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Psychosocial Risk Factors and the Impact of Anxiety on Individuals with Chronic Musculoskeletal Pain

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Abstract

Aim: The aim of this study was to identify psychosocial risk factors in individuals with chronic musculoskeletal pain (≥3 months) and to examine their association with anxiety.

Methods: This cross-sectional study was conducted with 203 participants who applied to the Family Medicine Clinic of a tertiary hospital between February and June 2022, were adults with musculoskeletal pain lasting at least 3 months, and met the inclusion criteria. Data were collected using a Demographic Information Form, Visual Analog Scale (VAS), the Yellow Flag Questionnaire (YFQ), and the State-Trait Anxiety Inventory (S-TAI).

Results: The mean age of the 203 participants was 45.38±12.68, with 67% reporting low back pain and 52.2% reporting neck pain. The mean total scores obtained from the scales were 44.31±8.27 for the TAI, 41.01±10.77 for the SAI, 73.05±16.80 for the YFQ, and 6.09±1.92 for the VAS, respectively. Positive and significant correlations were found between VAS scores and TAI, SAI, and YFQ scores ($p=0.018$; $p=0.048$; $p<0.001$). Positive and statistically significant correlation was found between TAI and SAI scores and YFQ scores ($p<0.001$ and $p=0.006$).YFQ scores were significantly higher in individuals aged 41 and above ($p<0.001$), primary school graduates ($p<0.001$), married individuals ($p<0.001$), those with low income ($p=0.002$), those with chronic diseases ($p<0.001$), individuals with widespread pain ($p<0.001$), those receiving treatment ($p<0.001$), and those not benefiting from treatment ($p=0.047$).

Conclusions: The psychosocial effects of chronic musculoskeletal pain were found to be at a moderate to high level. It was observed that as state and trait anxiety levels increased, the psychosocial effects of pain also increased. Various sociodemographic characteristics, health status, and response to treatment negatively affected the psychosocial effects of pain.

Keywords: Chronic musculoskeletal pain, Psychosocial risk factors, Anxiety, State-Trait Anxiety Inventory, Yellow Flag Questionnaire, Pain intensity

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INTRODUCTION

Musculoskeletal disorders represent a significant global public health concern, contributing to reduced quality of life and substantial workforce loss [1]. Chronic musculoskeletal pain is highly prevalent and commonly affects regions such as the lower back, neck, shoulders, and knees [2]. The etiology of such pain involves a complex interplay of sociodemographic factors—including genetic predisposition, age, sex, and obesity—as well as health-related variables such as physical disability, poor general health, and psychological stress. In addition, occupational hazards—such as jobs involving heavy lifting or exposure to whole-body vibration—play a critical role in the development and persistence of chronic pain [3].

Long-term and severe musculoskeletal pain may negatively affect the functionality of the individual not only in physical but also in mental and social aspects. In chronic pain conditions, individuals may develop fear of injury during movement, decrease in occupational productivity and various psychological disorders [4].

In this context, the concept of yellow flags has been introduced in the literature to describe social and psychological risk factors that may influence the prognosis of musculoskeletal pain. Yellow flags include a range of factors such as persistent pain requiring treatment, beliefs that the pain is harmful or disabling, activity avoidance due to fear of pain, preference for passive rather than active treatment approaches, anxiety and stress, work-related fatigue, as well as family dynamics such as overprotection or lack of support. The identification of yellow flags can aid in predicting the course and outcome of chronic pain conditions [5, 6].

In the current literature, although research on the psychosocial components of chronic pain is increasing, studies evaluating the relationship between yellow flags and anxiety levels in detail are still limited [7-11].

This study aimed to evaluate the psychosocial aspects of pain in individuals with chronic musculoskeletal pain lasting at least three months and to examine their relationship with state and trait anxiety levels. The findings are expected to enhance clinical awareness and support the development of strategies that incorporate psychosocial factors into pain management.

METHODS

This cross-sectional studywas conducted between February 15 and June 15, 2022, with individuals who presented with musculoskeletal pain lasting at least 3 months at the Family Medicine outpatient clinic of a tertiary care hospital and met the inclusion criteria.A total of 203 participants were enrolled.

Individuals aged 18–65 years who presented to the Family Medicine outpatient clinic, had musculoskeletal pain for at least 3 months (including chronic pain conditions such as chronic myofascial pain, fibromyalgia, chronic widespread pain, gout, osteoarthritis, rheumatoid arthritis, and spondyloarthropathies), had the ability to understand and answer the questions asked, and agreed to participate were included in the study.

Those with musculoskeletal pain lasting less than 3 months, those with serious psychiatric disorders (e.g., schizophrenia, delirium, acute confusional states), those with other metabolic or infectious diseases causing muscle pain, individuals showing “red flag” signs (cauda equina syndrome, tumors, inflammatory diseases, or other symptoms requiring urgent intervention), those who have undergone surgical operations within the last 6 months related to pain, individuals with a history of trauma (e.g., fractures), pregnant women, and those with conditions preventing communication (hearing and speech impairments, cognitive dysfunctions, uncooperative individuals), were excluded from the study.

Participants’ sociodemographic characteristics, general health status, and musculoskeletal pain-related features were obtained through the Descriptive Information Form.

Pain intensity was assessed using the Visual Analog Scale (VAS).

The Yellow Flag Questionnaire (YFQ) was administered to examine the psychosocial impact of pain.

Participants' anxiety levels were measured using the State-Trait Anxiety Inventory (S-TAI) which consists of two separate subscales: the State Anxiety Inventory (SAI) and the Trait Anxiety Inventory (TAI). Both subscales were evaluated and reported separately in this study to capture distinct aspects of anxiety.

Using a form prepared by us, participants’ sociodemographic characteristics—including age, gender, education, employment, and income status—as well as the presence of known chronic diseases,

diagnosed conditions causing pain, pain localization, type, duration, and treatment status were examined. Additionally, height (cm) and weight (kg) measurements were taken to calculate the Body Mass Index (BMI) (kg/m^2).

The Yellow Flag Questionnaire

The Yellow Flag Questionnaire was developed by Salathe et al. in 2018 to evaluate the psychosocial impact and identify risk factors in individuals suffering from chronic musculoskeletal pain [12]. The questionnaire was adapted into Turkish by Koç et al. in 2021. It consists of 32 items across seven subscales: activity, work, emotion, harm-blame, diagnostic beliefs, comorbidity, and control. Each item is scored from 0 to 4, with total scores ranging between 0 and 100. Seven items (1, 4, 5, 6, 14, 26, and 30) are reverse scored. The overall Cronbach's alpha was reported as 0.91 in the original version and 0.797 in the Turkish adaptation [13].

State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory (S-TAI) was developed by Spielberger et al. in 1964 [14]. It was later adapted into Turkish by Öner and Le Compte. S-TAI, a self-assessment inventory, consists of two separate 20-item subscales: the State Anxiety Inventory (SAI) and the Trait Anxiety Inventory (TAI).

The first part, SAI, evaluates how an individual feels at a specific moment. Items in this section are rated on a 4-point Likert scale with the following response options: "not at all," "somewhat," "moderately so," and "very much so."

The second part, TAI, measures a person's general tendency to feel anxious and includes response options such as "almost never," "sometimes," "often," and "almost always."

Both scales contain a mix of positively and negatively worded items. Positively worded (reverse-scored) items are scored in reverse: a score of 1 becomes 4, and a score of 4 becomes 1. In negatively worded (direct) items, higher scores (e.g., 4) indicate higher levels of anxiety.

To calculate the total scores, two separate scoring keys are used: one for the direct items and another for the reverse-scored items. The total score for direct items is calculated, the total from reverse-scored items is subtracted, and then a constant is added. This constant is 35 for both the State and Trait Anxiety Inventories. Scores on each scale range from 20 to 80, with higher scores indicating higher levels of anxiety and lower scores indicating lower levels of anxiety [15].

Ethical considerations

The study was conducted with the approval of the Local Ethics Committee (Date: 02.02.2022, Approval Number: 25). All procedures were carried out in accordance with the Declaration of Helsinki. Verbal and written informed consent were obtained from all participants.

Statistical analyses

The SPSS 25.0 statistical package program was used for data analysis. Descriptive data related to the sociodemographic characteristics of the participants were presented in frequency tables (N and %). Descriptive statistics for continuous variables were expressed as mean ± standard deviation (SD) or median (min–max). The data were examined in terms of normality assumptions. If the data were normally distributed, Pearson correlation analysis—a parametric test—was used to determine the relationship between SAI, TAI, YFQ, and VAS scores. If the data did not show normal distribution, Spearman correlation analysis—a non-parametric test—was used. In addition, to assess whether the SAI, TAI, YFQ, and VAS scores differed significantly based on sociodemographic variables, independent samples t-test or Mann–Whitney U test, and one-way ANOVA or Kruskal–Wallis test were applied depending on the normality of the data. In cases where a significant difference was found between multiple groups, post-hoc tests were conducted to determine between which groups the difference existed. A p-value of less than 0.05 was considered statistically significant.

RESULTS

This study was conducted with 203 participants aged between 23 and 65 years (mean: 45.38 ± 12.68 years). The distribution of the participants' sociodemographic and medical characteristics is presented in Table 1.

Table1. Distribution of sociodemographic and medical

Variables		n	%
Age	40 years and below	73	36.0
	41 years and above	130	64.0
Gender	Female	143	70.4
	Male	60	29.6
Education level	Literate	28	13.8
	Primary school	79	38.9
	Middle school	24	11.8
	High school	34	16.7
	University	38	18.8
Marital status	Married	152	74.9
	Single	51	25.1
Employment status	Not working	13	6.4
	Housewife	91	44.8
	Blue collar	56	27.6
	White collar	43	21.2
Income status	Low	78	38.4
	Medium	105	51.7
	High	20	9.9
Presence of chronic disease	No	68	33.5
	Yes	135	66.5
Groups according to body mass index	Underweight	3	1.5
	Normal	47	23.2
	Overweight	73	36.0
	Obese	80	39.3

Data presented as number (n) and percentage (%)

Table 2 displays the characteristics related to musculoskeletal pain. Among the participants, 67% (n = 136) reported low back pain, 52.2% (n = 106) reported neck pain, and 36.8% (n = 75) had extremity pain.

A number of participants reported pain in multiple musculoskeletal sites. Therefore, the percentages for low back, neck, and extremity pain represent overlapping groups.The average duration of pain was 85.50 ± 75.14 months (min: 3 – max: 432)(Table 2).

Table2. Participants' characteristics of related musculoskeletal pain

Variables		**n**	**%**
Localization of pain*	Low back pain	136	67.0
	Neck pain	106	52.2
	Leg-arm pain	75	36.8
Pain type	Localised pain	55	27.1
	Radiating pain	148	72.9
Treatment status	No	41	20.2
	Yes	162	79.8
Distribution of treatments applied	Medical treatment	151	74.4
	Muscle/joint injection	81	39.9
	Exercise	66	32.5
	Physical therapy	103	50.7
	Surgery	16	7.9
	Alternative medicine	13	6.4
Benefit from treatment	Yes	21	10.3
	Partially	129	63.5
	No	41	20.2
Duration of pain (months) (mean ± SD)		85.50 ± 75.14	

Data presented as number (n) and percentage (%). * Since multiple pain sites could be reported by each participant, the percentages sum to more than 100%.

Descriptive statistics of the total and subscale scores of the instruments used in the study are presented in Table 3. The mean total scores were as follows: Trait Anxiety Inventory (TAI): 44.31 ± 8.27; State Anxiety Inventory (SAI): 41.01 ± 10.77; Yellow Flag Questionnaire (YFQ): 73.05 ± 16.80; and Visual Analog Scale (VAS): 6.09 ± 1.92 (Table 3).

Table3. Descriptive statistics of scale and subscale scores

	Min	**Max**	**Mean**	**SD**
Trait Anxiety Inventory - Total	23	67	44,31	8,27
State Anxiety Inventory - Total	20	70	41,01	10,77
YFQ - Total	23	105	73,05	16,80
YFQ - Activity	1	27	15,79	5,46
YFQ - Work	0	16	7,84	3,68
YFQ - Emotion	4	23	12,97	4,30
YFQ - Harm/Blame	0	15	7,65	3,44
YFQ - Belief in God	0	8	6,29	1,75
YFQ - Comorbidity	0	13	5,24	2,27
YFQ - Control	3	28	17,26	4,94

Data presented as minimum (min), maximum (max), mean and standard deviation (SD) values. YFQ: Yellow Flag Questionnaire

As shown in Table 4, a positive and statistically significant correlation was found between the total scores of TAI and SAI (r = 0.542, p < 0.001). Additionally, positive and statistically significant correlations were observed between the total scores of TAI and YFQ (r = 0.243, p < 0.001), and SAI and YFQ (r = 0.191, p = 0.006).

Table4. Correlation results of scale and subscale relationships

		1	2	3	4	5	6	7	8	9	10
1- TAI- Total score	r	1									
	p										
2- SAI- Total score	r	.542	1								
	p	**<0.001**									
3- YFQ- Total score	r	.243	.191	1							
	p	**<0.001**	**0.006**								
4- YFQ - Activity	r	0.106	0.032	.731	1						
	p	0.132	0.651	**<0.001**							
5- YFQ - Work	r	.159	0.125	.673	.421	1					
	p	**0.024**	0.075	**<0.001**	**<0.001**						
6- YFQ - Emotion	r	.172	.190	.690	.378	.466	1				
	p	**0.014**	**0.007**	**<0.001**	**<0.001**	**<0.001**					
7- YFQ - Harm/ Blame	r	.167	0.120	.572	.302	.299	.330	1			
	p	**0.017**	0.087	**<0.001**	**<0.001**	**<0.001**	**<0.001**				
8- YFQ - Belief in God	r	0.015	-0.061	.193	-0.046	-0.031	0.048	-0.057	1		
	p	0.832	0.385	**0.006**	0.513	0.665	0.495	0.420			
9- YFQ - Comorbidity	r	.289	.315	.616	.222	.318	.417	.319	.179	1	
	p	**<0,001**	**<0.001**	**<0,001**	**0.001**	**<0.001**	**<0.001**	**<0.001**	**0,011**		
10- YFQ - Control	r	.178	.151	.732	.450	.316	.266	.288	.282	.496	1
	p	**0.011**	**0.031**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	

SAI: State Anxiety Inventory. TAI: Trait Anxiety Inventory. YFQ: Yellow Flag Questionnaire

Table 5 compares the total and subscale scores of TAI, SAI, and YFQ according to the participants' sociodemographic characteristics. A statistically significant relationship was found between TAI total score and gender ($p < 0.001$) and type of pain ($p < 0.001$); TAI scores were higher among females and those with radiating pain. A significant difference was also found in TAI total scores by educational level ($p = 0.032$), with participants who had only primary education scoring higher. Similarly, a significant relationship was found between SAI total score and gender ($p = 0.002$) and type of pain ($p = 0.001$), with higher scores in females and those with radiating pain. SAI total scores also differed significantly by educational level ($p = 0.026$), with high school graduates showing the highest scores.

There was a statistically significant relationship between YFQ total score and age ($p < 0.001$), marital status ($p < 0.001$), presence of chronic disease ($p < 0.001$), type of pain ($p < 0.001$), and treatment status ($p < 0.001$). Higher YFQ scores were observed in participants aged 41 and older, those who were married, had chronic illness, experienced radiating pain, and were receiving treatment.

Table5. Comparison of the total and subscale scores of the scales according to the demographic characteristics of the participants

Variables	**N**	**Trait Anxiety Inventory - Total**	**State Anxiety Inventory - Total**	**YFQ – Total**
Age		**Mean±SD**	**Mean±SD**	**Mean±SD**
40 and below	73	44.29±9.00	41.78±11.71	61.88±16.72
41 and above	130	44.32±7.87	40.58±10.23	79.33±13.24
p=		0.977	0.449	**<0.001**
Gender		**Mean±SD**	**Mean±SD**	**Mean±SD**
Female	143	46.17±7.54	42.51±10.22	74.45±17.42
Male	60	39.87±8.30	37.45±11.29	69.73±14.82
p=		**<0.001**	**0.002**	0.068
Education level		**Mean±SD**	**Mean±SD**	**Mean±SD**
1) Literate	28	43.61±7.79	43.61±9.38	80.14±14.49
2) Primary school	79	46.06±8.15	40.86±10.18	80.23±13.93
3) Middle school	24	41.96±7.24	37.21±7.62	72.08±13.26
4) High school	34	45.50±9.45	44.76±11.96	70.18±14.57
5) University	38	41.61±7.60	38.47±12.37	56.11±15.11
p=		**0.032**	**0.026**	**<0.001**
Post-Hoc		**2-3,5 4-5**	**1-3, 3-4, 4-5**	**1-3,4,5 2-3,4,5 5-3,4**
Marital status		**Mean±SD**	**Mean±SD**	**Mean±SD**
Married	152	44.27±8.53	40.54±10.84	77.01±14.76
Single	51	44.43±7.53	42.43±10.52	61.27±17.11
p=		0.904	0.279	**<0.001**
Employment status		**Mean±SD**	**Mean±SD**	**Mean±SD**
Not working	13	43.85±9.56	41.77±10.75	81.31±10.41
Housewife	91	46.05±7.72	41.84±9.64	81.48±13.19

Blue collar	56	43.09±8.47	40.96±11.57	70.30±14.06
White collar	43	42.35±8.29	39.12±12.04	56.30±14.89
p=		0.051	0.590	**<0.001**
Post-Hoc		-	-	**1-3,4** **2-3,4** **3-4**
Income status		**Mean±SD**	**Mean±SD**	**Mean±SD**
Low	78	45.77±8.18	44.21±10.81	74.60±15.89
Middle	105	43.94±7.71	40.00±10.16	74.25±17.19
High	20	40.55±10.32	33.90±9.69	60.75±13.51
p=		**0.033**	**<0.001**	**0.002**
Post-Hoc		**1-3**	**1-2,3; 2-3**	**3-1,2**
Presence of chronic disease		**Mean±SD**	**Mean±SD**	**Mean±SD**
No	68	43.81±8.10	40.85±11.30	61.19±14.94
Yes	135	44.56±8.37	41.10±10.53	79.03±14.37
p=		0.541	0.880	**<0.001**
Groups according to body mass index		**Mean±SD**	**Mean±SD**	**Mean±SD**
Underweight	3	41.33±10.97	46.33±11.50	75.00±21.79
Normal	47	43.55±8.80	40.60±13.51	62.21±17.59
Overweight	73	43.45±8.06	40.34±11.05	72.47±15.09
Obese	80	45.65±8.02	41.68±8.57	79.89±14.28
p=		0.301	0.711	**<0.001**
Post-Hoc		-	-	**2-3,4** **3-4**
Pain type		**Mean±SD**	**Mean±SD**	**Mean±SD**
Localised pain	55	40.95±7.68	37.00±9.33	62.09±17.29
Radiating pain	148	45.56±8.16	42.51±10.91	77.13±14.70
p=		**<0.001**	**0.001**	**<0.001**
Treatment status		**Mean±SD**	**Mean±SD**	**Mean±SD**
No	41	44.15±7.55	40.51±11.26	64.71±17.50
Yes	162	44.35±8.47	41.14±10.67	75.17±15.99
p=		0.887	0.739	**<0.001**
Benefit from treatment		**Mean±SD**	**Mean±SD**	**Mean±SD**
Yes	21	43.52±10.37	40.38±14.48	64.71±17.15
Partially	129	44.40±7.93	41.09±10.19	74.48±16.31
No	42	44.60±8.73	41.71±10.76	73.69±17.54
p=		0.886	0.894	**0.047**
Post-Hoc		-	-	**1-2,3**

ANOVA, Independent T Test, Post-Hoc; LSD. YFQ: Yellow Flag Questionnaire

DISCUSSION

In this study, the psychosocial effects of pain and their relationship with anxiety levels were evaluated in individuals experiencing chronic musculoskeletal pain lasting at least three months. The findings revealed that pain encompasses not only physical but also significant psychological and social dimensions. In the majority of participants, the psychosocial effects of pain were found to be at moderate to high levels; a significant positive correlation was identified between pain intensity and both state and trait anxiety levels.

Previous studies have reported that chronic pain negatively affects individuals' social functioning, work life, and emotional state, leading to psychiatric symptoms such as anxiety and depression. A study conducted in 2013 reported a positive correlation between pain intensity and anxiety levels in individuals with chronic pain, and a four-year follow-up study carried out in the Netherlands in 2014 demonstrated that this relationship increased over time [16, 17]. Similarly, Martinez-Calderon et al. reported that as pain intensity increased, pain-related anxiety levels also rose [18]. In line with these studies, our study also identified a significant relationship between pain intensity and both trait and state anxiety scores.

In our study, yellow flag scores increased in parallel with pain intensity and showed a significant correlation with anxiety levels. Similarly, in the Turkish adaptation of the Yellow Flags Questionnaire (YFQ) by Koç et al., a positive relationship was found between yellow flag scores and anxiety levels [13]. Although this relationship was not observed in the original study by Salathé et al., which developed the YFQ, subsequent research has demonstrated significant associations between yellow flags, both pain intensity and anxiety [19-21]. In our study, the mean yellow flag score was 73.05 ± 16.80, indicating a pronounced psychosocial impact of pain among the participants.

Many risk factors have been identified regarding the psychosocial effects of chronic musculoskeletal pain, including advanced age, genetics, obesity, tall stature, postural disorders, and muscle weakness. Poor general health, emotional stress, and occupations involving continuous heavy lifting and whole-body exposure to vibration are also considered psychosocial risk factors [22, 23].

When evaluated in terms of gender differences, studies in the literature have reported varying results. For example, a study conducted in 2019 reported a higher incidence of low back, neck, and back pain in women [24]. In a study conducted in Sweden involving 35,000 individuals with chronic pain, both pain intensity and anxiety scores were found to be significantly higher in women [25]. Tavahomi et al. also demonstrated that anxiety levels were higher in women with chronic neck pain compared to men [26]. However, there are contradictory findings in the literature indicating higher anxiety levels in men [27]. In our study, trait and state anxiety scores were significantly higher in females compared to males, aligning with the general trend observed in the literature.

The findings related to the age variable show both similarities and differences compared to the literature. Some studies have reported that sensitivity to pain-related anxiety increases with age [28]. However, in our study, no significant relationship was found between age and anxiety scores. Nevertheless, yellow flag scores were higher in individuals aged 41 and above, a finding consistent with the study by Abdel Salam et al [29].

In our study, anxiety scores and yellow flag scores were found to be significantly higher in individuals with low income levels. This finding aligns with some previous studies. It is thought that factors such as pain-related work loss, inadequate access to treatment, and chronic stress may increase psychological impact, particularly among individuals living in low-income groups. Mills et al. also reported higher anxiety levels in individuals with low socioeconomic status [30]. However, some studies have found no significant relationship between income level and pain or anxiety [31]. At this point, factors such as country-specific conditions, differences in healthcare access, and cultural variables may play a role.

This study has several limitations. The cross-sectional design limits the ability to determine causal relationships between chronic pain, psychosocial factors, and anxiety levels. Additionally, although the sample size is sufficient for preliminary analyses, it may restrict the generalizability of the findings to broader populations. The self-report questionnaires used in the study are based on participants' perceptions, which carries the risk of bias related to subjective responses and reporting accuracy. Future studies should employ longitudinal designs to better elucidate the temporal relationships and causality among pain intensity, psychosocial stressors, and mental health outcomes.

Conclusions

This study has demonstrated that chronic musculoskeletal pain exerts a moderate to high psychosocial impact on individuals. The psychosocial stress associated with chronic pain increases the prevalence of anxiety symptoms. Moreover, factors such

as sociodemographic characteristics, overall health status, and treatment response have been identified as significant determinants of these effects. Therefore, it is crucial to consider psychosocial factors in pain management. In particular, more comprehensive and holistic follow-up strategies should be developed for individuals who are elderly, of low socioeconomic status, or have not received effective treatment.

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