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Original Article

Clinical presentation of carpal tunnel syndrome with different severity: a cross sectional study

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Abstract: *Background*: Carpal tunnel syndrome is a common neuropathy in the hand which presented with pain and paresthesia in the hands and the wrists. The aim of our study was evaluated clinical symptoms of patients with different severity of CTS. *Methods*: This study is a cross-sectional study was performed on 40 patients referred to Emam khomeyni Hospital in Tehran from 2017 to late 2019 with symptoms of CTS and have been diagnosed with a definite diagnosis. *Results*: A positive significant correlation was between severity of CTS and age, and reverse significant correlation was between severity of CTS with duration of symptoms. There were significant relationships between severity of CTS and shaking or ringing the hands symptoms, weakness or atrophy of the flexion test and reverse phalen test ($P < 0.05$). *Conclusion*: Clinical symptoms of CTS can be diagnosing different severity of disease, so considering of symptoms can plays a predominant role in the diagnosis of the disease.

Keywords: Clinical presentation, carpal tunnel syndrome, neuropathy, severity

Introduction

Carpal Tunnel Syndrome (CTS) is one of the most common upper extremity neuropathies that occurs due to pressure on the median nerve in the wrist [1]. The incidence of disease is more common in males than females at the age of thirty and forty years [2] and the incidence of CTS is 0.3% in the general population and prevalence of disease in the United States is 5% [3, 4]. The symptoms of disease are included pain, paresthesia, and weakness in the hand and wrist which these symptoms are often in the morning and night [5]. The symptoms often are seen in moving of the hand. In the 55% to 65% of cases the symptoms are showed in the bilateral. In addition, some risk factors for disease are pregnancy, obesity and rheumatoid diseases such as rheumatoid arthritis [6, 7]. There is also evidence that hypothyroidism increases the severity of disease [8]. The standard method for diagnostic of disease is electromyogram (EMG) test & nerve conduction study (NCS) which the sensitivity (60-84%) and specificity (more than 95%) of this test are good [10]. Also ultrasound sonography and MRI are effective in diagnosis of CTS [11]. Treatments of disease are included surgical and non-surgical, the surgical treatment is recommending for severe cases such as median nerve involvement and non-surgical treatment is recommending for mild and moderate cases [4]. The conservative treatments are included administration of corticosteroids (injection or oral), physiotherapy, lasers, changing the job, and splinters [12]. Physiotherapy can reduce developing of CTS and also the symptoms are controlled with splinting or corticosteroids. The administration of non-steroidal analgesics such as nonsteroidal anti-inflammatory drugs (NSAIDs) and gabapentin are not suitable for treating CTS. Given that EMG-NCV is a painful and expensive procedure, and also clinical symptoms of CTS can help us to diagnose the severity of the disease without using EMG-NCV. So to prevent a painful and costly diagnosis method for patients in this study we aimed to evaluate clinical symptoms of CTS and severity of the disease in the affected population.

Materials and methods

This study was a cross-sectional descriptive study which was conducted on 40 patients (75 patient samples) with diagnosed CTS referred to Emam khomeyni Hospital in Tehran from

Table 1. Age, Pain score, Duration of symptoms based on severity of CTS

Variable	Number	Minimum	Maximum	Mean	Standard deviation	Severity CTS	
						r	*P*-value
Age	75	31	84	49.73	12.53	0/362	0/001
Pain score	66	0	10	4.82	2.77	0/09	0/46
Duration of symptoms	70	02/0	10	1.76	2.29	-0/192	0/047

2017 to 2019. Patients were evaluated with EMG-NCV and severity of disease was determined with this test. The severity of CTS was classified in the form of minimal, mild, moderate, severe, extreme. The symptoms and demographic characteristics (including age, sex, occupation, underlying disease), as well as EMG-NCS information were collected in checklist. The patients had informed consent to enroll in the study. The patients with radiculopathy or with polyneuropathy, or both of them were excluded of study. The pain was evaluated based on VAS (between 0 to 10).

All Data were analyzed using SPSS version 24 software. The statistical tests were chi square, independent t test, Mann Whitney and Spearman Correlation. The data were presented based on mean and standard division and frequency (percent). $P < 0.05$ as considered a significant level.

Results

40 patients with CTS participated in the study; of these 75 hands (including 18 male (24%) and 58 female (76.3%)) and the mean age of male was 51.83 ± 14.14 years and female was 50.96 ± 10.30 years and the mean age of all patients was 49.73 ± 12.53 years. The range of age was between 31 to 84 years. The severity of CTS in men was significantly higher than that of women (P < 0/001). Distribution of age and gender showed **Table 1**.

The mean of pain (VAS) in 66 (88%) patients was 4.82 ± 2.77 (from 0 to 10) and mean duration of symptoms in 70 (93%) patients was 2.29 ± 1.76 years (between one week and 10 years). Correlation coefficient Spearman showed that the severity of CTS had inverse correlation with the duration of symptoms, and had no significant correlation with the pain.

The occupations of the participants in the study were included 38 cases (housewife), 3 cases (4%) disable, 2 cases (7.2%) non hand worker, 6 cases (8%) retired, 13 cases (17.3%) free job, and 2 (7.2%) unemployed.

Among 38 patients (38.5%) were right handed and 37 cases (3.49%) were left handed, and there was no significant correlation between CTS severity and hand side (P = 29).

The prevalence of underlying diseases were 21 cases (28%) diabetes, 3 cases (4%) hypothyroidism and 2 (2.7%) both of them. The incidence of diabetes was more common in patients than hypothyroidism.

There was a significant relationship between severity of CTS and shaking or ringing the hands symptoms, weakness or atrophy of the flexion test and reverse phalen test. There was no significant relationship between the severity of CTS and other symptoms (P > 0.05) (**Table 2**).

Discussion

In our study, the prevalence of female was higher than male subjects (with a female to male ratio of 3.16 to 1), but the severity of CTS was higher in males than females, and age was considered as a risk factor in the development of CTS. In a study conducted by Petit and colleagues that was evaluated the risk factors associated with CTS in the labor patients. In this study, ageing was as a risk factor for CTS [13]. In our study, the mean age of males was 51.18 and female was 50.96, and the mean age of all patients was 49.73, and the subjects were between the ages of 31 to 84 years. In the study of Rouq and colleagues, the occurrence of symptoms were observed in 67 males and 160 females with an average age of 47.79. Involvement of forearm and three fingers lateral in males was more common than females, as well as involving end-fingers of foreign fingers was more common in in females than men. The involvement of three lateral fingers were more common over the age of 50 years than age <

Table 2. Frequency of symptoms and its relationship with disease

Symptoms or Positive Testing	Severity CTS								Total N = 75		P
	Minimal N = 11		Mild N = 18		Moderate N = 29		Sever N = 17				
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	
Night pain	7	63.6%	12	66.7%	18	62.1%	8	47%	45	60%	0/25
Upper limb pain	8	72.7%	11	61.1%	22	75.9%	10	58.9%	51	68%	0/65
neck pain	3	27.3%	5	27.8%	9	31%	4	23.5%	21	28%	0/87
Shaking or ringing your hands	4	36.4%	13	72.2%	23	79.2%	13	76.5%	53	70.7%	0/04
Pain or paresthesia holding	9	81.8%	15	83.3%	26	89.7%	14	82.4%	64	85.3%	0/99
Feel numbness in every 5 fingers	4	36.4%	9	50%	21	72.4%	8	47%	42	56%	0/47
The feeling of numbness drawn from the neck and shoulder downwards	3	27.3%	2	11.1%	5	17.2%	4	23.5%	14	18.7%	0/92
Sensory disturbances in the median nerve range	4	36.4%	7	38.9%	8	27.6%	9	53%	28	37.3%	0/45
Weakness or atrophy of the thenar eminence	0	0%	1	5.6%	5	17.2%	4	23.5%	10	13.3%	0/02
Reduced hand agility	4	36.4%	7	38.9%	18	62.1%	10	58.9	39	58.9%	0/07
Hypothenar muscle weakness or atrophy, Sixtyflexion, Armpermeation, Forearm flexion	0	0%	2	11.1%	2	6.9%	2	11.8%	6	8%	0/52
phalen test	3	27.3%	9	50%	20	69%	11	64.7%	43	57.3%	0/03
Tinel test	3	27.3%	7	38.9%	11	37.9%	8	47%	29	38.7%	0/27
Reverse Phalen Test	2	18.2%	6	33.3%	16	55.2%	9	53 %	33	44%	0/03

50 years [14]. In our study, the severity of CTS was not significantly correlated with pain score and the mean score of pain in 66 patients was 2.77 (from 0 to 10). In the Finsen study, pain score was evaluated in 30 pregnant women with CTS, the mean pain score was between 2.6 (0 to 10) and 1.2 after wearing orthoses for one week and the pain score was decreased in the weeks after birthing, reducing the severity of pain during pregnancy was significantly associated with weight loss ($r = 0.97$, $P < 0.001$) [15]. In our study, homeworking was more common in the jobs. Ghasemi and colleagues studied the prevalence of CTS and its risk factors in 906 cases (332 workers and 574 computer users), the incidence of CTS was higher in males. Also, the severity of CTS in workers was higher than computer users, and the mean age and duration of work in patients with CTS was longer than non-CTS patients, the mean ages in both groups were less than 30 years. In our study, the frequencies of hypothyroidism was about 3 (4%) and diabetes was 21 (28%). In a study by Karne who evaluated the incidence of CTS in 36 patients with primary hypothyroidism, 6 (16.6%) of patients had CTS and hypothyroidism was significantly associated with CTS. No relation was found between age, duration of disease, serum level of TSH, etiology of disease and therapies for thyroid hormones with occurrence of CTS in hypothyroid patients [17]. In our study, the highest incidence of CTS was found in housewives, and a significant relationship was found between using hand and CTS, but there was no significant relationship between hand dominance and CTS severity. Also, there was a significant relationship between severity of CTS with pain but no had significant relationship with paresthesia in 5 fingers. In two study by Tang, first study was a cross-sectional on 262 patients with CTS (396 CTS hands) that 84% of patients were female and the dominant hand was more involved. Repetitive movements with strength in the hands and wrists CTS was associated with clinical manifestations including pain and paresthesia in the median nerve, but 75.3% of the 396 hand had operated CTS hands. In the second study was case control, and 61 cases were female. There was a significant relationship between handwashing and CTS severity [18]. In our study, phalen maneuver test and Reverse phalen maneuver test had significant correlation with CTS, but Tinel's test was not meaningful. In a study by Hansen and colleagues in 142 patients with diagnosed CTS by EMG-NCV that 67% had CTS. The sensitivities of Tinel and phalen maneuver tests were 27% and 34%, respectively. Also phalen maneuver test was better than Tinel [19].

Conclusion

Nevertheless, the past medical history and physical examination plays predominant role in clinical diagnosis but in the present study, there was no significant relationship between the majority of symptoms of CTS and the severity of the disease. However, the disease is very common and requires further examination for definitive diagnosis, but identification of key symptoms for diagnosis and follow up is essential, although this study plays a significant role for the symptoms of the disease.

Disclosure of conflict of interest

None.

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