. The annual direct medical costs for patients with FM are approximately 3 times higher than those for patients who do not have FM (3). Furthermore, complications associated with FM are often chronic. A multicenter, long-term longitudinal study did not find any clinically meaningful improvement in the severity of FM over 11 years (4). A cross-sectional study reported significant physical and psychological impairments in FM (5). About 25% of workers with FM stopped working within 5 years of a diagnosis, and about 33% of workers with FM received financial benefits due to FM (6).

An individualized, symptom-based, stepwise treatment for FM may be identified by studying a patient's pain characteristics. The diagnostic criteria for FM based on clinical symptoms have improved in recent years (7-11). Despite the great variability in FM manifestations, pain is primarily evaluated by the FM working group's taxonomy, which can aid in understanding the treatment and management of FM (12). Assessing pain characteristics in patients with FM would help manage widespread pain.

Women suffer from FM 3 times more often than men (13). Previous studies have focused on more female patients with FM, but studies on male patients, as well as analyzing gender differences in pain characteristics, are limited, and are controversial (14,15). The differences in these findings may be related to diagnostic and geographical heterogeneity. Therefore, it is necessary to elucidate gender differences relevant to pain characteristics in patients with FM using the same diagnostic criteria.

Pain and mood disorders frequently coexist and influence each other (16). Depression and anxiety are most commonly associated with FM; depression is diagnosed in > 50% of patients with FM during their lifetime (1,17). Moreover, pain intensity is strongly associated with depression and anxiety symptoms (18). Depression and anxiety increase pain severity and decrease pain tolerance, whereas prolonged pain is associated with a higher mood dysregulation, which negatively affects treating both conditions. A similar relationship between pain and depression/anxiety has been found in FM, but only a few studies have reported differences in pain characteristics in patients with FM in

different emotional states (with/without anxiety, with/without depression).

Clinical studies are needed to better understand the manifestations of FM in specific settings and to provide adequate assistance for treatment. Gender- and emotion-specific pain characteristics in patients with FM have not yet been elucidated. In our study, we aimed to analyze the differences in pain characteristics in patients with FM specific to gender (male/female) and different emotional states (with/without anxiety and with/without depression) in a large population of Chinese adults.

METHODS

Patients

The study consisted of 197 patients (146 women and 51 men) aged 42.91 ± 12.57 years suffering from FM. Patients were recruited from the outpatient clinic of the Rheumatology and Immunology Department of the First Medical Center of PLA General Hospital from June 2020 through September 2021.

All patients were examined by a senior rheumatologist who followed the 2016 revision of the fibromyalgia diagnostic criteria from the American College of Rheumatology (7). The 2016 criteria are satisfied if the following 3 conditions are met: a Widespread Pain Index (WPI) score ≥ 7 and a Symptom Severity Scale (SSS) score ≥ 5 or a WPI 4 - 6 with a Symptom Severity Scale score ≥ 9 ; generalized pain is present, defined as pain in at least 4 of 5 regions; and symptoms have been present at a similar level for at least 3 months. The previous requirement that the patient have no other conditions that could explain the pain was eliminated. The exclusion criteria were pregnancy; the presence of major diseases, such as inflammatory rheumatic immune diseases; malignant tumors; uncontrolled endocrine diseases; and depression combined with suicidal thoughts or severe mental disorders, such as schizophrenia and bipolar disorder.

Our study was approved by the Ethics Committee of the PLA General Hospital (Approval No: S2019-269-01). All patients provided written informed consent before participating in the study.

Measurements

Three distinct indices were used to assess pain characteristics: the Numeric Rating Scale (NRS-11) to assess pain severity, the WPI to assess the number of pain regions, and the Short Form-McGill Pain Question-

naire-2 (SF-MPQ-2) to assess pain quality. The Zung Self-rating Anxiety Scale (SAS) and the Zung Self-rating Depression Scale (SDS) were used to determine each patient's emotional state.

The NRS-11 (19) is a widely used 11-point system for evaluating pain severity on a 0 to 10 scale, from "no pain" to "the worst imaginable pain." Study patients selected a whole number to reflect their pain severity. Higher scores indicated severe pain.

The WPI (9) corresponds to the number of pain regions in the patient's body over the previous week. Study patients were asked to indicate the presence of pain or tenderness in the following 19 anatomical areas: left shoulder girdle, right shoulder girdle, left hip (buttock, trochanter), right hip (buttock, trochanter), left jaw, right jaw, upper back, lower back, left upper arm, right upper arm, left upper leg, right upper leg, chest, neck, abdomen, left lower arm, right lower arm, left lower leg, and right lower leg. Considering the analytical interpretation, the left and right regions were combined, such as the left upper arm and the right upper arm added to the upper arm, to compare the differences in the occurrence rate of pain regions between different groups. Each region was scored as either 0 or 1.

The SF-MPQ-2 (20) consists of 4 pain categories: continuous, intermittent, neuropathic, and affective pain, with a total of 22 items. Study patients rated the intensity of their pain on these 22 items on a scale of 0 to 10, each representing a different pain quality or related perception (from no pain to the worst pain in the past week). The total and 4 subcategory scores were calculated as the mean of the 22 items and the items in each subcategory, respectively.

The SAS (21) is a self-reported scale with 20 items relevant to psychological and somatic anxiety. Study patients scored each item on a scale from one (none or a little of the time) to 4 (most or all of the time) based on their experiences in the past week. The standard score was calculated by multiplying the raw score by 1.25. A total SAS score < 50 was considered to indicate no anxiety. In this study, patients with FM were divided into a group with anxiety (SAS score $\geq$ 50) and a group without anxiety (SAS score < 50).

The SDS (23) is a questionnaire that evaluates the severity of a depressive mood state and consists of 20 items rated from one (none or little of the time) to 4 (most or all of the time). The standard score was calculated by multiplying the raw score by 1.25. A total SDS score < 52 was defined as the absence of depression. In

our study, patients with FM were divided into groups with depression (SDS score $\geq$ 52) and without depression (SDS score < 52).

Statistical Analyses

Data were analyzed using IBM SPSS Statistics 23.0 (IBM Corporation). Descriptive statistics were performed for all variables, including the mean and SD, median and interquartile range (IQR), and count (proportion/rate). The major statistical procedures used to examine significance were an independent 2-sample t test, χ^2 test, and Mann-Whitney U test. A *P*-value of < 0.05 was considered statistically significant.

RESULTS

Demographic and General Pain Characteristics of Patients With FM

Patient demographic characteristics are presented in Table 1. The mean (SD) age of the patients was 42.91 ($\pm$ 12.57) years. The majority of patients were women (74.1%), married (81.2%), had anxiety (75.1%), and had depression (75.1%); about 50% of them had a middle or high school education and were employed, and 42.1% patients had a disease duration of one - 5 years.

The pain severity on the NRS-11 was 7 (5 - 8), the number of pain regions determined by the WPI was 13 (10 - 16), and the total score of the different pain qualities on the SF-MPQ-2 was 2.36 (1.68 - 3.73). The most frequently reported pain regions (occurrence rate > 80%) were the right shoulder girdle (89.34%), left shoulder girdle (88.32%), upper back (85.28%), and neck (81.73%) (Fig. 1a). The most frequently reported pain qualities (occurrence rate > 70%) were tiredness/exhaustion (97.46%), aching pain (94.42%), numbness (78.68%), cold/freezing pain (75.63%), and tenderness (75.13%) (Fig. 1b).

Pain Severity and Pain Regions in Subgroups

Table 2 presents the pain severity of different genders and emotional states. Pain severity differed significantly between women than in men (*P* = 0.014). Women reported more severe pain than men. Anxiety (*P* = 0.413) and depression (*P* = 0.614) did not significantly affect pain severity.

The occurrence rates of pain in different regions in the previous week are shown in Table 2. The number of pain regions determined by the total WPI score was not significantly different in patients of different

Table 1. Demographic characteristics of study patients ($n = 197$).

Variables	Number	Percentage (%)
Gender		
Women	146	74.1
Men	51	25.9
Emotional states		
With anxiety	148	75.1
Without anxiety	49	24.9
With depression	148	75.1
Without depression	49	24.9
Duration of disease		
3 mos-1 y	48	24.4
1-5 ys	83	42.1
5-10 ys	30	15.2
More than 10 ys	36	18.3
Marital status		
Married	160	81.2
Single	26	13.2
Divorced/separated	8	4.1
Widowed	3	1.5
Education		
Primary school or below	24	12.2
Middle or high school	117	59.4
University or above	56	28.4
Employment situation		
Employed	91	46.2
Work-disabled	34	17.3
Other (student, full-time homemaker, or other)	72	36.5

genders and in those with different emotional states. The 2 most frequently reported pain regions were the shoulder girdle (96.57%) and upper back (85.62%) in women and the shoulder girdle (92.16%) and hip (buttock, trochanter) (90.20%) in men. Chest pain was more frequently reported in men ($P = 0.001$).

In patients who had anxiety, the 2 most frequently reported pain regions were the shoulder girdle (96.62%) and the upper back (86.49%). The shoulder girdle (91.84%) and lower legs (89.80%) were the 2 most frequently reported pain regions in patients with FM who did not have anxiety. In patients who had depression, the 2 most frequently reported pain regions were the shoulder girdle (96.62%) and upper back (86.49%). The shoulder girdle (91.84%), upper arm (85.71%), and lower back (85.71%) were the most frequently reported regions of pain in patients who

did not have depression. Patients who had anxiety experienced pain in the jaw more frequently than those who did not have anxiety ($P = 0.017$), whereas lower leg pain was more frequently reported in those who had anxiety than in those who did not have anxiety ($P = 0.043$). Depression did not significantly affect the number of pain regions ($P > 0.05$).

Pain Qualities in Subgroups

Different pain quality intensities are shown in Table 3.

Numbness intensity differed significantly between women and men ($P = 0.032$). Numbness in women was more serious than in men. The other pain qualities did not differ significantly between the genders.

Tenderness intensity ($P = 0.001$), pain caused by light touch ($P = 0.031$), tiredness/exhaustion ($P = 0.001$), sickening ($P < 0.001$), fearfulness ($P < 0.001$), and punishing/cruel thoughts ($P < 0.001$) were significantly different between those patients who had and did not have anxiety. The intensities of piercing pain ($P = 0.038$), pain caused by light touch ($P = 0.007$), tiredness/exhaustion ($P = 0.018$), sickening ($P = 0.039$), fearfulness ($P = 0.018$), and punishing/cruel thoughts ($P = 0.008$) were significantly different between those patients who had and did not have depression.

Figure 2 shows the occurrence rates of different pain qualities. Men experienced more shooting pain than women ($\chi^2 = 3.99$; $P = 0.046$). The incidence rates of punishing/cruel thoughts ($\chi^2 = 12.60$; $P < 0.001$), fearfulness ($\chi^2 = 8.37$; $P = 0.004$), sickening ($\chi^2 = 9.11$; $P = 0.003$), cold/freezing pain ($\chi^2 = 5.42$; $P = 0.020$), and tenderness ($\chi^2 = 8.87$; $P = 0.003$) were significantly higher in patients with anxiety than in those without anxiety. Depression was significantly associated with pain caused by light touch ($\chi^2 = 5.97$; $P = 0.015$), tenderness ($\chi^2 = 4.91$; $P = 0.027$), and piercing pain ($\chi^2 = 3.90$; $P = 0.048$).

DISCUSSION

Fibromyalgia results from various diseases and risk factors. With a limited understanding of its mechanism of action, widespread chronic pain appears to be the primary manifestation. Patients with FM frequently seek medical care for chronic pain. Managing and treating chronic pain results in a financial burden to patients and the health care system. Despite the necessity of understanding FM's pain characteristics, only a few studies in Chinese patients have elucidated them. A full understanding of FM's pain features is key to aiding in an effective diagnosis and efficient treatment of FM.

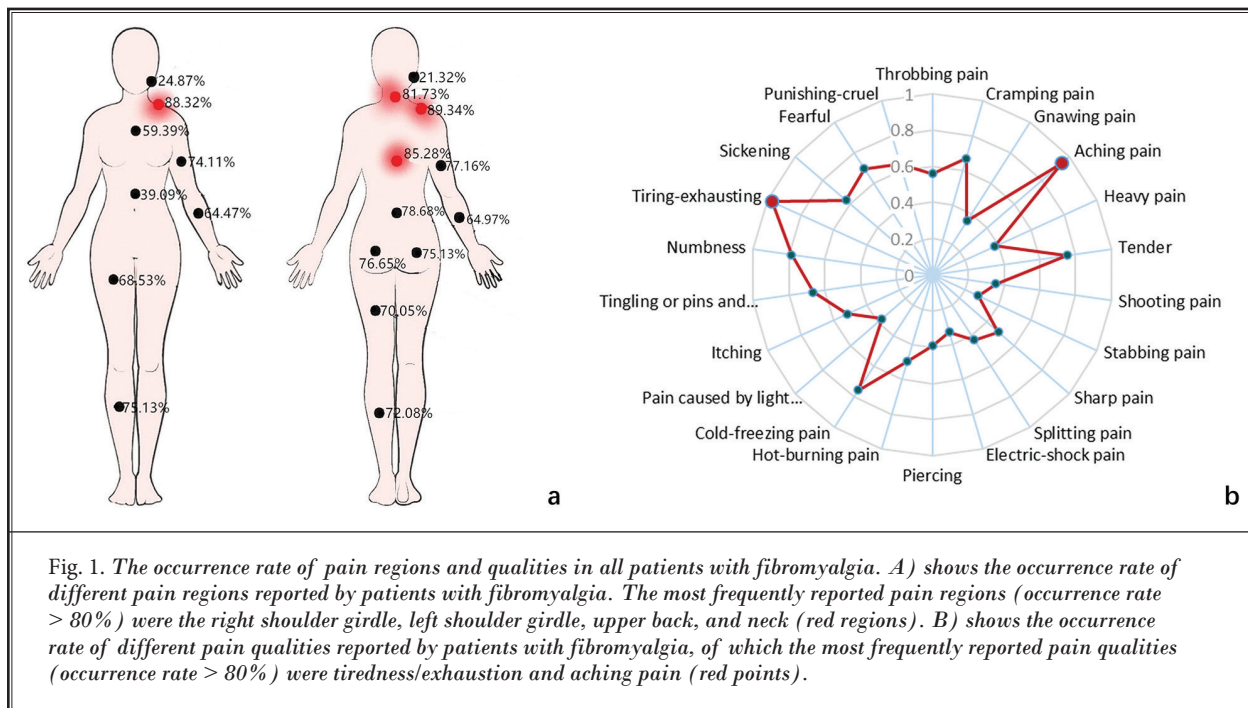


Fig. 1. The occurrence rate of pain regions and qualities in all patients with fibromyalgia. A) shows the occurrence rate of different pain regions reported by patients with fibromyalgia. The most frequently reported pain regions (occurrence rate > 80%) were the right shoulder girdle, left shoulder girdle, upper back, and neck (red regions). B) shows the occurrence rate of different pain qualities reported by patients with fibromyalgia, of which the most frequently reported pain qualities (occurrence rate > 80%) were tiredness/exhaustion and aching pain (red points).

Our study analyzed pain characteristics in 197 Chinese patients of different genders and emotional states (with/without anxiety, with/without depression). Previous studies demonstrated that FM is often accompanied by depression and anxiety disorder. To the best of our knowledge, ours is the first study to directly compare pain characteristics in patients with FM who have and do not have anxiety/depression.

The patients in this study were enrolled to represent real-world situations. The women/men ratio was 146:51 in this study, similar to the frequently observed ratio of 3:1 in FM populations (23). The patients with FM with/without anxiety and with/without depression ratio were both 148:49, consistent with previous findings (1,17). A significantly higher number of women than men patients experienced severe pain, which is consistent with the results of a previous study (24). Women may have a higher sensitivity to pain, a lower pain threshold, and poor pain tolerance, which supports our results (26,27). Anxiety and depression did not significantly affect pain severity in patients with FM.

Widespread pain is the primary characteristic of FM. In our study, pain was not evenly distributed throughout the body, similar to the outcomes of a previous study (27). All patients with FM frequently experienced pain in the shoulder girdle regardless of gender and emotional state, suggesting that shoulder girdle pain may be a specific characteristic of FM. Spine areas

on the upper back, neck, lower back, and hip were the next most frequently involved regions exhibiting pain in patients with FM. The limbs and other body parts were relatively less involved. Considering pain in the spinal area, spine-origin diseases, such as degenerative diseases and spondyloarthritis that cause spinal pain, should be ruled out before making an FM diagnosis (28).

Spine diseases generally have typical imaging features or elevated serum inflammatory markers that can differentiate them from generalized FM. FM from spine-origin diseases are also frequently confused in clinical practice; therefore, a comprehensive understanding of the characteristics of each disease is necessary to correctly identify them.

Gender and emotion did not influence the number of pain regions. Men with FM frequently report chest pain. Our results support the well-known fact that men are more likely to have angina pectoris (chest pain) than women (29) or that it may be a psychosocial factor for men to report more chest pain. Patients with FM who also have anxiety more frequently reported pain in the jaw region, which is consistent with previous findings that depression and anxiety symptoms are both risk factors for temporomandibular joint pain (30), since jaw pain, jaw function, and disability are related to temporomandibular joint disturbance (31). Patients with FM who do not have anxiety frequently

Table 2. Pain severity and the occurrence rate of pain regions in fibromyalgia patients of different genders and with different emotional states.

Pain severity/ regions	Gender				Emotional states							
	Women FM (n = 146)	MenFM (n = 51)	Z/ χ^2 value	P value	aFM (-) (n = 49)	aFM (+) (n = 148)	Z/ 2 value	P value	dFM (-) (n = 49)	dFM (+) (n = 148)	Z/ χ^2 value	P value
NRS-11, median (IQR)	7 (5-8)	6 (4-7)	-2.47	0.014	6 (4-8)	7 (5-8)	-0.82	0.413	6 (4-8)	7 (5-8)	-0.51	0.614
Total score of WPI (IQR)	13 (10-16)	12 (10-16)	-0.40	0.686	12 (10-15)	13 (11-16)	-1.28	0.201	12 (10-15)	13 (10-16)	-1.15	0.249
Pain regions, n (%)												
Jaw	44 (30.14)	10 (19.61)	2.11	0.147	7 (12.29)	47 (31.76)	5.65	0.017	9 (18.37)	45 (30.41)	2.68	0.102
Shoulder girdle	141 (96.57)	47 (92.16)	1.69	0.193	45 (91.84)	143 (96.62)	1.93	0.164	45 (91.84)	143 (96.62)	1.93	0.164
Upper arm	124 (84.93)	40 (78.43)	1.15	0.285	41 (83.67)	123 (83.11)	0.01	0.927	42 (85.71)	122 (82.43)	0.28	0.594
Lower arm	107 (73.29)	34 (66.67)	0.81	0.367	36 (73.47)	105 (70.95)	0.12	0.734	35 (71.43)	106 (71.62)	0.001	0.979
Neck	120 (82.19)	41 (80.39)	0.08	0.775	37 (75.51)	124 (83.78)	1.69	0.194	39 (79.59)	122 (82.43)	0.20	0.656
Upper back	125 (85.62)	43 (84.31)	0.05	0.821	40 (81.63)	128 (86.49)	0.69	0.406	40 (81.63)	128 (86.49)	0.69	0.406
Lower back	114 (78.08)	41 (80.39)	0.12	0.729	40 (81.63)	115 (77.70)	0.34	0.560	42 (85.71)	113 (76.35)	1.92	0.165
Chest	77 (52.74)	40 (78.43)	10.34	0.001	27 (55.10)	90 (60.81)	0.50	0.481	27 (55.10)	90 (60.81)	0.50	0.481
Abdomen	55 (37.67)	22 (43.14)	0.47	0.491	16 (32.64)	61 (41.22)	1.13	0.287	19 (38.78)	58 (39.19)	0.003	0.959
Hip (buttock, trochanter)	119 (81.51)	46 (90.20)	2.10	0.148	39 (75.59)	126 (85.14)	0.83	0.362	39 (79.59)	126 (85.14)	0.83	0.362
Upper leg	111 (76.03)	41 (80.39)	0.41	0.523	38 (77.55)	114 (77.03)	0.01	0.940	40 (81.63)	112 (75.68)	0.74	0.389
Lower leg	118 (80.82)	39 (76.47)	0.44	0.506	44 (89.80)	113 (76.35)	4.11	0.043	41 (83.67)	116 (78.38)	0.64	0.424

FM: fibromyalgia; aFM (+): FM with anxiety; aFM (-): FM without anxiety; dFM (+): FM with depression; dFM (-): FM without depression; WPI: Widespread Pain Index; IQR: interquartile range.

report pain in the lower leg area, which needs to be substantiated using a larger sample.

In our study, tiredness/exhaustion and aching pain were the 2 most frequently reported pain qualities in all patients regardless of gender and emotional state, suggesting that tiredness/exhaustion and aching pain may require more consideration in FM. Women had a significantly higher intensity of numbness, whereas men exhibited a significantly higher rate of shooting pain. However, this gender-based difference remains unclear. Nonetheless, some studies believe this may be related to differences in sex hormones; components of

the endogenous analgesic system; brain structure and function; sex chromosomes; and psychosocial factors (32).

Some pain qualities' intensities and occurrence rates differed significantly among patients with different emotional states. The intensity of pain caused by light touch, and all 4 types of pain-affective descriptors in patients with FM who had anxiety or depression was significantly higher than those who did not have anxiety or depression. The occurrence rates of 3 types of pain-affective descriptors, cold/freezing pain and tenderness, were significantly higher in those who

Pain Characteristics in Fibromyalgia with Different Gender and Emotional States

Table 3. The intensity of different pain qualities in FM patients of different genders and with different emotional states.

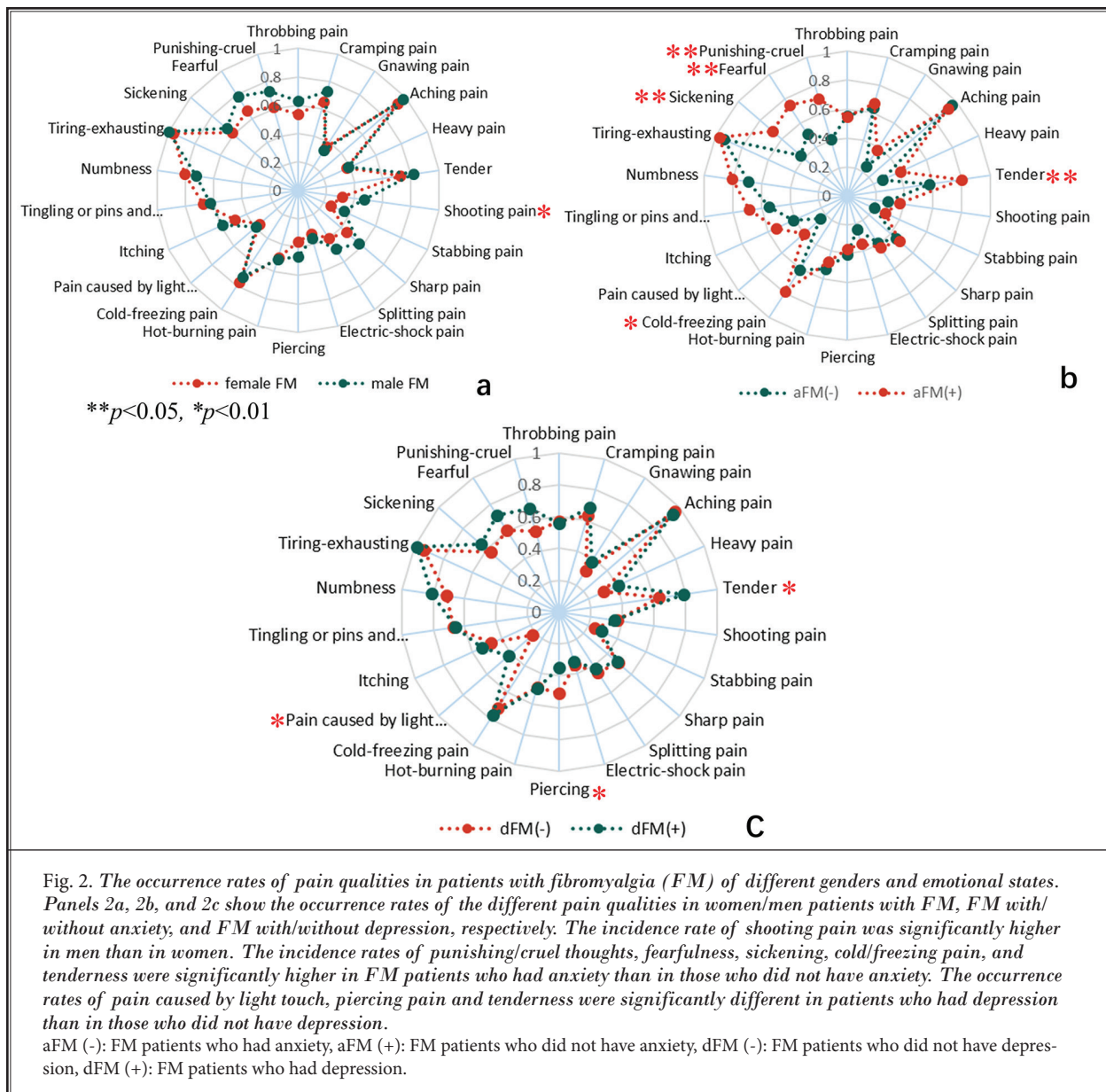
Pain qualities	Gender				Emotional states							
	Women FM (n = 146)	Men FM (n = 51)	Z value	P value	aFM (-) (n = 49)	aFM (+) (n = 148)	Z value	P value	dFM (-) (n = 49)	dFM (+) (n = 148)	Z value	P Value
Continuous pain												
Throbbing pain	1 (0-4)	2 (0-5)	-1.24	0.216	1 (0-4)	1 (0-4)	-0.18	0.859	1 (0-5)	1 (0-4)	-0.79	0.433
Cramping pain	2 (0-5)	3 (0-7)	-1.32	0.187	2 (0-6)	3 (0-5)	-0.10	0.921	2 (0-5.5)	3 (0-5.75)	-0.38	0.707
Gnawing pain	0 (0-3)	0 (0-3)	-0.37	0.715	0 (0-1.5)	0 (0-3)	-1.47	0.141	0 (0-3)	0 (0-2.75)	-0.69	0.488
Aching pain	6 (4-8)	6 (4-8)	-0.56	0.575	6 (3-8)	6 (4-8)	-0.48	0.634	6 (3-7)	6 (4-8)	-1.73	0.083
Heavy pain	0 (0-3)	0 (0-2)	-0.01	0.991	0 (0-2)	0 (0-2.75)	-1.19	0.236	0 (0-3)	0 (0-2)	-0.88	0.374
Tenderness	3 (0-6)	4 (2-7)	-1.37	0.170	3 (0-4)	4 (1-7)	-3.20	0.001	3 (0-5)	4 (1-6.75)	-1.89	0.059
Intermittent pain												
Shooting pain	0 (0-2)	0 (0-3)	-1.73	0.084	0 (0-1)	0 (0-2)	-1.08	0.282	0 (0-2)	0 (0-2)	-0.23	0.822
Stabbing pain	0 (0-1)	0 (0-2)	-1.45	0.146	0 (0-0)	0 (0-1)	-0.66	0.510	0 (0-0.5)	0 (0-1)	-0.34	0.738
Sharp pain	0 (0-4.25)	1 (0-4)	-0.66	0.507	0 (0-3)	1 (0-4.75)	-0.57	0.567	0 (0-5)	0 (0-4)	-0.03	0.973
Splitting pain	0 (0-3)	0 (0-3)	-0.77	0.444	0 (0-3.5)	0 (0-2.75)	-0.17	0.866	0 (0-4)	0 (0-2)	-0.90	0.371
Electric-shock pain	0 (0-1)	0 (0-2)	-0.52	0.605	0 (0-1)	0 (0-1)	-0.99	0.323	0 (0-2)	0 (0-1)	-0.43	0.667
Piercing	0 (0-3)	0 (0-3)	-0.79	0.431	0 (0-4.5)	0 (0-2)	-0.92	0.356	1 (0-4)	0 (0-2)	2.07	0.038
Neuropathic pain												
Hot-burning pain	0 (0-4)	1 (0-3)	-0.14	0.893	1 (0-5.5)	1 (0-3.75)	-0.70	0.486	0 (0-3.5)	0.5 (0-4)	-0.09	0.932
Cold-freezing pain	4.5 (1-8)	3 (0-5)	-1.73	0.084	3 (0-8)	4 (1-7)	-0.87	0.384	5 (0-8)	4 (1-7)	-0.60	0.550
Pain caused by light touch	0 (0-2)	0 (0-2)	-0.24	0.810	0 (0-1)	0 (0-3)	-2.15	0.031	0 (0-0)	0 (0-3)	-2.68	0.007
Itching	0 (0-3)	1 (0-3)	-1.06	0.290	0 (0-2.5)	1 (0-3)	-1.58	0.115	0 (0-3)	1 (0-3)	-0.57	0.566
Tingling or 'pins and needles'	2 (0-5)	2 (0-5)	-0.84	0.399	1 (0-4)	2.5 (0-5)	-1.85	0.065	2 (0-5)	2 (0-5)	-0.14	0.891
Numbness	4 (1-6)	3 (0-5)	-2.15	0.032	3 (0-5)	4 (1-6)	-1.48	0.140	3 (0-6.5)	3.5 (1-6)	-0.55	0.580
Affective descriptors												
Tiredness/Exhaustion	7 (5-9)	7 (5-9)	-0.22	0.828	5 (3.5-8)	8 (5-9)	-3.33	0.001	6 (5-8)	8 (5-9)	-2.36	0.018
Sickening	2 (0-6)	3 (0-6)	-0.17	0.863	0 (0-3)	3.5 (0-6)	-3.59	<0.001	1 (0-4)	3 (0-6)	-2.07	0.039
Fearfulness	2.5 (0-6)	3 (1-5)	-0.48	0.634	1 (0-3.5)	4 (0.25-6)	-3.71	<0.001	1 (0-4.5)	3.5 (0-6)	-2.37	0.018
Punishing/cruel thoughts	2 (0-6)	4 (0-6)	-1.20	0.231	0 (0-3)	4 (0-7)	-3.73	<0.001	1 (0-4)	3 (0-7)	-2.64	0.008

FM: fibromyalgia; aFM (+): FM with anxiety; aFM (-): FM without anxiety; dFM (+): FM with depression; dFM (-): FM without depression; IQR: interquartile range.

had anxiety than in those who did not have anxiety. The occurrence rates of pain caused by light touch and tenderness were significantly higher among those who had depression than among those who did not have depression.

All or some of the pain-affective descriptors were predictably more severe or more frequently reported in those who had anxiety/depression than in those who

did not have anxiety/depression. Pain caused by light touch and tenderness, representing high pain sensitivity, is expected to be more severe or more frequently reported in patients who have anxiety/depression, considering that anxiety/depression causes high pain sensitivity. These results are consistent with the view that underlying depression and anxiety alter pain perception, in which central sensitization, alterations in



central pain mechanisms, and neuroendocrine dysfunctions are considered the most important factors in the pain development (33). The intensity and occurrence rates of piercing pain were significantly higher among patients who did not have depression than among those who did; further studies are needed to substantiate this finding.

The prevalence of pain and anxiety/depression occurring simultaneously was much higher than when these conditions were analyzed separately (34). Recent studies have shown that the high rate of comorbidity

between FM and mood disorders is caused by a large number of overlapping pathophysiological processes and risk factors, providing a 2-way neurobiological basis that mutually aggravates and disables the relationship between pain and mood disorders (35,37). Pain negatively affects the diagnosis and treatment of anxiety and depression, which are associated with greater pain and disability (37). Therefore, the simultaneous assessment and treatment of anxiety, depression, and pain are required to improve long-term outcomes.

CONCLUSION

FM is a chronic, painful disease. Our study explored the pain characteristics of FM in 3 dimensions: pain severity, pain regions, and pain quality. Exploring the multidimensional pain characteristics of FM would help gain a deeper and more comprehensive understanding of the disease, thereby better identifying and diagnosing FM. A comprehensive understanding of the pain characteristics of FM will contribute to disease education, reduce patient concerns, and improve compliance and clinical efficacy.

At the same time, it is also helpful for the treatment process of cognitive-behavioral therapy. FM pain characteristics differ under various conditions.

Patients with FM and anxiety experienced more frequent and more severe tenderness, and 3 types of pain-affective descriptors, including punishing/cruel thoughts, fearfulness, and sickening. Compared to those who did not have anxiety, they also experienced more frequent jaw pain, cold/freezing pain, more severe pain caused by light touch, and tiredness/exhaustion as well as less frequent lower leg pain.

Patients with FM and depression reported more frequent and severe pain caused by light touch, more frequent tenderness, more severe tiredness/exhaustion, sickening, fearfulness, and punishing/cruel thoughts; they had less frequent and less severe piercing pain than FM patients who did not have depression. These pain characteristics provide a reference for selecting anxiolytic drugs and antidepressants. For example, if patients with FM show more frequent and/or serious tenderness, anti-anxiety drugs could be prescribed. Our study revealed that jaw pain, lower leg pain, cold/freezing pain, tenderness, pain caused by light touch, piercing pain, and especially pain-affective descriptors

were significantly associated with anxiety and depression in FM.

These findings suggest that implementing suitable psychological treatment could prove beneficial for patients with FM by reducing the frequency and intensity of the aforementioned pain. Further research is necessary to investigate the effectiveness of disease education, psychotherapy, and personalized medication in addressing symptoms, improving quality of life, and promoting treatment adherence, considering the specific pain characteristics observed in the study.

Limitations

One of the limitations of this study was that all patients were enrolled from a single tertiary hospital with a relatively large sample size, which may not be representative of all patients throughout the People's Republic of China. Another limitation is the lack of objective indicators of pain, which should be incorporated into future studies.

CONCLUSION

Our study analyzed pain severity, pain regions, and pain quality in patients with FM of both genders. We also analyzed their emotional states (with/without anxiety, with/without depression). We found gender significantly affected pain severity, chest pain, numbness, shooting pain, jaw pain, lower leg pain, cold/freezing pain, tenderness, pain caused by light touch, piercing pain; pain-affective descriptors were closely related to emotional states in FM. Accurate pain assessment in FM greatly benefits from developing an individual treatment to improve a patient's quality of life and reduce the economic burden of management and treatment.

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