

Evaluation of Neuropathic Pain Component in Myofascial Pain Syndrome; Its Effect on Emosyonel Status, Sleep and Quality of Life

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ABSTRACT

Objective: This study aimed to evaluate the neuropathic pain component in patients with myofascial pain syndrome and to examine the effects of neuropathic pain on emotional status, sleep and quality of life.

Material and Methods: 73 patients with MPS (myofascial pain syndrome) in their neck or upper back region admitted to the tertiary university hospital were included. Questionnaires were administrated to the patients via face-to-face interviews, and included sociodemographic variables. The patients were evaluated for neuropathic component by DN4 (Douleur Neuropathique en 4 Questions) questionnaires, and pain by VAS (Visual Analogue Scale). Validated questionnaires measuring emotional status, sleep quality and quality of life were used.

Results: Of the 73 patients, 48 (65.8%) were female and 25 (34.2%) were male. The mean age of all recruited patients was 38.2±10.6 years. According to the DN4 scale 56.2% of the patients had neuropathic pain. MPS patients were divided into two groups as those with and without neuropathic pain. VAS, BDI (Beck Depression Inventory), and PSQI (Pittsburgh Sleep Quality Index) scores were significantly higher among MPS patients with neuropathic pain than among MPS patients without neuropathic pain (p<0.01). The patients with neuropathic pain had lower scores for all the parameters of the SF-36 (Short Form-36). Moreover vitality, social function, mental health, and emotional role dimensions scores were significantly lower in MPS patients with neuropathic pain than MPS patients without neuropathic pain (p<0.01).

Conclusion: An appropriate diagnosis and treatment of the neuropathic pain plays an important role and can reduce the pain, improve the quality of life and sleep quality, and decrease the level of depression in the treatment of MPS.

Keywords: Myofascial pain syndromes, neuropathic pain, quality of life, sleep quality, depression

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INTRODUCTION

Myofascial pain syndrome (MPS), an important cause of chronic musculoskeletal pain, is a non-inflammatory rheumatic disease accompanied by autonomic dysfunction, causing local or referred pain, characterized by the presence of trigger points in the muscle or fascia. MPS can be seen in all ages and genders; however, its incidence may increase with advancing age. The underlying aetiology is multifactorial; causes may be listed as poor ergonomics, trauma, inappropriate body mechanics, emotional stress and postural stresses due to repeated overuse. Recent studies indicated that MPS should not be a local/peripheral painful syndrome and considered to be a syndrome of central sensitivity. MPS is characterized by latent or active trigger points, local taut band within the muscle, local and referred pains arising from trigger points, local twitch and jump response, and limited range of motion (1-4).

Primer MPS can occur independently of other pain generators. However, MPS often coexists with or is secondary to other acute and chronic painful musculoskeletal conditions including.

Neuropathic pain (NP), one of the most common conditions associated with MPS, is an acute or chronic pain syndrome resulting from aberrant somatosensory processing of the pain-causing mechanism in the peripheral or central nervous system (2). In neuropathic pain that starts with peripheral sensitization, increased transduction sensitivity of nociceptors and changes in ionic conductance in peripheral nerve terminal cause this process. Inflammatory cells also produce growth factors and cytokines that contribute to the increased sensitivity of nociceptors. Structural factors such as muscle shortening, impaired and weakened collagen, and trophic changes contribute to the pathophysiology of myofascial neuropathic pain (5,6). The aim of this study was to determine the prevalence of neuropathic pain component by DN4 scale in patients with MPS, and to examine the effects of neuropathic pain on emotional status, sleep quality and quality of life.

MATERIAL and METHODS

Study Design: This observational, cross-sectional, clinical study was conducted in the Physical and Rehabilitation Department of our institution between February 2021 and December 2021. The Clinical Research Ethics Committee of the university school of medicine approved the study protocol (Decision no: 2021/27; date: February 1, 2021). Prior to the evaluation, the patients, as appropriate, were given verbal and written information on the nature of the study. Informed consent forms were signed upon admission to the trial. All procedures performed in studies with human participants met the ethical standards of the Institutional Research Commission and the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards.

Patient Selection and Data Collection: A total of 73 patients with MPS in their neck or upper back region were included in the study. Patients with the primary MPS who met the inclusion criteria [(age between 19 and 60 years, patients with persisting neck or shoulder pain for ≥ 3 months, MTrPs in one or more of the trapezius, the infraspinatus, and/or the levator scapulae muscles), normal neurologic examination, being able to read and write fluently in Turkish, and giving an informed consent] were involved via simple random sampling. The existence of MPS was evaluated using specific diagnostic criteria (7, 8). The exclusion criteria were as follows:

- (i) patients diagnosed with fibromyalgia, cervical radiculopathy/myelopathy, metabolic diseases like hypothyroidism or diabetes mellitus
- (ii) any diagnosis of psychiatric disorders and receiving psychiatric treatments or cognitive dysfunctions including dementia,
- (iii) inability to read and understand the questionnaires,
- (iv) malignancy,
- (v) presence of kyphoscoliosis
- (vi) implementation of dry needling or local anaesthetic injection to trigger point muscle 3 months prior to the beginning of the study,
- (vii) patients with previous brain, neck or shoulder surgery,
- (viii) prisoners or pregnant women.

Once the patients agreed to participate, the patients' sociodemographic data (gender, age, body mass index (BMI), educational status, marital status, occupational status) were recorded. Visual analogue scale (VAS) was used to evaluate the intensity of the pain. VAS is a psychometric measuring instrument used to assess changes in symptom levels of each patient in order to achieve a rapid scaling of symptoms and follow-up of the disease. VAS is a simple and commonly applied method for the evaluation of pain intensity. Patients were instructed to rate their pain intensity with the activity, which ranged from '0' (no pain) to '10' cm (severe pain). A Turkish version is available (9).

Assessment of Neuropathic pain

The symptoms of neuropathic pain and severity of pain can be determined by using several screening questionnaires including the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS), the Neuropathic Pain Questionnaire, the Douleur Neuropathique en 4 Questions (DN4), and Pain DETECT (10-12). In this study, the existence of neuropathic pain component in both trigger point and referred pain regions was assessed with DN4 questionnaires. DN4 is consists of ten questions; seven questions related to pain quality based on an interview with the patient, and three are concerned with clinical findings. Symptoms assessed are burning, painful cold, electric shocks, tingling, pins and needles, numbness, and itching. The physician assesses whether there is reduced sensation (hypoesthesia) to touch or pinprick, and if light brushing increases or causes pain (allodynia) by examination. Each item is scored 'yes' (1 point) or 'no' (0 points). The cut-off value is a total score of 4/10 for indicates that the source of pain is likely neuropathic. A Turkish study on the validity, internal consistency and reliability of the DN4 was conducted. The Turkish version of DN4 questionnaire was found reliable and valid. Moreover, it was found quicker, and more sensitive screening tool (1-minute test) compared with the Turkish version of LANSS questionnaire (13, 14).

Assessment of Sleep Quality, Quality of Life and Emotional Status

We used the Pittsburgh Sleep Quality Index (PSQI) for the assessment of sleep quality, which was developed by Buysse et al. (19) and validated and checked for reliability for Turkey by Ağargün et al. PSQI questionnaire is a self-report of sleep quality within the past month, consisting of 19 questions which finally generate seven component scores: 'subjective sleep quality', 'sleep latency', 'sleep duration', 'habitual sleep efficiency', 'sleep disturbances', 'use of sleep medication' and 'daytime dysfunction'. These 19 items are used for scoring. The PSQI total score ranges from 0-21, with the highest scores indicating poor sleep quality. A total score >5 indicates poor clinical sleep quality (15,16).

We used Short Form-36 (SF-36) for quality of life, which has a valid and reliable form in Turkish. It's a self-reported questionnaire, contains 36 health-related items and assesses eight dimensions of physical and mental health. Eight dimensions are physical functioning, physical role, vitality, general health, body pain, emotional role, social functioning, and mental health. The score of each domain is 0 and 100 and higher score is showing a greater health status (17, 18).

We used the Beck Depression Inventory (BDI), to assess the presence and severity of depressive symptomatology, which was validated and checked for reliability for Turkish adult population. BDI consisted of 21 questions, with each question scored between 0 and 3. Total score range between 0 to 63. 0-13 points as no depression, 14-24 points as moderate depression and above 25 points as severe depression (19).

Statistical analysis

The sample size was calculated using the program G*power (V3.1.9.2), with a minimum sample size of 65 at an $\alpha=0.05$ and a power of 95% (20, 21). Data were analysed using IBM SPSS (Statistical Package for Social Sciences) V23. Conformity to normal distribution was tested using the Kolmogorov-Smirnov test. We used Student t-test for parametric variables, and Mann-Whitney U-test for non-parametric variables. We used the Chi-square test to evaluate the categorical variables. The statistical analysis was conducted at a 95% confidence level and a P-value <0.05 was considered statistically significant.

RESULTS

The participant recruitment scheme for the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) study is shown in Figure 1.

A total of 73 patients with MPS were included in this study. Of the 73 patients, 48 (65.8 %) were female and 25 (34.2 %) were male. The mean age of all recruited patients was 38.2 ± 10.6 years. MPS patients were divided into two groups as those with and without neuropathic pain. There was no statistically significant difference between two groups in terms of sociodemographic characteristics (Table 1).

VAS, BDI, and PSQI scores were significantly higher among MPS patients with neuropathic pain than among MPS patients without neuropathic pain ($p<0.01$, $p<0.01$ and $p<0.01$, respectively). SF-36 vitality, social function, mental health, and emotional role dimensions scores were significantly lower in MPS patients with neuropathic pain than MPS patients without neuropathic pain ($p<0.01$) (Table 2).

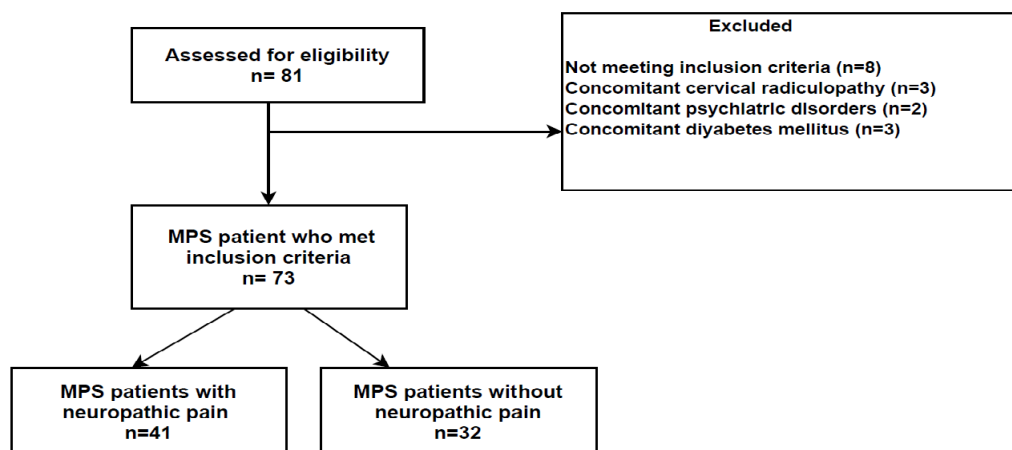


Figure 1. The participant recruitment scheme

Table 1. Comparison of sociodemographic characteristics of MPS patients with and without neuropathic pain

		MPS patients with neuropathic pain (n=41)	MPS patients without neuropathic pain (n=32)	P
Age- Mean \pm SD		39.1 \pm 9.8	37.6 \pm 10.6	0.552
Gender- n (%)	Female	31 (77.6%)	17 (53.1%)	0.624
	Male	10 (24.4%)	15 (46.9%)	
Weight- Mean \pm SD		69.4 \pm 11.6	68.6 \pm 13.8	0.621
Height- Mean \pm SD		164.8 \pm 8.4	165.7 \pm 7.6	0.384
BMI- Mean \pm SD		25.8 \pm 3.9	24.4 \pm 4.2	0.224
Marital status-n (%)	Married	25(60.9%)	18 (56.2%)	0.112
	Single	13 (31.7%)	12 (37.7%)	
	Divorced/widowed	3 (7.4%)	2 (6.1%)	
	Illiterate	0	0	
Education Level- n (%)	\leq Elementary school	4 (9.8%)	2 (6.3%)	0.586
	Elementary school	14 (34.1%)	12 (37.5%)	
	Middle school	10 (24.4%)	8 (25%)	
	High school	13 (31.7%)	10 (31.2%)	
Comorbid disease- n (%)	Yes	16 (39.0%)	12 (37.5%)	0.248
	No	25 (61.0%)	20 (62.5%)	

MPS: Myofascial pain syndrome; BMI: body mass index; *Chi-square test

Table 2. Comparison of clinical parameters of MPS patients with and without neuropathic pain

		Patients with neuropathic pain (n=41) Mean±SD	Patients without neuropathic pain (n=32) Mean±SD	p
VAS		6.8±1.7	5.7±1.8	<0.001
BDI		8.2±3.1	6.4±4.8	<0.001
PSQI		8.3±3.2	6.2±3.3	<0.001
SF-36	Physical function	61.4±24.7	74.6±21.7	0.037
	Physical role limitation	46.2±20.1	59.3±39.8	0.687
	Body pain	45.8±20.7	54.6±18.8	0.024
	General health	50.2±17.1	64.7±18.3	0.032
	Vitality	37.5±18.4	56.3±18.7	<0.001
	Social function	54.3±20.7	71.7±22.6	<0.001
	Mental health	38.1±37.5	63.5±39.6	<0.001
Emotional role limitation		56.4±15.8	71.9±15.3	<0.001

SD: Standart Deviation; **MPS:** Myofascial pain syndrome; **VAS:** Visual analogue scale; **BDI:** Beck Depression inventory; **PSQI:** Pittsburgh Sleep Quality Index; **SF-36:** Short Form-36; *Student t-test and Mann-Whitney U-test

DISCUSSION

MPS is an important cause of chronic musculoskeletal pain. The mechanisms underlying myofascial pain, and the formation of myofascial trigger points is not precisely known. MPS often have a referred neuropathic component. Most treatment protocols are planned and implemented for symptoms (22). An appropriate diagnosis and rehabilitation of the neuropathic pain component plays an important role in the treatment of MPS. Therefore, it is important to consider the neuropathic component in the management of MPS (2,22-24). In this study, we aimed to evaluate the neuropathic pain component in patients with myofascial pain syndrome by using DN4 scale, and to examine the effects of neuropathic pain on emotional status, sleep and quality of life. Findings of this study showed that MPS patients with neuropathic pain had significantly higher scores of VAS, BDI, and PSQI, and lower scores of physical function, body pain, vitality, general health, social function, mental health and emotional role dimensions of SF-36 compared to without neuropathic pain.

Peripheral and central mechanisms play a role in the pathogenesis of MPS, pathogenesis of MPS is complex and occurs as a result of multiple interacting mechanisms. Thus, the management and treatment of MPS can be difficult. Central sensitization refers to increased excitability at the spinal and supraspinal levels. Central sensitization causes nociceptive nerve impulses to be perceived as painful (hyperalgesia) and non-nociceptive nerve impulses to be perceived as painful (allodynia). This non-nociceptive pain is associated with myofascial pain (25). In previous studies, screening questionnaires such as the Leeds Assessment of Neuropathic Symptoms and Signs, the Neuropathic Pain Questionnaire, the DN4 questionnaires have been used to identify neuropathic pain in different medical conditions that have mixed neuropathic and nociceptive pain components. Screening questionnaires have been validated for the detection of neuropathic pain in patients with focal pain (10,26). In a retrospective, study results showed that breast cancer patients who had undergone breast surgery and received chemotherapy, the prevalence of MPS was found 20%, and neuropathic pain caused by chemotherapy was found in 7.5% of these patients (27).

In our study, neuropathic pain component was determined with the DN4 questionnaires, and according to the DN4 scale 56.2% of the patients had neuropathic pain and 43.8% had non-neuropathic pain.

There are many studies investigating the association between neuropathic pain components and sociodemographic data in the literature. In these studies, there was no significant difference in terms of age and gender (28, 29). MPS is more common in women than in men, and in our study, the female patients were higher in accordance with the literature (30). However, to the best of our knowledge, there is no investigating the relationship between the neuropathic pain component and sociodemographic data in MPS. In the present study, there was no statistically significant difference between with and without neuropathic pain groups in terms of sociodemographic characteristics.

MPS, one of the important causes of musculoskeletal pain, is experienced by 85% of the general population at some point in their life. The most important complaint of patients in MPS is pain. Various scales related to pain are used in monitoring the treatment results, and VAS is the most widely used in the literature (31). The results of this study showed that VAS scores were significantly higher among MPS patients with neuropathic pain than among MPS patients without neuropathic pain.

Previous studies have reported that particularly depression and anxiety disorders accompany with chronic pain, and so adversely affect sleep quality and quality of life. In this regard, the prevalence of depression and anxiety is increased in individuals with chronic pain (32,33). Also Smith et al. (34) determined higher levels of pain and poorer quality of life in patients with chronic neuropathic pain. Bouhassira et al. (10) reported higher level of pain and lower quality of life in patients with neuropathic pain than in patients without neuropathic pain. In our study, patients with persisting neck or shoulder pain for ≥ 3 months were included. MPS patients with neuropathic pain had significantly higher scores of VAS, BDI, and PSQI, and lower scores of physical function, body pain, vitality, general health, social function, mental health

and emotional role dimensions of SF-36 compared to without neuropathic pain. Previous studies in the literature have demonstrated the relationship between neuropathic pain and FMS (35-37). Unfortunately, there is limited data about the relationship between neuropathic pain and MPS. We think that further placebo-controlled studies are necessary on the relationship between neuropathic pain and MPS. Further placebo-controlled research on relationship between neuropathic pain and MPS is essential.

Study Limitations

The present study has some limitations. First, this was a cross-sectional study and we selected all patients from single-center, which may limit the generalizability of the study findings. Second is the limited number of MPS patients with neuropathic pain were included and the control group was not selected.

CONCLUSION

The presences of neuropathic pain in MPS patients may adversely affects the quality of life and sleep quality, also increases pain scores and depression levels. An appropriate diagnosis and treatment of the neuropathic pain plays an important role and can reduce the pain, improve the quality of life and sleep quality, and decrease the level of depression in the treatment of MPS.

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Author Contributions: TES, KD, SA and RS: Concept, Data collection and/or processing, Analysis and/or interpretation, Literature review, TES: Writing, Revision.

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Ethical approval: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by Local Ethical Committee. All procedures performed in studies with human participants met the ethical standards of the Institutional Research Commission and the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards. This study was approved by Düzce University Medical Faculty Research Council (Decision no: 2021/27; date: February 1, 2021).

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