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Research Article

Prevalence of carpal tunnel syndrome in cases with migraine and tension type headache

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ABSTRACT

Background: Carpal Tunnel Syndrome (CTS) is the most frequent entrapment neuropathy; also Tension Type Headache (TTH) and migraine headache are the most common forms of headaches. The aim of this study is to determine whether there is a relationship between carpal tunnel syndrome and migraine and/or TTH, and if so, to determine the factors causing this relationship.
Methods: This study included 201 patients who were electro-physiologically diagnosed with idiopathic CTS and 100 controls. In addition to being examined for headaches, each patient's Body Mass Index (BMI) was determined, and each was evaluated with Boston Questionnaire Form (BQF) and a Beck Depression Scale (BDS).
Results: The CTS group had significantly more patients with TTH and migraine headache than did the control group. In addition, the CTS group had a significantly higher frequency of headaches, and significantly higher BDS and BMI than did the controls. There were no significant differences in headache type and frequency of headache between those with mild CTS and those with mild-serious CTS. In addition, the Boston scores of CTS patients with headache were higher than those CTS patients without headache. Further, the monthly income levels of patients with CTS were lower than those of the control group.
Conclusion: We found that primary headache is more frequent in CTS patients than in controls. This may be due to somato-autonomic reflexes and other common risk factors that can be seen in both CTS patients and those with headache, including obesity, depression and low level of income.

Keywords: Carpal tunnel syndrome, Primary headaches, Tension type headache, Migraine, Body mass index, Depression

INTRODUCTION

Carpal Tunnel Syndrome (CTS) occurs when the median nerves in the carpal tunnel become squeezed or pressed. In addition, it is the most frequent entrapment neuropathy. The symptoms of CTS, especially aches and paresthesias, often increase at night, and only one symptom may be present at onset. While various factors are thought to contribute to its etiology, CTS is frequently idiopathic.[1] The prevalence of CTS was reported to be between 3.72% and 5.8% in a study carried out in Sweden and the United States of America.[2] However, there are no clear data regarding the prevalence of CTS in our country (Turkey).

Tension Type Headache (TTH) and migraine headache are the most common primary headaches. It should be noted, that although migraine headache is typically

unilateral, the pain may also be bilateral in some patients, and are characterized by throbbing accompanied by nausea, vomiting, photophobia, and phonophobia. These symptoms are often severe enough to cause serious functional losses in patients.[3] TTHs are generally defined as non-localized and Obtuse and have moderate-mild severity.[4] While the prevalence of migraine ranges from 10 to 18%, the prevalence of TTH ranges from 30 to 80%, depending on the location of the study.[4]

CTS, migraine, and TTH are all conditions causing chronic ache that are frequently encountered in society. To our knowledge, there have been no studies examining the relationship between these three conditions. Therefore, the objective of this study was to examine whether these three chronic conditions, which are very frequently seen in society, are related in any way.

METHODS

This study included 372 hands of 201 patients that applied to our electrophysiology laboratory with a pre-diagnosis of CTS and were electro-physiologically diagnosed with definitive CTS in our lab. Patients were excluded for the following reasons: the existence of any additional disease having a tendency to develop CTS (rheumatoid arthritis, diabetes mellitus, hypo-hyperthyroid, etc.), the existence of any reason that could cause headache except the primary headache, the non-definitive diagnosis of CTS by electrophysiology, and any pathological finding besides CTS upon neurological examination. Only patients with idiopathic CTS that met our inclusion criteria were included in the study. The study was carried out in accordance with the Helsinki declaration and the local ethics committee approved the study protocol. Informed consent was obtained from all cases, and each was given a detailed explanation regarding the procedures to be applied in the study. Headaches were evaluated by the 2004 IHS criteria and Body Mass Index was calculated [BMI: Weight (kg)/Length (m^2)]. The patients were given the Boston Questionnaire Form (BQF) and the Beck Depression Inventory (BDI), which questioned them about their symptoms, severity, and their functional capacity. All patients underwent a detailed neurological examination, and all of their socio-demographic characteristics were recorded. The control group was created from 100 age- and sex-matched healthy volunteers from the staff of our hospital and their relatives. The control group underwent all of same procedures and filled out same questionnaires as the patient group, with the exception of the BQF.

The same researcher performed all electro neurophysiological examinations. The patients were allowed to relax in a room (temperature between 22-24°C) for 15 minutes while their hands were prepared. A Medelec-Oxford Synergy Electromyography (EMG) device was used for the examination under the following conditions: the active recording electrode was attached to the abductor pollicis brevis muscle, and the reference electrode was attached to the 1st finger distal. The recording was made with at least 5 cm between the stimulator electrode (cathode) and the active electrode, and the examination was repeated with superficial electrodes for the sensory conduction studies. The clinical severity of CTS was assessed on a 6-stage scale as follows: stage 0 = no evidence suggesting the presence of CTS; stage 1 = only nocturnal paresthesias; stage 2 = diurnal paresthesias; stage 3 = sensory deficit; stage 4 = loss of strength in the muscles; and stage 5 = complete atrophy or complete plegia.[5,6] Electrophysiological abnormalities of obese patients with CTS were evaluated on a 5-stage scale as follows: stage 1 = abnormal segmental or comparative studies; stage 2 = abnormal finger/wrist sensory conduction velocities; stage 3 = abnormal finger/wrist sensory conduction velocities and abnormal distal motor latencies; stage 4 = absence of sensory response and abnormal distal motor latency; stage 5 = absence of sensory and motor responses.[5-7]

Statistical analysis

The "SPSS (Statistical Package for Social Sciences) 15.0 for Windows" program was used for statistical analysis in this study. The Chi-Square test was used to compare the qualitative data, including symptoms and results of the physical examination. Prior to performing calculations on the non-qualitative data, the Kolmogorov Simirnov test was used to determine the conformity with the normal distribution. The nonparametric "Mann Whitney U" and "Kruskal-Wallis" tests were used, while the parametric "student t test" and "unilateral variance analysis" (ANOVA) tests were used. Logistic regression analysis was performed to determine whether the dependent variables of age, BMI and depression more affecting the independent variable on CTS. The results are presented as mean ± standard deviation for numeric values and as "n" and "%" for the qualitative values. Values of $P < 0.05$ were accepted as significant.

RESULTS

Of the 201 CTS patients, 181 were female and 20 were male. Their mean age was 46.04 ± 9.93 years. Of the 100 healthy volunteers, 84 were female and 16 were male. Their mean age was 45.18 ± 5.72 years. There were no statistically significant differences in the ages or sex distributions between these two groups ($P = 0.182$, $P = 0.093$, respectively). The incidences of both TTH and migraine headache were significantly higher in the CTS group than in the control group ($P = 0.001$). In addition, the headache attack frequency was significantly higher in the CTS group than in the control group ($P = 0.003$). 61.7% of the patients with CTS had headache, with 49.3% of them having TTH and 12.4% of them experiencing migraines. Headache was detected in 20% of the control group, with 14% of them having TTH and 6% of them experiencing migraine. The BMI values of the patients with CTS were significantly higher than those of the control group ($P = 0.001$). There were no

significant differences between those patients with mild CTS and those with mild-severe CTS in terms of headache type and headache attack frequency (P = 0.77, P = 0.25, respectively). In addition, there was no significant difference between the clinical stage of CTS and frequency of headache (P = 0.43).

The Boston mean symptom severity and mean functional capacity scores of CTS patients with headache were significantly higher than those of CTS patients without headache (P = 0.026, P = 0.023, respectively). When the duration of CTS symptoms in the CTS patient group were compared with the duration of headaches, it was found that the duration of CTS symptoms were significantly longer (P = 0.031). There was no significant difference in terms of education time between the patient and the control groups (P = 0.423). However, the CTS patient group did have a significantly lower income level than did the control group (P = 0.029). The mean age of CTA patients with headache was significantly lower than those without headache (P = 0.001) and the number of females was significantly higher (P = 0.01). Logistic regression analysis showed that between dependent variables of age, BMI and depression, age is most affecting independent factor of CTS. The descriptive properties of the patient and control groups are shown in Tables 1 and 2.

Table 1: The descriptive properties of the patient and control groups.

	Patient group (n=201)	Control group (n=100)	P
Age (years)	46.04 ± 9.93	45.18 ± 5.72	0.182
Sex			
Male	20	16	0.093
Female	181	84	
Education (years)			
≤8	157	83	0.423
>8	44	17	
Economic situation (Turkish Liras/month)			
≤1500	65	21	0.029
>1500	136	79	
Headache			
None	77	80	0.001
TTH	99	14	
Migraine	25	6	
BDS			
<17	112	94	0.001
≥17	89	6	
BMI			
<30	102	69	0.0001
≥30	99	31	
Boston SSS	3.00 ± 0.95		
Boston FCS	2.59 ± 0.96		

The data for the numeric expressions are given as means ± SD (standard deviation). BMI: Body mass index, BDS: Beck depression scale, Boston SSS: Boston symptom severity score, Boston FCS: Boston functional capacity score

Table 2: The descriptive properties of CTS patients with headache versus those without headache.

	Patient group (n=201)	No headache (n=77)	P
Age (years)	44.16 ± 10.08	49.09 ± 8.92	0.001
Sex			
Male	7	13	0.01
Female	117	64	
Education (years)			
≤8	93	16	0.66
>8	31	61	
Economic situation (Turkish Liras/month)			
≤1500	10	7	0.8
>1500	114	70	
BDS			
<17	68	44	0.77
≥17	56	33	
BMI			
<30	24	8	066
≥30	100	69	
Boston SSS	3.12 ± 0.90	2.81 ± 0.99	
Boston FCS	2.71 ± 0.98	2.40 ± 0.89	

The data for the numeric expressions are given as means ± SD (standard deviation). BMI: Body mass index, BDS: Beck depression scale, Boston SSS: Boston symptom severity score, Boston FCS: Boston functional capacity score

DISCUSSION

CTS and primary headaches are the most frequently seen neurological diseases. In this study, we determined that both migraine and THH are more frequent in patients with CTS.

To our knowledge, there is no published study examining the relationship of these two neurological diseases. However, Sakhel et al. reported that 19% of the 378 CTS patients evaluated had headache and atypical symptoms, such as neck ache. Approximately 7% of these patients had ipsilateral headache, and surgery cured the headaches in 73% of these patients.[8] These results are associated with Somato's somato-autonome reflex model, which states that somatic afferent stimulation causes a common visceral response in the central nervous system.[9,10] Therefore, in a case where a peripheral stimulant like CTS exists, it can be hypothesized that there may be a central reflex response, such as headache. Our study appears to support this hypothesis, in that the CTS patients with headache had higher Boston functional capacity and symptom severity scores compared to those without headache. In addition, CTS patients with headache had longer duration of CTS symptoms than did those CTS patients without headache. In our study, 124 of the 201 patients with CTS had headache, with 99 of them having THH and 25 of them having migraine type. We detected a higher frequency of headache than did the study by Sakhel and et al. because our study focused on headaches primarily in patients with CTS. In 2012, a

study carried out in Germany reported that 55.5% of the 9635 patients evaluated had headache. 17% of these patients had migraine, 13.35% had TTH and 12.8% had both TTH and migraine together.[11] In the study carried out by Sakhel et al., other atypical symptoms were grouped together with headache, and headache typology was not performed. This resulted in the headache frequency being detected as even lower than that in the German population.

The relationship between headache and CTS may be explained by the fact that they have common risk factors, one of which is obesity. Previous studies have examined the relationship between obesity and headache and obesity and CTS. In a study carried out in 2013 in France with 676 CTS patients, it was reported that the BMIs of the CTS patients were significantly higher than those of the control group, especially in those patients older than 60 years.[12] BMI was also detected to be a risk factor for CTS in another study from 2005.[13] In addition, in the previously described 2013 French study, it was stated that obesity could be a risk factor for both TTH and the migraine, although obesity is not frequently observed in migraine patients.[14] The study by Debroah et al. emphasized that obesity does not cause migraine, but can increase the number of migraine attacks and can lead to chronic migraine.[15] In our study, the BMIs of the CTS patients were higher than those of the control group. In addition, the BMIs of CTS patients with headache were higher than those without.

Previous studies have reported an association of depression with various chronic aches. Some studies have shown that suicidal behaviors increase with depression in patients with chronic ache.[16] Migraine, TTH, and CTS are known to cause chronic ache. Another common risk factor of these conditions is depression. The relationship between headaches and depression has been shown in many studies. A prospective cohort study in 2013 monitored 36016 female patients without depression for approximately 13.8 years, and found that 3833 of these patients who developed headaches also developed depression.[17] In the study carried out by Öyekçin and et al. with 30 migraine and 30 chronic THH patients, the most common accompanying psychiatric disease was found to major depression.[18] In another study carried out in 1997, all levels of depression, anxiety and neurotic tendency in young female patients aged between 14-18 with migraine and TTH were higher than those of a control group. In addition, those patients with migraine had higher levels of depression, anxiety, and neurotic tendency than did the group with TTH.[19] CTS is also associated with ache, and therefore, it may also be associated with depression. In a study published in the year 2006, 45 of 235 patients with upper extremity problems had CTS, and the depression scores of all disease groups increased with decreasing upper extremity health.[20] Other studies have also reported the relationship of CTS with depression.[21,22] In our study, the Beck depression scores of CTS patients were higher than those of the control group.

We found that the income level of patients with CTS was lower than that of the control group. Previous studies have reported that the frequency of CTS, migraine, and TTH increase with decreasing economic situation. In the multi-central and society based study by Stefano and et al., poor economical situation was reported to be a risk factor for CTS. In addition, after surgery, those with poorer economic situations relapsed more often than those with better income levels.[23] In another study (2012), it was reported that both migraine and TTH are seen more frequently in those with middle level socioeconomic situation.[24] In a study carried out by Carod-Artal et al., it was shown that low-income level is a risk factor for chronic migraine.[25]

CONCLUSION

In conclusion, our results show that CTS patients have higher frequency of headache than does the normal population. While this may be caused by common risk factors such as age, obesity, depression and low-income level, it may also arise from somato-autonomic reflexes. Future comprehensive, randomized studies should be carried out in order to expand knowledge regarding this subject.

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