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Which patients with carpal tunnel syndrome are more associated with fibromyalgia syndrome?

Zeynep Kirac Unal[a,*], Zeynep Tuba Bahtiyarca[a], Damla Cankurtaran[a], Ece Unlu Akyuz[a]

[a] *University of Health Sciences, Diskapi Yildirim Beyazit Training and Research Hospital, Department of Physical Medicine and Rehabilitation, Ankara, Türkiye*

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Abstract

Aim: In this study, it was aimed to detect the presence of Fibromyalgia Syndrome (FMS) and related factors in patients diagnosed by Carpal Tunnel Syndrome (CTS).

Materials and Methods: Demographic data and the features of CTS were noted by applying face-to-face questionnaire method. The existence of FMS in patients with CTS was investigated using the 2016 American College of Rheumatology (ACR) Fibromyalgia Diagnostic criteria. The Fibromyalgia Impact Questionnaire (FIQ) was introduced to patients diagnosed with FMS. Then, the correlations between the incidence of FMS in CTS patients, the presence of FMS and the hand with CTS, the severity of CTS and the existence of FMS were investigated. In addition, the relationship between the presence of FMS and the duration of CTS symptoms, and the severity of CTS and FIQ were also examined.

Results: 151 patients included in the study. Bilateral CTS was detected in 89 (58.9%) patients. In patients with bilateral CTS, severity was classified as mild, moderate, or severe according to the worse hand. CTS was mild in 55 (36.4%), moderate in 87 (57.6%), and severe in 9 (6.0%) patients. Concomitant FMS was detected in 73 (48.3%) of all CTS patients. FMS rate is higher in patients with bilateral CTS (p=0.001). No significant relevance was observed between the severity of CTS and the presence of FMS (p = 0.864). The median duration of CTS symptoms with FMS patients was 24 (1-240) months; this period was found to be 12 (1-120) months in those without FMS. No significant relations between the presence of FMS and the duration of CTS symptoms were encountered (p = 0.073). The severity of CTS and FIQ demonstrated no significant difference (p=0.955).

Conclusion: The case of FMS is high in specially bilaterally CTS patients. The fact that there may be common points in the pathogenesis of these two diseases suggests that it should be considered for diagnosis and treatment.

Introduction

Carpal Tunnel Syndrome (CTS) is one of the widespread entrapment neuropathies. Many studies have been done on the etiopathogenesis of CTS and it has been revealed that this syndrome is not only a compression neuropathy, but also central sensitization takes an important role in pain and paresthesia [1-3].

Fibromyalgia Syndrome (FMS) is one of the chronic non-inflammatory musculoskeletal diseases characterized by common and persistent pain. Although its etiology has not been fully elucidated, genetic, and environmental factors as well as increased central sensitization and decreased endogenous inhibition response to pain may be responsible [4]. Patients may experience symptoms like fatigue, pain, sleep disturbances, headache, morning stiffness, weakness, irritable bowel, and dysuria. Paresthesia symptoms in the extremities are also seen in 26-84% of FMS patients, and they can be confused with entrapment neuropathies in the differential diagnosis [5].

Considering that the central sensitization mechanism is common in both syndromes, and considering the existence of studies focusing on the frequency of conditions that can cause paresthesia in patients with FMS, such as CTS or tarsal tunnel syndrome, and not being studied much, we wanted to examine the presence of FMS in CTS cases [1, 5-7]. We also aimed to examine the influence between the severity and symptom duration of CTS and FMS, and the relationship between the severity of CTS symptoms with FMS severity.

*Corresponding author:
Email address: zeynepkirac88@gmail.com (Zeynep Kirac Unal)

Materials and Methods

A high prevalence of undetected CTS in patients with FMS has been reported previous studies. In addition, the prevalence of CTS was higher in patients with FMS than in the normal population. Therefore, our hypothesis in this study is that the incidence of CTS is higher in FMS patients than in normal population [5, 6].

Patients who applied to our outpatient's clinic, had symptoms in at least one extremity for at least one month and were diagnosed with CTS in the electrophysiologjc examination were included in this study. Approval was received from the Ethics Committee of our hospital before the study and the study was guided accommodating with the Helsinki Declaration (Decision Date: 18.10.2021, Decision No: 122/06).

Inclusion criteria in this study

- Individuals aged 18-65 years
- Electrophysiologically proven CTS
- Voluntary to participate in the study.

Exclusion criteria in this study

- People who had an operation due to CTS
- People with other accompanying entrapment neuropathies in the upper extremities
- Patients with a history of diseases that may cause secondary CTS such as previous wrist fracture, inflammatory rheumatic disease, hypothyroidism
- Pregnancy
- Patients with neurological disease that may cause neuropathy.

By applying face-to-face survey method to the patients, individuality data (gender, age, body mass index, employment, education, and marital status), smoking and alcohol use status, comorbidities, dominant hand, and hand side with CTS were questioned. The duration of CTS symptoms and the severity of CTS were determined as severe/moderate/mild according to the Padua classification [8] and noted.

The presence of accompanying FMS in CTS patients was evaluated due to the 2016 American College of Rheumatology (ACR) Fibromyalgia Diagnostic Criteria [9]. According to these criteria, patients who meet the first 3 criteria below were diagnosed with FMS:

1. The index of widespread pain (WPI) is at least 7 or higher and the scale of symptom severity (SSS) is at least 5, or the WPI is 4-6, and the SSS is at least 9.
2. Generalize pain: Pain in 4/5 regions: 5 body areas of WPI and a total of 19 regions were determined in these areas. First region: upper left (left jaw, shoulder, arm, forearm), Second region: Upper right (right jaw, shoulder, arm, forearm), Third zone: Lower left (upper-lower leg and left hip), Fourth region: Lower right (right hip, right upper and lower leg), Fifth zone: (chest, waist, neck, back, abdomen) Exclude pain in the jaw, chest, and abdomen. One point is given for the pain in each region and WPI gets a score between "0-19".
3. Symptom duration is 3 months or longer.

In the first part of the two-part SSS, the patient is asked to rate the severity level of "fatigue", "waking up without rest" and "cognitive symptoms" in the last week between 0 and 3. Accordingly, the patient determines the severity of symptoms as 3: severe, 2: moderate, 1: mild, 0: no. In the second part of the SSS, the patient answers the existence of "headache", "lower abdomen cramps and/or pain" and "depression" in last six months as absent: 0, or present:1. Accordingly, SSS is recorded between "0-12" in total.

The Fibromyalgia Severity Score (FSS) is obtained when the SSS scores are added with the WPI. WPI, SSS and FSS scores of all patients with CTS were recorded. The Fibromyalgia Impact Questionnaire (FIQ), a validness and reliability study in Turkish, were administered to all patients who meet the FMS diagnostic criteria [10].

FIQ, a scale that evaluates health status and physical function in FMS, consists of approximately 10 items. The first item consisted of 11 Likert-type queries, each of which was scored between 0-3, questioning physical function. In the second and third items, the patient is asked to notice the number of days in the last week where she/he felt better and could not go to work (including housework). The remaining seven questions are items that question pain, work difficulty, fatigue, morning fatigue, depression and anxiety, stiffness, and are based on the patient marking the appropriate places in the visual equivalence scale.

The scores obtained from the first 13 questions are adjusted to 10 points and the second question is scored in reverse. The patient receives a score between 0-100 after answering the questions. An increase in the score means an increase in physical disability.

Statistical analysis

The sample size was made using the G* power (V3.1.7) program; at least 70 patients were found for each group with $\alpha = 0.05$, 80% power, and d=0.424 effect size. The sample size was calculated with reference to the study by Fahmi DS et.al. [11]. The sample size was also compatible with similar previous studies [6, 12].

Statistical Package for Social Science (SPSS) version 20.0 software (IBM Corporation, Chicago, IL) was used to perform all statistical analysis. The variables were assessed by using histograms, probability plots, and the Kolmogorov-Smirnov test to normally distribution. Quantitative data were expressed using range, mean, standard deviation and median, while qualitative data were expressed in frequency and percent. Quantitative data were analyzed using Student's t-test and Mann Whitney U test to compare between the two groups. Fisher exact tests and Pearson chi-square were used. P value which demonstrates statistical significance is less than 0.05 ($p<0.05$). Then, the incidence of FMS in CTS patients, the relations between the presence of FMS, the hand with CTS, the severity of CTS and the existence of FMS, the presence of FMS and the

duration of CTS symptoms, CTS severity and FIQ were combined examined.

Results

Of the 151 patients involved in the study, 131 (86.8%) were female and 20 (13.2%) were male. The arithmetic mean age was 50.76±9.99 years. Unilateral CTS was detected in 62 (41.1%) and bilateral CTS in 89 (58.9%) patients. In patients with bilateral CTS, severity was classified as mild, moderate, or severe according to the worse hand. Mild CTS was detected in 55 (36.4%), moderate in 87 (57.6%), and severe in 9 (6.0%) patients. Concomitant FMS was detected in 73 (48.3%) of all CTS patients. The clinical and demographic properties of the patients are revealed in Table 1. The relationship between the existence of FMS and the hand with CTS is shown in Table 2. FMS rate is higher in patients with bilateral CTS (p=0.001). No significant correlation was emerged between the severity of CTS and the presence of FMS (p=0.864) (Table 3). While the median duration of CTS symptoms in those with FMS was 24 (1-240) months; this period was found to be 12 (1-120) months in those without FMS (Table 3).

Table 1. Demographic data of the patients.

n=151		
Age (years), mean±sd		50.76±9.99
BMI (kg/m²), med (min-max)		28.59 (19.53-59.5)
Gender n(%)	Woman	131 (86.8)
	Man	20 (13.2)
Educational Status n(%)	Illeterate	5 (3.3)
	<12 years	139 (92.1)
	≥12 years	7 (4.6)
Active Worker n(%)	No	118 (78.1)
	Yes	33 (21.9)
Marrital Status n(%)	Married	132 (87.4)
	Single	8 (5.3)
	Other	11 (7.3)
Comorbidities	None	81 (53.6)
	Cardiac	28 (18.5)
	Endocrine	18 (11.9)
	Respiratory	7 (4.6)
	Cardiac and endocrine	13 (8.6)
	Cardiac and respiratory	3 (2.0)
Dominat hand n(%)	Right	149 (98.7)
	Left	2 (1.3)
Hand with CTS n(%)	Right	44 (29.1)
	Left	18 (11.9)
	Bilaterally	89 (58.9)
Severity of CTS n(%)	Mild	55 (36.4)
	Moderate	87 (57.6)
	Severe	9 (6.0)
FMS Presence n(%)	No	73 (48.3)
	Yes	78 (51.7)

SD: Standard deviation; BMI: body mass index, CTS: Carpal Tunnel Syndrome, FMS: Fibromiyalgia Syndrome.

Table 2. The Relationship between the Presence of FMS and the hand with CTS.

	FMS (+) (n=73) n (%)	FMS (-) (n=78) n (%)	p
CTS in right hand (n=44)	12 (27.3)	32 (72.7)	0.001
CTS in left hand (n=18)	7 (38.9)	11 (61.1)	
CTS in the bilateral hand (n=89)	54 (60.7)	35 (39.3)	

CTS: Carpal Tunnel Syndrome, FMS: Fibromiyalgia Syndrome, p value calculated with Pearson chi-square test.

Table 3. The relationship between the presence of FMS and duration and severity of CTS.

	FMS (+) (n=73)	FMS (-) (n=78)	p
Age (years), mean±sd	51.14±10.12	50.40±9.92	0.962*
Symptom Duration of CTS (months), median (min-max)	24 (1-240)	12 (1-200)	0.073**
Mild CTS (n=55)	26 (47.3)	29 (52.7)	0.842***
Moderate & Severe CTS (n=96)	47 (49.0)	49 (51.0)	

CTS: Carpal Tunnel Syndrome, FMS: Fibromiyalgia Syndrome, *: calculated with independent sample T-test, **: calculated with Mann Whitney U test, *** Pearson chi-square test.

Table 4. The relationship between the severity of CTS and the severity of FMS.

FMS (+) (n=73)	Mild CTS (n=26)	Moderate & Severe CTS (n=47)	p
FIQ, Mean±SD	52.22±15.82	52.46±17.93	0.955

No significant relations were found between the duration of CTS symptoms and the presence of FMS (p = 0.073) (Table 3). No significant difference was exerted between the severity of CTS and FIQ scores in patients with FMS (p = 0.955) (Table 4).

Discussion

In this study, FMS was found to be high in patients with CTS. There are several studies in the literature focusing on the frequency of CTS in patients with FMS, and the outputs were found to be inconsistent [12-14]. In the study of Nacir et al., CTS was found to be 20.63% in the FMS group and 2.82% in the control group, and the results were found to be statistically significant [5]. In another study in which 50 patients with FMS were compared with patients without FMS, there exist no remarkable statistically significant distinctions between the groups in the sense of CTS diagnosis in electrophysiological examination [4].

In a study of Paiva HR et al., examining the characteristics of 150 CTS patients referred to a hand surgery clinic, it was observed that 43 (28.7%) patients received treatment with

a history of FMS [13]. In this aforementioned study, unlike our study, the patients were noted as having yes/no FMS treatment history without questioning the 2016 ACR FMS Diagnostic Criteria. This may be the reason for the difference in rates of the presence of concomitant FMS in CTS patients. In that study, it was also shown that CTS patients with FMS had statistically significantly higher mean age than CTS patients without FMS. Although the duration of CTS symptoms and the presence of FMS were not investigated in that study, it may suggest that there may be a relationship with the high mean age. In addition, the mean duration of symptoms in Paiva HR et al.'s study was 4.6 years, significantly longer than the mean duration in our study (1.5 years). In our study, however, no significant difference was determined between the duration of CTS symptoms and the presence of FMS, and the age of the patients with CTS and the frequency of FMS. Additionally, although the electrophysiological severity of CTS was not noted in the study of Paiva HR et al., it suggests that more severe patient groups may have been included in our study due to the examination of the patient population referred to a hand surgery clinic [13]. Differences in the design of the studies may have been effective in obtaining different results.

Although it is seen that the central sensitization mechanism and paresthesia symptoms are common for FMS and CTS, there is an extremely limited study in the literature investigating the frequency of FMS in patients with CTS [6]. In this study, the existence of FMS was investigated among patients who presented with numbness in their hands and whose CTS was detected or not according to nerve conduction studies. In this study, the frequency of FMS was found to be 25.45% in the presence of clinical CTS, and 26% in the presence of CTS both clinically and electrophysiological, and no significant difference was demonstrated between the two groups. When the two groups with and without FMS were compared in the study, a significant difference was determined in median nerve conduction velocities. In our study, the intensities of CTS were electrophysiological determined according to the Padua classification, and median nerve conduction velocities were not noted separately. Like this study, in our study, the presence of FMS was found to be higher in patients with electrophysiological CTS (48.3%).

This study will contribute to the literature as it is the first study to examine the relationship between CTS severity or CTS symptom duration and FMS. On the other hand, there are some limitations of the study, such as being a cross-sectional study, small number of patients, and unknown long-term follow-up results.

Conclusion

FMS can be encountered frequently in CTS patients, and CTS can be encountered frequently in FMS patients. The fact that there may be common points in the pathogenesis of these two diseases suggests that it should be considered in diagnosis and treatment.

Ethics approval

Approval was received from the Ethics Committee of our hospital before the study and the study was guided according with the Helsinki Declaration (Health Sciences University Diskapi yildirim Beyazit Education and Research Hospital Clinical Research Ethics Committee, Decision Date: 18.10.2021, Decision No: 122/06).

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