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Original Article *Özgün Araştırma*

EVALUATION OF THE RELATIONSHIP BETWEEN RISK FACTORS AND CLINICAL AND ELECTROPHYSIOLOGICAL FINDINGS IN PATIENTS WITH A PRELIMINARY DIAGNOSIS OF CARPAL TUNNEL SYNDROME

Karpal Tünel Sendromu Ön Tanılı Hastalarda Risk Faktörlerinin Klinik ve Elektrofizyolojik Bulgular ile İlişkisinin Değerlendirilmesi

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ABSTRACT

Objective: This study aims to evaluate the relationship between risk factors and the severity of symptoms, functional status, and electromyography (EMG) results in patients with a preliminary diagnosis of carpal tunnel syndrome (CTS).

Material and Methods: This cross-sectional study was conducted between February 2025 and March 2025. The study population consisted of patients treated at Samsun Physical Medicine and Rehabilitation Diseases Hospital who were referred to the EMG unit with a preliminary diagnosis of CTS. The sample size was calculated using the Minitab-16 program, and a total of 261 patients were included. Participant data were collected through face-to-face interviews using a questionnaire administered by an experienced EMG nurse. Electromyography (EMG) assessments were performed and reported by a Physical Medicine and Rehabilitation specialist who was blinded to the questionnaire results. The questionnaire included 14 initial questions regarding the patients' age, gender, specific characteristics, risk factors related to CTS, and their Visual Analog Scale (VAS) scores. Subsequently, the Boston Carpal Tunnel Questionnaire (BCTQ) was administered. A significance level of $p<0.05$ was considered statistically significant for comparisons.

Results: Among the patients included in the study, 216 (82.8%) were female, and 45 (17.2%) were male. The median age was 49 (range: 20–94) years. The mean total score of the BCTQ was 5.4±1.5. Of the patients referred to the electrophysiology laboratory with a preliminary diagnosis of CTS, 53.3% were diagnosed with CTS. When comparing patients with and without electrophysiologically confirmed CTS, the condition was found to be more common in females, individuals with a smoking history of more than 21 years, and patients with diabetes mellitus (DM). Compared to individuals without CTS, those diagnosed with CTS had higher age, longer duration of wrist pain, higher total BCTQ scores, VAS scores, and Body Mass Index (BMI) values.

Conclusion: The risk factors, BCTQ scores, and EMG findings of patients referred to the EMG laboratory with a preliminary diagnosis of CTS appear to be complementary. Female gender, long-term smoking (≥21 years), and the presence of diabetes were significantly associated with CTS. Considering these risk factors in clinical evaluations may contribute to the development of effective strategies for the early diagnosis and management of CTS.

Keywords: *Carpal tunnel syndrome, electromyography, entrapment neuropathy, Boston Carpal Tunnel Questionnaire, risk factors*

ÖZ

Amaç: Bu çalışma karpal tünel sendromu (KTS) ön tanılı hastalarda risk faktörlerinin; hastaların semptomlarının şiddeti, fonksiyonel durumları ve elektromiyografi (EMG) sonuçları ile ilişkisini değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntemler: Kesitsel tipteki çalışmanın verileri Şubat 2025-Mart 2025 tarihleri arasında toplandı. Çalışmanın evrenini Samsun Fiziksel Tıp ve Rehabilitasyon Hastalıkları Hastanesinde tedavi gören, KTS ön tanısıyla EMG birimine yönlendirilen hastalar oluşturmaktadır. Çalışmanın örneklem sayısı, minitab-16 programıyla hesaplandı, 261 hastayla çalışıldı. Katılımcı verileri, alanda deneyimli bir EMG hemşiresi tarafından yüz yüze uygulanan anket formu aracılığıyla toplanmıştır. EMG değerlendirmeleri ise, anket sonuçlarına dair bilgi sahibi olmayan Fiziksel Tıp ve Rehabilitasyon uzmanı hekim tarafından körleme yöntemiyle gerçekleştirilmiş ve raporlanmıştır. Anket formunda literatür taranarak oluşturulan ilk 14 soruda; hastaların yaşı, cinsiyeti, KTS ile ilgili bazı özellik ve risk faktörleri ile Vizüel Analog Skalası puanı sorgulandı. Sonrasında ise Boston Karpal Tünel Ölçeği (BKTÖ) sorularına yer verildi. Karşılaştırmalarda anlamlılık düzeyi $p<0,05$ olarak kabul edildi.

Bulgular: Çalışmaya dahil edilen hastaların 216 (%82,8)'sı kadın, 45 (%17,2)'i erkekti. Yaş ortancaları 49 (20-94) yıldı. Boston karpal tünel ölçeği toplam puan ortalamaları 5,4±1,5 idi. KTS ön tanısı ile elektrofizyoloji laboratuvarına gönderilen hastaların %53,3 üne KTS tanısı kondu. Elektrofizyolojik olarak doğrulanmış KTS tanısı olan ve olmayan hastalar karşılaştırıldığında, KTS'nin kadınlarda, 21 yıldan uzun süredir sigara kullanan bireylerde ve diyabetes mellitus (DM) olan hastalarda daha yaygın olduğu görüldü. KTS tanısı alan hastalarda ise KTS tanısı almayan hastalara göre; yaş, bilek ağrısı süresi, BKTÖ toplam puanı, VAS skoru ve vücut kitle indeksi (VKİ) değerleri daha yüksekti.

Sonuç: EMG laboratuvarına KTS ön tanısı ile yönlendirilen hastaların risk faktörleri ile BKTÖ puanları ve EMG sonuçları birbirini tamamlayıcı niteliktedir. Kadın cinsiyet, uzun süreli sigara kullanımı (≥21 yıl) ve DM varlığı, KTS ile anlamlı şekilde ilişkilendirildi. Belirtilen risk faktörleri klinik değerlendirmede dikkate alınarak, KTS'nin erken tanı ve yönetimine dair yaklaşımlar geliştirilebilir.

Anahtar Kelimeler: *Karpal tünel sendromu, elektromiyografi, tuzak nöropati, Boston Karpal Tünel Ölçeği, risk faktörleri*

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INTRODUCTION

CTS is the most common entrapment neuropathy of the upper extremity, occurring due to compression of the median nerve at the wrist. This condition leads to symptoms such as weakness, numbness, and pain in the hand and fingers.[1] Its prevalence ranges from 1% to 5%.[2]

The etiology of CTS is multifactorial and has been associated with various risk factors, including female sex, age, obesity, diabetes, hypothyroidism, osteoarthritis, rheumatoid arthritis, trauma, and connective tissue disorders.[3,4] In particular, repetitive, forceful, and hand-straining movements, frequent wrist flexion, and prolonged use of vibrating tools have been identified as contributing risk factors. CTS can lead to permanent damage to the median nerve, causing persistent wrist pain, negatively impacting an individual's quality of life and daily functionality, and resulting in loss of productivity. Therefore, early diagnosis and appropriate management of CTS are crucial.[5]

The primary approach to diagnosing CTS involves a thorough patient history and physical examination, along with positive provocation tests. However, EMG remains the most critical diagnostic test for entrapment neuropathies, as it provides definitive confirmation of the diagnosis.[6]

This study aims to investigate the relationship between risk factors and the severity of symptoms, functional status, and EMG findings in patients with a preliminary diagnosis of CTS. Furthermore, we seek to determine which risk factors are associated with significantly higher scores on the Boston Carpal Tunnel Questionnaire and their correlation with EMG-confirmed CTS diagnosis. A better understanding of the relationship between risk factors and clinical as well as electrophysiological assessments may contribute to the development of preventive strategies for risk factor modification in the early diagnosis and management of CTS.

MATERIALS AND METHODS

The data for this cross-sectional study were collected between February 2025 and March 2025. The study population consisted of patients receiving treatment at Samsun Physical Medicine and Rehabilitation Diseases Hospital who were referred to the EMG unit with a preliminary diagnosis of CTS. The sample size was calculated as 223 using the Minitab-16 program, based on results from similar studies, assuming a 5% type 1 error and 80% study power. Considering potential data loss, the final study included 261 patients.[7]

The inclusion criteria were as follows: receiving treatment at Samsun Physical Medicine and Rehabilitation Diseases Hospital, being 18 years or older, understanding and speaking Turkish, and providing informed consent to participate in the study. The exclusion criteria were as follows: being under 18 years of age, having a pacemaker, pregnancy, an EMG referral for conditions other than CTS, and a history of previous CTS surgery. Ultimately, the study was conducted with 261 patients who met the inclusion criteria. Ethical approval for the study was obtained from the local ethics committee on January 29, 2025 (OMUKAEK 2025/36). In addition, institutional permission was obtained from the Provincial Directorate of Health and the chief physician of the relevant hospital.

Participant data were collected through face-to-face interviews using a questionnaire administered by an experienced EMG nurse. EMG assessments were performed and reported by a Physical Medicine and Rehabilitation specialist who was blinded to the questionnaire results. In accordance with the principles of the Declaration of Helsinki, the questionnaire was administered after obtaining informed consent from all participants.

The first 14 questions in the questionnaire were developed by the researcher based on a literature review and are presented in Supplementary Appendix. This section included questions regarding age, gender, CTS-related characteristics and risk factors, as well as the VAS score. Following these, the BCTQ was included.

BCTQ comprises two subscales: the Symptom Severity Scale (SSS), which includes 11 items scored from 1 (best) to 5 (worst), and the Functional Status Scale (FSS), consisting of 8 items scored on the same scale. Higher scores on both subscales indicate greater symptom severity and poorer functional status.[8] This scale was originally developed by Levine et al. in 1993 [9] and is one of the most commonly used assessment tools for CTS patients. It evaluates the severity of symptoms and functional status. The Turkish validity and reliability study was conducted by Melek Sezgin et al. in 2006. [8]

Pain severity was evaluated using 10-cm VAS. It is used to measure the subjective level of pain experienced by the patient. The VAS consists of a standard 10 cm scale, where 0 represents "no pain" and 10 represents "unbearable pain." Patients indicate their pain level by marking the point on the scale that best represents their experience.[10]

Electrophysiological Examination

Patients admitted to the EMG unit with a preliminary diagnosis of CTS were kept in a room temperature environment of 24–27°C for approximately 15 minutes before undergoing EMG testing. The examination was performed by an expert physician using a 4-channel Neuro-MEP-4 device, and the results were reported by the same physician.

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In the sensory nerve conduction study of the median nerve, the active ring electrode was placed at the proximal interphalangeal (PIP) joint of the 2nd finger, while the reference ring electrode was positioned 3 cm distal to the active electrode. Stimulation was applied at the wrist level (between the palmaris longus and flexor carpi radialis tendons), approximately 12–14 cm proximal to the active electrode, to measure sensory distal latency, sensory nerve action potential (SNAP) amplitude, and sensory nerve conduction velocity in the finger-to-wrist segment.

In the sensory nerve conduction study of the ulnar nerve, the active ring electrode was placed at the PIP joint of the 5th finger, while the reference ring electrode was positioned 3 cm distal to the active electrode. Stimulation was applied at the wrist level (flexor carpi ulnaris tendon), approximately 12–14 cm proximal to the active electrode, to measure sensory distal latency, SNAP amplitude, and sensory nerve conduction velocity in the finger-to-wrist segment.

In the motor conduction study of the median nerve, the active recording electrode was placed on the abductor pollicis brevis muscle, while the reference recording electrode was positioned on the distal phalanx of the thumb. Stimulation was applied to the median nerve at the wrist and forearm-elbow level proximal to the active recording electrode to evaluate distal motor latency (DML), compound muscle action potential (CMAP), and motor nerve conduction velocity between the wrist and elbow.

In the motor conduction study of the ulnar nerve, the active recording electrode was placed on the adductor digiti minimi muscle, while the reference recording electrode was positioned on the distal phalanx of the 5th finger. Stimulation was applied to the ulnar nerve at the wrist, elbow, and above-elbow levels proximal to the active recording electrode to assess DML, CMAP, and motor nerve conduction velocity across the wrist-elbow-above elbow segment.

The reference values used in our EMG unit are presented in Table 1.

Table1: Reference values used in our EMG unit

	Median Nerve	Ulnar Nerve
Sensory Nerve Conduction		
SNAP Amplitude (μV)	≥20	≥6.0
Conduction Velocity (m/s)	≥50	≥50
Motor Nerve Conduction		
CMAP Amplitude (mV)	≥4.1	≥7.2
Distal Motor Latency (ms)	≤3.8	≤3.3
Conduction Velocity (m/s)	≥50	≥50

SNAP: Sensory Nerve Action Potential, **CMAP**: Compound Muscle Action Potential

The EMG results were recorded as CTS "present" or "absent" and classified as mild, moderate, or severe. Based on electrophysiological findings, patients were categorized as follows:

- Mild CTS: Slowing of median distal sensory conduction velocity and a reduction in SNAP amplitude below normal.
- Moderate CTS: Findings consistent with mild CTS, along with decreased median nerve CMAP and prolonged DML.
- Severe CTS: Significant reduction in CMAP and prolonged DML, often accompanied by the absence of SNAP. In needle EMG, findings of denervation (positive sharp waves, fibrillation potentials) were observed.[11]

Statistical Analysis

The collected data were analyzed using SPSS 26.0 statistical software**.** Descriptive variables were presented as median, minimum, maximum, frequency, and percentage**.** The Kolmogorov-Smirnov test was used to assess whether continuous variables followed a normal distribution**.**

For comparisons between independent groups, the Student's t-test was applied to variables with normal distribution, while the Mann-Whitney U test was used for variables that did not follow a normal distribution**.** To evaluate differences between independent groups for categorical variables summarized by counts and ratios, the Chi-square test with Bonferroni correction was applied.

The correlations between continuous variables was assessed using Spearman's correlation analysis**.** A p-value < 0.05 was considered statistically significant.

Correlation coefficients were interpreted as weak (0.00–0.29), moderate (0.30–0.69), and strong (0.70–1.00).

RESULTS

Of the patients included in the study, 216 (82.8%) were female and 45 (17.2%) were male. The median age was 49 years (range: 20–94). The median BMI was 28.54 (range: 18.2–66.6). A total of 55.2% were housewives, 26.1% were laborers, and 11.1% were civil servants.

Regarding hand dominance, 235 (90%) of the patients were right-handed, and 16 (10%) were left-handed. CTS was diagnosed in 27.3% of the patients on the dominant hand side, 15.1% on the non-dominant hand side, and 57.6% bilaterally. Among patients with a unilateral diagnosis, CTS severity was classified as mild in 33.9%, moderate in 59.3%, and severe in 6.8%. In those diagnosed bilaterally, CTS severity was classified as 17.5% mild, 68.8% moderate, and 13.8% severe on the dominant hand side, and 23.8% mild, 61.3% moderate, and 15.0% severe on the non-dominant hand side.

Some characteristics and risk factors of patients presenting with a preliminary diagnosis of CTS are shown in Table 2.

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Table 2: Distribution of certain risk factors among patients with a preliminary diagnosis of carpal tunnel syndrome

Variables	n (%)
Occupation involving frequent writing or computer use	
Yes	37 (14.2)
No	224 (85.8)
Occupation requiring work with vibrating tools	
Yes	23 (8.8)
No	238 (91.2)
Smoking status	
Yes	85 (32.6)
No	176 (67.4)
Duration of smoking among smokers	
1-5 years	12 (14.1)
6-10 years	12 (14.1)
11-20 years	26 (30.6)
21 years or more	35 (41.2)
Family history of CTS	
Yes	93 (35.6)
No	168 (64.4)
History of trauma in the affected wrist	
Yes	33 (12.6)
No	228 (87.4)

CTS: Carpal Tunnel Syndrome

The median duration of wrist pain was 6 months (range: 0.5–300). The median VAS score for this pain was 7 (range: 0–10). The prevalence of risk factors for CTS among the patients was as follows: DM in 14.9%, hypothyroidism in 10.3%, rheumatoid arthritis in 8.4%, kidney disease in 6.5%, and osteoarthritis in 5.7%.

The mean symptom severity scale score on the BCTQ was 2.8±0.8, the mean functional status scale score was 2.6±0.8, and the mean total scale score was 5.4±1.5.

Of the patients referred to the electrophysiology laboratory with a preliminary diagnosis of CTS, 53.3% were diagnosed with CTS based on EMG findings. The comparison of certain patient characteristics and the presence or absence of a CTS diagnosis according to EMG results is shown in Table 3. When comparing patients with and without electrophysiologically confirmed CTS, the prevalence of CTS was statistically significantly higher in female patients and in patients with a smoking history of more than 21 years. Moreover, older age and longer duration of wrist pain were associated with CTS ($p<0.001$).

The symptom severity scale scores ($p=0.001$), functional status scale scores ($p=0.013$), total scale scores ($p=0.001$), VAS scores ($p=0.001$), and BMI values ($p=0.009$) on the Boston Carpal Tunnel Questionnaire were statistically significantly higher in patients diagnosed with CTS compared to those without a CTS diagnosis. The prevalence of CTS was statistically significantly higher in patients with DM ($p=0.004$) compared to those without DM. There was no statistically significant difference between the prevalence of CTS and other comorbid diseases examined ($p>0.05$).

Total Boston Carpal Tunnel Questionnaire scores were significantly higher in females than in males ($p=0.014$), in patients with a family history of CTS than in those without ($p=0.023$), and in patients with DM than in those without DM ($p=0.049$). Correlation Between BMI, VAS, Pain Duration, and BCTQ Scores in Patients with a Preliminary Diagnosis of CTS is shown in Table 4.

According to Spearman correlation analysis, there was a weak positive and statistically significant relationship between pain duration and VAS score ($r=0.254$, $p<0.001$), pain duration and Boston Symptom Severity score ($r=0.213$, $p=0.001$), pain duration and Boston Functional Status score ($r=0.264$, $p<0.001$), pain duration and Boston Total score ($r=0.265$, $p<0.001$), and VAS score and BMI ($r=0.173$, $p=0.005$).

There was a moderate positive and statistically significant relationship between VAS score and Boston Symptom Severity score ($r=0.595$, $p<0.001$), VAS score and Boston Functional Status score ($r=0.389$, $p<0.001$), VAS score and Boston Total score ($r=0.529$, $p<0.001$). A strong positive and statistically significant relationship was found between Boston Symptom Severity score and Boston Functional Status score ($r=0.659$, $p<0.001$), Boston Symptom Severity score and Boston Total score ($r=0.908$, $p<0.001$), and Boston Functional Status score and Boston Total score ($r=0.908$, $p<0.001$).

According to the Spearman correlation analysis performed in patients diagnosed with unilateral CTS, a weak positive correlation was found between CTS severity and the Boston Total score ($r=0.257$, $p=0.049$). A moderate positive correlation was observed between the Boston Symptom Severity score and the Boston Functional Status score ($r=0.567$, $p<0.001$), as well as between the Boston Symptom Severity score and CTS severity ($r=0.350$, $p=0.007$). Additionally, a strong positive and statistically significant correlation was found between the Boston Symptom Severity score and the Boston Total score ($r=0.892$, $p<0.001$), and between the Boston Functional Status score and the Boston Total score ($r=0.858$, $p<0.001$).

According to the Spearman correlation analysis performed in patients diagnosed with bilateral CTS, a weak positive correlation was observed between the Boston Symptom Severity score and CTS severity on the non-dominant hand ($r=0.297$, $p=0.007$), as well as between the Boston Total score and CTS severity on the non-dominant hand ($r=0.239$, $p=0.033$). A moderate positive correlation was found between the Boston Symptom Severity score and the Boston Functional Status score ($r=0.663$, $p<0.001$), as well as between CTS severity on the dominant hand and CTS severity on the non-dominant hand ($r=0.531$, $p<0.001$). Furthermore, a strong positive and statistically significant correlation was noted between the Boston Symptom Severity score

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and the Boston Total score (r=0.898, p<0.001), and between the Boston Functional Status score and the Boston Total score (r=0.907, p<0.001). No statistically significant correlation was found between age and the parameters pain duration, VAS score, BMI, Boston Symptom Severity score, Boston Functional Status score, and Boston Total score (p>0.05).

DISCUSSION

This study found that CTS was more common in females, older individuals, long-term smokers (≥21 years) and patients with diabetes. Patients diagnosed with CTS had higher pain duration, VAS, BCTQ, and BMI scores.

Otelea et al. reported that CTS was three times more common in females than in males [12]. In our study, the diagnosis of CTS was also found to be statistically significantly higher in women than in men. This difference has been anatomically attributed to the presence of a narrower carpal tunnel in women.

In the study by Hidayati et al. [13], CTS was most commonly diagnosed in the 40–49 age group, whereas in the study by Abumunaser et al. [14], the highest prevalence of CTS by gender and age group was reported in the 45–54 age range. In our study, the median age of patients diagnosed with CTS was found to be 51 years, which is consistent with the literature. This has been attributed to the decline in nerve elasticity with advancing age and the deterioration of soft tissue, leading to median nerve compression.

Table 3: Comparison of certain patient characteristics in patients with a preliminary diagnosis of carpal tunnel syndrome based on electromyography results

Characteristics	CTS Diagnosis Based on EMG Results: Present n (%)	Absent n (%)	p
Age (years) (Median)	51 (24-94)	45 (20-72)	**<0.001**
Gender			
Male	31 (22.3)	14 (11.5)	**0.02**
Female	108 (77.7)	108 (88.5)	
Occupation involving frequent writing or computer use			
Yes	20 (14.4)	17 (13.9)	0.91
No	119 (85.6)	105 (86.1)	
Occupation requiring work with vibrating tools			
Yes	14 (10.1)	9 (7.4)	0.44
No	125 (89.9)	113 (92.6)	
Smoking status			
Yes	51 (36.7)	34 (27.9)	0.19
No	88 (63.3)	88 (72.1)	
Duration of smoking among smokers			
1-5 years	9 (9.8)	7 (20.5)	**0.03**
6-10 years	10 (13.7)	7 (14.7)	
11-20 years	19 (29.4)	12 (32.4)	
21 years or more	30 (47.1)	12 (32.4)	
Family history of CTS			
Yes	53 (38.1)	40 (32.8)	0.36
No	86 (61.9)	82 (67.2)	
History of trauma in the affected wrist			
Yes	22 (15.8)	11 (9.0)	0.09
No	117 (84.2)	111 (91.0)	

CTS: Carpal Tunnel Syndrome**, EMG:** Electromyography

Table 4: Correlation between body mass ındex, visual analog scale scores, pain duration, and boston carpal tunnel questionnaire scores in patients with a preliminary diagnosis of carpal tunnel syndrome.

Variables	Pain Duration (months)	VAS Score	BMI	Boston Symptom Severity Score	Boston Functional Status Score	Boston Total Score
Pain Duration (months)						
r*	1	0.254	0,84	0.213	0.264	0.265
p*	.	**0.000**	0.177	**0.001**	**0.000**	**0.000**
VAS Score						
r		1	0.173	0.595	0.389	0.529
p		.	**0.005**	**0.000**	**0.000**	**0.000**
BMI						
r			1	0.105	0.066	0.093
p			.	0.091	0.288	0.134
Boston Symptom Severity Score						
r				1	0.659	0.908
p				.	**0.000**	**0.000**
Boston Functional Status Score						
r					1	0.908
p					.	**0.000**
Boston Total Score						
r						1
p						.

r: Pearson correlation coefficient, **p**: Significance value
BMI:Body Mass Index, **VAS**: Visual Analog Scale

In the study by Prastowo et al.[15], 86% of the patients were housewives, while in the study by Al-Jasim et al.[5], 53% of the patients were housewives. In our study, this rate was 55.2%. Although not statistically significant,

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housewives constituted 51.8% of those diagnosed with CTS across all occupational groups in our study. This may be explained by the repetitive nature of daily household chores and childcare, which involve frequent wrist movements recognized risk factors for CTS.

Similar to the findings of Şahin et al.[16], our study found that BMI values were statistically significantly higher in patients diagnosed with CTS compared to those without CTS. This was attributed to increased hydrostatic pressure in the carpal tunnel and an increased amount of stored fat.

In the study by Al-Jasim et al.[5], 11.7% of the patients had DM, and the presence of DM was found to be statistically associated with reporting CTS symptoms on the Boston Carpal Tunnel Scale. The prevalence of DM was reported as 12.5% in the Hail study [17] and 19.4% in the study by Alduraibi et al.[18] In our study, 14.9% of the patients had a diagnosis of DM, consistent with the literature. Furthermore, CTS presence and total Boston Carpal Tunnel Scale scores were statistically significantly higher in patients diagnosed with DM. This may be explained by the neuropathic effects of diabetes impairing nerve elasticity and increasing tunnel pressure.

In the study by Şahin et al., Boston Carpal Tunnel Scale Symptom and Severity Scale scores were statistically significantly higher in the CTS group; however, no significant difference was found between functional status scale scores and the electrophysiological diagnosis of CTS [16]. The same study also reported no correlation between CTS severity and Boston Carpal Tunnel Scale scores in patients with CTS.

Schrijver et al. reported a weak correlation between the CTS diagnosis on EMG and the Boston symptom and functional scales [19]. Similarly, Chan et al. found no correlation between preoperative and postoperative electrophysiological CTS detection and Boston symptom severity and functional status [20]. However, in our study group, the symptom severity scale scores, functional status scale scores, and total scale scores of the Boston Carpal Tunnel Scale were statistically significantly higher in patients diagnosed with CTS compared to those without CTS.

In patients diagnosed with unilateral CTS, a weak correlation was found between CTS severity and the Boston Total score, while a moderate correlation was observed between the Boston Symptom Severity score and CTS severity. In contrast, in patients diagnosed with bilateral CTS, a weak positive correlation was noted between CTS severity in the non-dominant hand and both the Boston Symptom Severity score and the Boston Total score. Compared to the literature, our study demonstrated a stronger complementary relationship between Boston Carpal Tunnel Scale scores, electrophysiological CTS diagnosis, and CTS severity. We believe that these results are influenced by the characteristics of the patient group included in the study and the associated risk factors.

The use of validated and reliable assessment tools, the application of EMG to each patient, and the implementation of blinding are among the strengths of this study. However, the fact that the study was conducted in a single center constitutes a limitation in terms of generalizability.

This study demonstrated that CTS was significantly more prevalent among females, long-term smokers (particularly those with over 21 years of smoking history compared to non-smokers), and patients with DM. Additionally, patients diagnosed with CTS had significantly higher age, wrist pain duration, BCTQ total scores, VAS scores, and BMI values compared to those without a CTS diagnosis. These findings highlight the importance of considering these risk factors in clinical evaluations for the early diagnosis and effective management of CTS. Furthermore, the concordance between BCTQ scores and EMG findings suggests that these assessment tools are complementary in clinical practice.

Conflict of Interest: There is no conflict of interest.

Researcher Contribution Rate Statement: Concept/Design: ZC; Analysis/Interpretation: ZC; Data Collection: ZC; Writer: ZC; Critical Review: ZC; Approver: ZC.

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