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Evaluation of sexual dysfunction in females with neck and upper back myofascial pain syndrome: a cross-sectional study

Ramazan Yılmaz[1] · Savaş Karpuz[1] · Emine Akdere[1] · Halim Yılmaz[1]

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Abstract

Myofascial pain syndrome (MPS) is a prevalent chronic musculoskeletal pain disorder that is frequently encountered in clinical practice and can cause sexual dysfunction in women. While there have been studies examining sexual function in various painful rheumatic conditions, particularly fibromyalgia, no studies have been conducted specifically on primary MPS. In this context, we aimed to investigate the frequency of sexual intercourse and the factors associated with it in women diagnosed with MPS. The study was designed as a cross-sectional study at a tertiary rehabilitation center between May 2022 and April 2023. Forty-five consecutive sexually active women (mean age: 38.1 ± 6.8 years) diagnosed with primary MPS were included in the study. They were compared to 45 healthy women of similar ages. The participants were interviewed regarding their weekly frequency of sexual intercourse and the importance of sexual life. Also, the Beck Depression Inventory (BDI) and the Visual Analog Scale (VAS) were assessed. The importance of sexual life score ($p = 0.008$), BDI ($p < 0.001$), VAS pain ($p < 0.001$), and VAS fatigue ($p < 0.001$) values were found to be lower in the patient group compared to the control group. The frequency of sexual intercourse was lower in the patient group, although this difference did not reach statistical significance ($p = 0.083$). In patients with a higher BDI score (≥ 17), the number of sexual intercourse was lower ($p = 0.044$), and the severity of fatigue was higher ($p = 0.013$). Significant associations were observed in MPS patients between the weekly frequency of sexual intercourse and VAS pain, VAS fatigue, BDI, and the importance of the sexual life score. A positive correlation was observed between the number of weekly sexual intercourses and the importance of the sexual life score ($r = 0.577$, $p < 0.001$), and negative correlations were found between BDI ($r = -0.478$, $p < 0.001$), VAS pain ($r = -0.409$, $p < 0.001$), and VAS fatigue ($r = -0.439$, $p < 0.001$). Patients with MPS should be assessed for depressive mood and fatigue, as these factors may contribute to sexual dysfunction. These results may also emphasize the importance of adopting a multidisciplinary approach in the management of MPS patients with concurrent sexual dysfunction. Clinicaltrials.gov identifier: NCT05727566.

Keywords Depression · Myofascial pain · Sexual dysfunction · Chronic pain · Female

Introduction

Myofascial pain syndrome (MPS) is a chronic regional soft tissue disorder characterized by hyperirritable and painful trigger points, and referred pain in the muscle and fascia. MPS is characterized by non-inflammatory muscle pain and sensory, motor, and autonomic symptoms [1]. Fibromyalgia and MPS are the two most prominent forms of musculoskeletal pain disorders. Although it is similar to fibromyalgia in some aspects, they can be easily distinguished from each other by the fact that the pain is regional, and unlike the tender points in fibromyalgia, there are palpable taut bands in muscle fibers named trigger points. MPS is a chronic pain

✉ Ramazan Yılmaz
drramazanyilmaz@yahoo.com

Savaş Karpuz
svskrpz@hotmail.com

Emine Akdere
emineozkan_33_51@hotmail.com

Halim Yılmaz
drhalimyilmaz@hotmail.com

[1] Department of Physical Medicine and Rehabilitation, Konya Beyhekim Training and Research Hospital, University of Health Sciences, Konya, Turkey

pattern disease that may show central sensitization features such as fibromyalgia [2].

Although MPS is widespread in the general population, the lack of distinct diagnostic criteria makes it difficult to make an accurate clinical diagnosis. For this reason, there is no clear data on its prevalence, but its frequency in medical clinics can reach up to 30–93% [3, 4]. MPS can be seen at any age, especially in middle-aged (20 to 40-years-old) people, and appears to be more common in females [5]. Treatment options for MPS include analgesics, muscle relaxants, patient education, antidepressants, exercise therapy, myofascial release techniques, physical therapy modalities, local minimally invasive interventional applications (trigger point injection, dry needling, acupuncture, ozone therapy, botulinum toxin A, etc.), and others [3–5]. Many cases are resistant to these primary conservative approaches, and there is no effective and curable treatment for the disease yet. Accordingly, it negatively affects psychosocial well-being and quality of life by causing permanent morbidity in most patients [6].

Sexual life is one of the most indispensable activities of human life, and it is obvious that sexual health is related to general bio-psycho-social health. Sexual dysfunction in women is a very important and complex medical problem [7]. The frequency of sexual dysfunctions is around 40–45% in the general population, and this rate increases significantly in those with physical disabilities and chronic diseases [8, 9]. This problem, which has multifaceted parameters, manifests itself, especially with sexual reluctance and avoidance of sexual intercourse [8, 9].

It has been reported that sexual dysfunction is common in rheumatic diseases, especially in fibromyalgia, systemic sclerosis, and Sjögren's syndrome [10–12]. In a recent systemic review and meta-analysis examining 5457 women with rheumatic disease in 68 studies, the frequency of sexual dysfunction was reported to be 60% in sexually active women [13]. Although the cause of sexual dysfunction may vary according to the type of rheumatic disease, there is a significant impact on sexual function in all rheumatic diseases. Therefore, screening and treatment of sexual dysfunction are necessary for the routine follow-up of all rheumatic diseases.

The main factors leading to sexual dysfunction in rheumatic diseases are pain and depression [13]. It has been reported that central sensitization and chronic pain may impair sexual functions through the autonomic nervous system [14, 15]. Many studies have shown that the pelvic floor myofascial band is frequently observed in patients with chronic pelvic pain, and associated painful intercourse negatively affects sexual life [15, 16]. However, sexual dysfunction has never been investigated in primary MPS, which is associated with chronic pain, fatigue, disability, and depression, similar to other chronic rheumatic diseases. This disease, which is also characterized by central sensitization and autonomic impairment, may lead to sexual dysfunction through different central or peripheral mechanisms. In this context, we aimed to investigate the frequency of sexual intercourse in this patient group based on the hypothesis that neck and upper back MPS may adversely affect sexual life. Additionally, our aim was to examine the potential impact on individuals' sexual lives who have higher levels of depressive symptoms, as well as those who experience increased pain or fatigue.

Material and methods

Study design

The research was designed as a prospective cross-sectional descriptive study conducted on outpatients in a tertiary rehabilitation hospital. The study protocol was approved by the Ethics Committee of the University of Health Sciences Turkey, Hamidiye Scientific Research Ethics Committee (date: 06.04.2022, and approval number: 9/22). This study was conducted according to the Declaration of Helsinki, and written informed consent for participation in the study was obtained from all subjects. The study was registered on ClinicalTrials.gov (NCT number: NCT05727566).

Participants

Patients who applied to the University of Health Sciences, Konya Beyhekim Training and Research Hospital Physical Medicine and Rehabilitation Clinics, and were diagnosed with primer neck and upper back MPS clinically between May 2022 and April 2023 were assessed for the study. The diagnosis of primary neck and upper back MPS is established through a comprehensive clinical assessment, including a detailed clinical history and manual examination of the trigger points. The diagnostic criteria are in line with widely accepted clinical guidelines and are supported by relevant literature [17]. The diagnosis was based on a manual examination of the myofascial trigger point (MTrP), and MPS was diagnosed if all five of the major criteria and at least one of the three minor criteria were met. The five major criteria for the diagnosis of MPS are regional pain complaints, where the pain pattern follows a known distribution of muscular referred pain, palpable taut bands, focal tenderness at one point or nodule within the taut band, and restricted active range of motion or slight muscle weakness due to pain. The minor criteria are: manual pressure on the MTrP nodule reproduces the chief pain complaint; snapping palpation of the taut band at the MTrP elicits a local twitch response; and pain is diminished or eliminated by local muscular treatment [17]. Patients with secondary or concomitant MPS were excluded from the study after a very rigorous clinical

evaluation. Just like the patient group, the control group also met the exclusion criteria related to diseases and medications. The inclusion and exclusion criteria are as follows:

Inclusion criteria

- Being a married, sexually active, non-menopausal woman aged between 18 and 50.
- Diagnosis of the primary neck and upper back MPS for a duration of more than 3 months.
- Volunteering to participate in the study and having adequate communication abilities.

Exclusion criteria

- Fibromyalgia or any other soft tissue or degenerative disease that causes chronic pain.
- Inflammatory rheumatic diseases such as rheumatoid arthritis, ankylosing spondylitis, Sjögren's syndrome, lupus, systemic sclerosis, etc.
- Cervical/lumbar radiculopathy or myelopathy.
- Limited range of motion in the upper or lower extremities.
- Presence of major and/or uncontrollable systemic diseases (cardiovascular, pulmonary, hepatic, renal, hematological, etc.).
- Psychiatric illness or mental retardation (based on anamnesis and medical records).
- Use of antidepressants, anxiolytics, antiepileptic drugs, or any drugs known to affect sexual function.
- Neurological diseases, endocrine diseases, or malignancy.
- Previous hysterectomy or vaginal surgery, history of sexually transmitted diseases.
- Urinary or anal incontinence.
- Pregnancy, lactation, or current use of estrogen therapy.
- Chronic alcohol use.
- Hearing or vision problems or communication difficulties.

General evaluation

A consecutive sample of 45 patients who were diagnosed with primary neck and upper back MPS, along with an age- and gender-matched control group, were included in the study. The control group consists of healthy persons of similar age and socio-cultural status to patients group, selected mostly among relatives and friends of others patients who visited our hospital. The sociodemographic characteristics of all participants (age, sex, body mass index, educational status, employment status, family type, duration of marriage, and number of children) and clinical findings (duration of symptoms, presence of chronic diseases, severity of pain, and fatigue) were recorded. Patients with abnormal findings in laboratory tests or imaging were excluded from the study. Additionally, 15 patients who met the inclusion criteria but declined to participate in the study (10 women also refused to be in the control group) were excluded. A total of 90 voluntary participants, 45 from each group, were taken to a separate quiet room where no one else was present (Fig. 1).

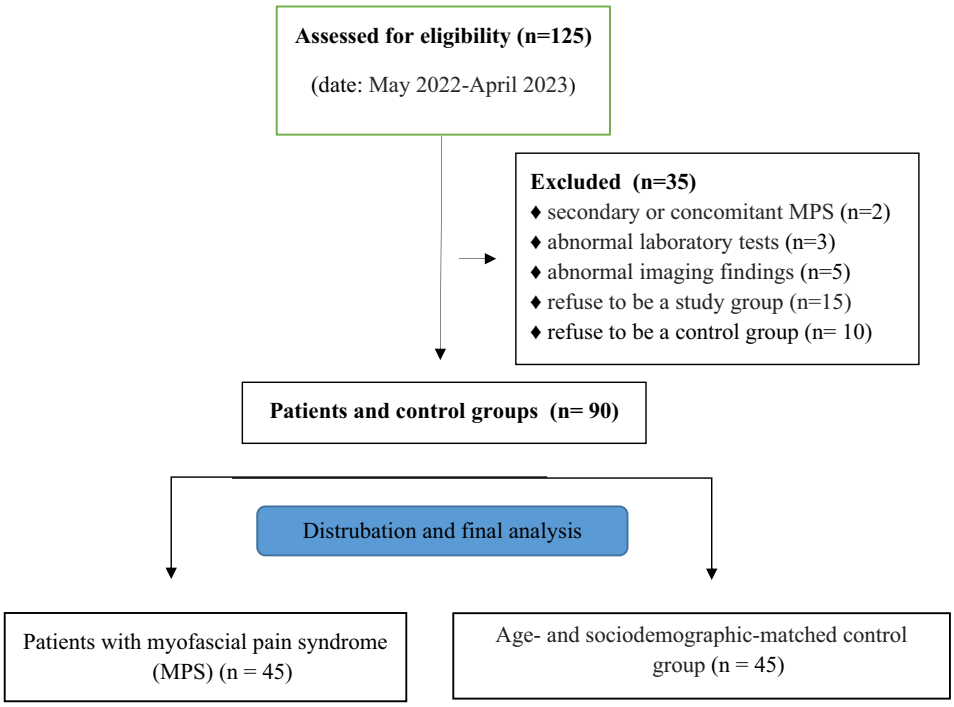

Fig. 1 Flowchart of the enrollment process of the study cohort

A female physician (EA) conducted the evaluation questionnaires in a calm, private setting, ensuring that patients could respond comfortably without any sense of embarrassment. The participants were verbally informed about the evaluation parameters, including the frequency of sexual intercourse, the importance of sexual life score, the Beck Depression Inventory score, and the intensity of pain and fatigue, as necessary. The majority of subjects completed the questionnaire forms by themselves; patients with low education levels completed them with help, without interfering their responses.

Frequency of sexual intercourse

The main outcome of the study was the frequency of weekly sexual intercourse. It was assessed based on the average frequency over the past three months, excluding the menstrual period. Sexual intercourse was defined as the penetration of the man's penis into the woman's vagina. Due to the retrospective nature of this inquiry, it was not possible to provide an exact number. Therefore, four options were presented: less than once a week, 1–2 times, 3–4 times, and 5 or more times.

Importance of sexual life score

A structured sexual life importance score was utilized [18]. Participants were asked to assess the overall importance of their sexual lives, taking into account their desires, satisfaction, and pain or discomfort experienced during sexual activity. To measure their response, a visual analog scale (VAS) ranging from 0 (not important at all) to 10 (extremely important) was used.

Beck Depression Inventory score

The Beck Depression Inventory (BDI), developed by Beck et al. and validated and tested for reliability in Turkish, consists of 21 items related to depressive symptoms such as pessimism, feelings of failure, lack of satisfaction, guilt, restlessness, fatigue, decreased appetite, indecisiveness, sleep disturbance, social withdrawal, and sexual interest [19]. Each item contains a four-point self-rating scale ranging from 0 to 3, which assesses a specific behavior associated with depression. The total maximum score is 63, and a score of 17 or higher indicates the presence of a depressive mood [8, 19].

Pain and fatigue intensity

The intensity of pain and fatigue experienced by the participants was measured using the Visual Analog Scale (VAS) [20]. The VAS questionnaire inquired about the average severity of pain and fatigue reported by the participants over the past three months. On this scale, which ranges from 0 to 10, a score of 0 indicates the absence of pain and fatigue, while a score of 10 represents the maximum level of pain and fatigue.

Statistical analysis

The G Power 3.1.9.4 software was utilized for power analysis. A literature review was conducted to determine the sample size for the study. Based on the primary outcomes of the study, which are the number of weekly sexual intercourses and the importance of sexual life scores, it was calculated (t-test: the difference between two independent groups or exact test for proportions of two independent groups) that a minimum of 13–34 patients per group should be included when the effect size ranges from 0.89 to 1.532 (ratio p1/p2 = 4.85), with an alpha value of 0.05 and a power value of 0.95 [18, 21].

Statistical analysis was conducted using IBM® SPSS Statistics 22.0 for Windows software. The categorical data used in the study were presented using frequency and percentage values [n, (%)], while the numerical data were presented using median (1st quartile–3rd quartile) values or mean ± standard deviation values. Non-parametric categorical data were evaluated using the Pearson Chi-square and Fisher's exact tests. The normal distribution of variables was assessed using the Shapiro–Wilk test. The independent groups' parametric values were compared using the Independent Samples t-test, while the Mann–Whitney U test was used for non-parametric values. The Kruskal–Wallis test was employed to compare variables among more than two independent groups. The relationship between the frequency of weekly sexual intercourse and clinical and demographic parameters was analyzed using Spearman's non-parametric rank correlation test. The significance level was set at $p < 0.05$.

Results

Both groups consisted of married and sexually active participants. The MPS group (n = 45) and the control group (n = 45) were statistically similar in terms of age, body mass index (BMI), education level, employment status, duration of marriage, family type, number of children, and presence of comorbid diseases (Table 1). The median symptom duration for MPS patients was 15 (6–60 months) months.

The sexual life importance score ($p = 0.008$), BDI ($p < 0.001$), VAS-pain ($p < 0.001$), and VAS-fatigue ($p < 0.001$) values were found to be lower in the patient group compared to the control group (Table 2). The weekly frequency of sexual intercourse was lower in the patient

Table 1 Demographic characteristics of study participants

	Patient group (n = 45)	Control group (n = 45)	p
Age (y ± SD)	38.11 ± 6.8	39.18 ± 7.7	0.490[a]
BMI (means ± SD)	26.31 ± 4.3	25.30 ± 3.4	0.214[a]
Education			
Illiterate	1 (%2)	2 (%5)	0.334[b]
Primary school (≤ 8 y)	9 (%20)	5 (%11)	
High school (9–12 y)	9 (%20)	2 (%11)	
College (> 13 y)	26 (58)	33 (%73)	
Employment			
Employed	25 (%56)	33 (%73)	0.078[c]
Housewife	20 (%44)	22 (%27)	
Family type (n %)			
Nuclear	40 (%89)	44 (%98)	0.203[b]
Large	5 (%11)	1 (%2)	
Duration of marriage (y)	15 (8.5–20.5)	14 (6.0–22.5)	0.872[d]
Number of children	3 (2–3)	3 (2–4)	0.529[d]
Chronic disease (n %)*			
Yes	10 (%22)	12 (%27)	0.625[c]
No	35 (%78)	33 (%73)	

BMI, body mass index; SD, standard deviation; y, years

*Including hypertension, diabetes, asthma, goiter, dermatitis, benign cardiac arrhythmia (no difference between groups)

[a]Independent samples t-test

[b]Fisher's exact test

[c]Pearson Chi-square test

[d]Mann–Whitney U test

Table 2 Evaluation of clinical parameters and sexual functions between groups

	Patient group (n = 45)	Control group (n = 45)	p
VAS-pain	7 (6–9)	3 (1–4.5)	< 0.001[a]
VAS-fatigue	7 (5–9)	4 (1.5–5)	< 0.001[a]
Beck Depression Inventory score	13 (8.5–21)	6 (3–9)	< 0.001[a]
BDIs ≥ 17 (n %)	18 (%40)	5 (%11)	0.002[b]
BDIs < 17 (n %)	27 (%60)	40 (%89)	
Importance of sexual life score	5 (4–7)	6 (5–8)	0.008[a]
Number of weekly sexual intercourse			
< 1 (n %)	20 (%44)	10 (%22)	0.083[c]
1 to 2 (n %)	19 (%43)	25 (%56)	
3 to 4 (n %)	6 (%13)	8%18)	
≥ 5 (n %)	0 (%0)	2 (%4)	

BDIs, Beck Depression Inventory score; VAS, visual analog scale

[a]Mann–Whitney U test

[b]Pearson Chi-square test

[c]Fischer's Exact test

group, although this difference did not reach statistical significance (p = 0.083) (Table 2). In patients with a higher BDI score (≥ 17), the number of sexual intercourse was lower (p = 0.044), and the severity of fatigue was higher (p = 0.013) (Table 3). Significant associations were observed in MPS patients between weekly frequency of sexual intercourse and VAS pain, VAS fatigue, BDI, and sexual importance score (Table 4). Individuals with lower sexual intercourse

Table 3 Comparison of clinical variables and sexual functions between high- and low-level Beck Depression Inventory score groups in patients with myofascial pain syndrome

Patients with MPS (n = 45)	High levels of BDIs (≥ 17)	Low levels of BDIs (< 17)	p
VAS-pain	7.5 (6–9)	7 (6–8)	0.424[a]
VAS-fatigue	8 (7–9)	6 (5–8)	0.013[a]
Importance of sexual life score	5 (3–6.25)	5 (5–7)	0.432[a]
Number of weekly sexual intercourse			
< 1 (n %)	12 (%27)	8 (%18)	0.044[b]
1 to 2 (n%)	4 (%9)	15 (%33)	
3 to 4 (n %)	2 (%4)	4 (%9)	
≥ 5 (n %)	0 (%0)	0 (%0)	

Mean ± SD values for normal distribution and median (1st quartile—3rd quartile) for non-normal distribution values were used. Categorical variables were expressed as n (%)

BDIs, Beck Depression Inventory score; VAS, visual analog scale, MPS, myofascial pain syndrome

[a]Mann-Whitney U test

[b]Pearson Chi-square test

Table 4 Comparison between evaluation parameters according to weekly sexual intercourse frequency

Number of weekly sexual intercourse	< 1 (n = 20)	1–2 (n = 19)	3–4 (n = 6)	> 5 (n = 0)	p[a]
Patients group					
Duration of marriage (y)	16.5 (13–20)	12 (5–21)	15 (8.5–22)	–	0.373
Duration of complaint (m)	19.5 (8–60)	12 (6–36)	42 (5.3–120)	–	0.589
Numbers of children	3 (2.3–3)	3 (2–3)	4 (1.8–4)	–	0.235
VAS-pain	8 (7–9.8)	7 (6–8)	6 (4.8–8.3)	–	**0.006**
VAS-fatigue	8 (6.3–9)	6 (4–8)	6 (5–8.3)	–	**0.048**
Beck Depression Inventory score	20 (13.5–23.8)	9 (7–12)	12.5 (7.8–18.8)	–	**0.001**
Importance of sexual life score	5 (2.3–5.8)	5 (5–7)	7.5 (5–8.5)	–	**0.021**
Number of weekly sexual intercourse	< 1 (n = 10)	1–2 (n = 25)	3–4 (n = 8)	> 5 (n = 2)[#]	p[a]
Control group					
Duration of marriage (y)	19 (9.8–25.6)	11 (6–22)	16 (3–26.8)	4 (1–7)	0.264
Numbers of children	3 (3–4)	3(2–4)	2.5 (1.3–3.8)	1.5 (1–2)	0.100
VAS-pain	3.5 (1.5–5.3)	4 (1.5–5)	1 (0–2.8)	2 (0–4)	0.148
VAS-fatigue	5 (3–6.5)	5 (3–5.6)	1 (0.3–3.5)	1.5 (0–3)	**0.007**
Beck Depression Inventory score	8 (6.8–20)	6.6 (3–8.5)	5.5 (3–8)	2.5 (2–3)	**0.053**
Importance of sexual life score	4.5 (2–5)	6 (6–7.6)	8 (8–8)	10 (10–10)	**< 0.001**

Median (1st quartile–3rd quartile) for non-normal distribution values were used

VAS, visual analog scale; m, months; y, years

[#]Median (min–max)

[a]Kruskal–Wallis test

frequency had higher levels of pain, fatigue, and BDI scores. Among those who had 3–4 weekly sexual intercourse occurrences, a significantly higher sexual life importance score was observed (p = 0.021) (Table 4). In the control group, individuals with a lower weekly frequency of sexual intercourse had higher VAS fatigue (p = 0.007) and a lower sexual life importance score (p < 0.001).

A positive correlation was observed between the weekly frequency of sexual intercourse and the sexual life importance score (r = 0.577, p < 0.001), and negative correlations were found between BDI (r = − 0.478, p 0.001), VAS pain (r = − 0.409, p < 0.001), and VAS fatigue (r = − 0.439, p < 0.001) (Table 5). Similar results to the correlation analysis shown in Table 5 were also observed in the patient group. In MPS patients, significant correlations were found between the weekly frequency of sexual intercourse and the sexual life importance score (r = 0.411, p = 0.005), BDI (r = − 0.491, p = 0.001), VAS pain (r = − 0.467, p = 0.001),

Table 5 Correlations with numbers of weekly sexual intercourse among participants

	r*	p
Age (y)	− 0.159	0.135
BMI (kg/m^2)	− 0.060	0.575
Education	− 0.107	0.314
Number of children	− 0.123	0.247
Duration of marriage (y)	− 0.161	0.131
VAS-pain	− 0.409	< 0.001
VAS-fatigue	− 0.439	< 0.001
Beck Depression Inventory score	− 0.478	< 0.001
Importance of sexual life score	0.577	< 0.001

BMI, body mass index; VAS, visual analog scale; y, years

*Spearman's rank correlation coefficient

and VAS fatigue (r = − 0.331, p = 0.026). Correlation values between the sexual life importance score and clinical parameters showed similarities to the correlation associated with the weekly frequency of sexual intercourse. As the sexual life importance score increased, VAS pain (r = − 0.342, p = 0.001), VAS fatigue (r = − 0.217, p = 0.04), and BDI (r = − 0.342, p = 0.001) decreased. No significant correlations were observed with other sociodemographic variables.

Discussion

In this study, which investigated sexual dysfunction in patients with primary neck and upper back MPS, it was found that the importance of sexual life scores was lower and BDI scores were higher in the patient group compared to the control group. Although the frequency of sexual intercourse was slightly lower in MPS patients, it did not reach statistical significance. However, it was observed that patients with higher levels of depressive symptoms and fatigue had a lower frequency of sexual intercourse. Furthermore, significant associations were found between the weekly frequency of sexual intercourse and the importance of the sexual life score, BDI scores, VAS fatigue, and VAS pain. Due to its high prevalence, primary MPS presents a significant research gap in terms of exploring its impact on sexual functioning. Therefore, this study is of particular importance as it is the first of its kind to examine sexual dysfunction in individuals with primary MPS affecting the neck and upper back.

The impact of sexual life extends beyond temporal boundaries and encompasses interconnected dimensions of physical, mental, emotional, general, and overall health [22, 23]. All these interrelated health types are positively associated with quality sex life, sexual satisfaction, and sexual self-esteem. The frequency of sexual activity in women has been found to be correlated with sexual satisfaction and happiness [24]. During sexual intercourse, the release of the oxytocin hormone reduces stress, endogenous endorphins provide a sense of relaxation, which may contribute to pain regulation, and androgens have a positive impact on overall health [25, 26]. However, it has been reported that approximately 40% of women experience sexual dysfunction, which negatively affects their quality of life, although the specific types of sexual dysfunction (desire, arousal, orgasm, and pain) may vary [9]. The causes of sexual dysfunction in women are complex and multifactorial, involving biological, psychological, sociocultural, and interpersonal factors. Common factors include chronic diseases, aging, hormonal factors, psychiatric disorders, and medication use (such as selective serotonin reuptake inhibitors, antiestrogens, anticholinergics, antihistamines, and certain cardiac drugs) [9, 27].

Chronic inflammatory rheumatic diseases can lead to sexual dysfunction in women through various direct and indirect mechanisms, including organ involvement, hormonal effects, musculoskeletal disability, and medication side effects [13, 28]. A systematic review and meta-analysis have predicted a prevalence of 60% for sexual dysfunction in sexually active women with systemic autoimmune rheumatic disorders [13]. Cross-sectional descriptive studies have reported an increased frequency of sexual dysfunction in conditions such as rheumatoid arthritis [12, 13], Sjögren's syndrome [11, 13], spondyloarthropathies [18], systemic lupus erythematosus [29, 30], systemic sclerosis [13, 31], idiopathic inflammatory myopathies [32], and vasculitis [33]. These studies suggest that sexual dysfunction is more strongly associated with factors such as disability, pain, fatigue, poor health perception, depression, and decreased quality of life than disease activity [13, 29–33]. In the present study, we observed a low frequency of sexual intercourse and low scores on the importance of the sexual life scale in MPS patients with high levels of pain, fatigue severity, and depressive symptoms, consistent with findings from existing literature on rheumatological diseases.

MPS and fibromyalgia are non-inflammatory rheumatic diseases characterized by chronic pain and central sensitization, which are similar to each other and defined as other sides of the same coin according to some researchers [17, 34]. In a systemic review of 10 studies on chronic musculoskeletal pain, including back pain and fibromyalgia, it was reported that sexual dysfunction was more common than in healthy controls and that sexual problems were correlated with pain and comorbid psychological problems [35]. Flegge et al. reported that those with chronic pain experienced significant sexual dysfunction, including a lack of interest in sexual activity and low satisfaction with their sexual lives. Compared with patients without sexual dysfunction, patients with sexual dysfunction had higher pain levels and more depressive symptoms and anxiety disorders [36]. In addition,

it has been reported that the relationship between low sexual satisfaction, pain, and depression is observed in women, not men. In a recent meta-analysis, it was reported that women with fibromyalgia experience an increase in sexual dysfunction characterized by decreased sexual desire and satisfaction, as well as increased sexual pain, compared to healthy controls [37]. Studies conducted in Turkey have shown that sexual problems are commonly observed in patients with fibromyalgia, and among those with sexual dysfunction, there is a higher intensity of pain and depression symptoms that negatively affect sexual functioning compared to those without sexual dysfunction [38, 39].

Central sensitization, characterized by enhanced excitability and altered processing of nociceptive signals within the central nervous system, plays a crucial role in the pathophysiology of chronic pain conditions, including MPS [17, 34, 35]. Trigger points in MPS are associated with regional and referred pain, muscle stiffness, restricted range of motion, and autonomic dysfunction [14]. Although painful myofascial trigger points are most commonly observed in the neck, upper back, and posterior shoulder, reflected pain in more distant regions may have motor and autonomic effects [40]. Chronic pelvic pain manifests with sexual dysfunction, disability, depression, and deterioration in quality of life, and its most common cause is pelvic floor myofascial pain [41]. The pelvic floor is interconnected with remote regions of the body, including the cervical region and the lower extremities, through myofascial connections. Consequently, dysfunctions affecting the muscles, ligaments, and fascia in distant areas can contribute to pelvic floor disorders, encompassing urinary incontinence, sexual dysfunction, and pain, owing to the continuum of tissues [42]. The highlighted aspects above, including central sensitization, autonomic involvement, anatomical continuity of the fascial system across regions, and myofascial dysfunction, suggest a potential impact on sexual function in the primary neck and upper back MPS [15].

In this study, based on the aforementioned hypothesis, although no significant difference was detected in terms of sexual intercourse frequency between the groups, we observed that MPS patients attributed less importance to sexual life. Additionally, similar to other rheumatic diseases and chronic painful conditions, including fibromyalgia, we revealed a significant relationship between depressive symptoms, pain, fatigue, and sexual dysfunction.

One of the most commonly used instruments for assessing sexual function is the Female Sexual Function Index (FSFI) [43]. The FSFI is a comprehensive questionnaire used to evaluate sexual dysfunction in women, measuring various dimensions of sexual function. However, factors such as the private and taboo nature of the subject, time-consuming administration, and impracticality in clinical settings like hospitals make the use of FSFI challenging. Therefore, the weekly frequency of sexual intercourse can be considered a simple and rapid alternative for assessing sexual function. A similar logical analysis can be applied to the importance of the sexual life score. The structured importance of the sexual life score used in our study can provide a concise representation of FSFI through a single question, allowing for a straightforward evaluation of sexual function. Indeed, studies have supported a strong correlation between weekly frequency of sexual intercourse [18, 21, 39, 44] and sexual importance score [18, 21] with FSFI. Consistent with these findings, our study also revealed results in line with this, with the strongest correlation ($r = 0.58$) observed between the weekly frequency of sexual intercourse and the sexual importance score.

Limitations

Main limitations of this study are its single-center nature, cross-sectional design, lack of a longitudinal approach, and the use of the FSFI questionnaire. Due to its cross-sectional nature, the number of weekly sexual intercourse was measured through recall and reported within a range of approximate values. Factors that can influence sexual function, such as body image, sleep disorders, sexual attractiveness, and anxiety, were not specifically assessed [45, 46]. The lack of information on participants' spouses' sexual dysfunction and their sexual skills could also limit the study's findings. Another limitation is that psychiatric disorders were not assessed using a structured psychiatric interview. Despite these limitations, as mentioned above, the use of the structured importance of sexual life score, the strong correlation between the frequency of sexual intercourse and the FSFI questionnaire, and the standardized administration of the questionnaires in an appropriate setting by a female physician are strengths of our study. Additionally, we hope that the present study, being the first investigation to examine sexual function in patients with primary MPS using a prospective cross-sectional design and considering highly selective inclusion criteria, will make a significant contribution to the literature.

Conclusion

This study demonstrates the association between pain and fatigue severity, as well as levels of depressive symptoms, with the frequency of sexual intercourse and the importance of the sexual life score in patients with primary MPS in the neck and upper back region.Therefore, it is crucial to conduct a comprehensive evaluation of patients with primary MPS who exhibit characteristics of chronic pain and central sensitization syndrome, such as fibromyalgia, considering

their depressive mood and fatigue. It should be noted that there are multiple factors contributing to sexual dysfunction in these patients, which should not be overlooked. Understanding the interplay between these factors can contribute to a more comprehensive assessment and management of sexual dysfunction in individuals with MPS and related conditions. Further research is needed to elucidate the exact nature, mechanisms, and causal relationship between MPS and sexual dysfunction. This study can serve as a stepping stone to explore these potential associations.

Author contributions RY, SK, EA, and HY developed the concept, research aims, and methodology for the present study. RY, EA, and SK recruited participants and conducted data collection. RY prepared and wrote the first draft of this manuscript, with reviews and revisions undertaken by all authors. According to the ICMJE authorship criteria, all authors have fulfilled the requirements of providing final approval for the version to be published and agree to be accountable for all aspects of the work, including the investigation and resolution of any questions regarding the accuracy or integrity of the manuscript.

Declarations

Conflict of interest The authors declare no competing interests.

Ethical approval The present study protocol was approved by the Ethics Committee of Hamidiye Scientific Research Ethics Committee (date: 06.04.2022, and approval number: 9/22). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the principles of the Declaration of Helsinki. The study was registered on ClinicalTrials.gov (NCT number: NCT05727566).

Informed consent Informed consent was obtained from all individual participants included in the study.

Open data sharing statement We consider and accept the sharing of the article and the data in its annexes to third parties without any hindrance after the acceptance of the article.

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