

Original Article

Demographic Pattern and Clinical Features of Patients with Carpal Tunnel Syndrome Presenting to Orthopedic Outpatient Clinics in a Military Hospital in Kuwait

Yousef A Marwan, Khadija A Ghadanfari, Sami M Kawar, Wael M Husain

Department of Orthopedic Surgery, Jaber Al-Ahmad Armed Forces Hospital, Ministry of Defense, Kuwait

Kuwait Medical Journal 2014; 46 (1): 49 - 53

ABSTRACT

Objectives: Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy. Our aim was to provide data about the demographic pattern and clinical features of this syndrome among patients in Kuwait, and compare it to data from other countries.

Design: Retrospective review of patients' medical records

Setting: Jaber Al-Ahmad Armed Forces hospital, Kuwait

Subjects and Methods: A retrospective review of the medical records of 175 Kuwaiti patients diagnosed with CTS at Jaber Al-Ahmad Armed Forces hospital in Kuwait between January 2006 and December 2010 was done. The diagnosis was based on history, physical examination and electrodiagnostic studies. Results are presented using frequencies and percentages.

Main Outcome Measures: Demographic and clinical features of patients with CTS

Results: Out of the 175 cases, 132 (75.4%) were females, with a male to female ratio of 1:3.1. The mean age was 43.68 years (range 25 – 70 years), peaking between 46 to 50 years (40; 22.9%). All the patients complained of nocturnal symptoms, while 173 (98.3%) had daytime symptoms. Physical examination revealed abnormal sensation, positive Phalen's test, positive Tinel sign, thenar muscle wasting and decreased power of thenar muscles in 150 (85.7%), 161 (92.0%), 129 (73.7%), 17 (9.7%) and 91 (52.0%) patients respectively. Involvement was bilateral in 141 (80.6%) patients. The most common cause / risk factor of CTS in this sample was obesity (66; 37.7%).

Conclusion: The demographic pattern and clinical features of this sample of CTS patients in Kuwait are similar to what was found elsewhere.

KEYWORDS: demographics, entrapment neuropathy, median nerve, signs and symptoms

INTRODUCTION

Carpal tunnel syndrome (CTS) is a neurological disorder of the median nerve characterized by sensory symptoms of the first three fingers and radial half of the fourth finger^[1-2]. It is considered as the most common upper limb compression neuropathy accounting for approximately 90% of all entrapment neuropathies^[3-5]. In Sweden, the prevalence of CTS in the general population was estimated to be 3.8%, with one out of five subjects with hand symptoms of pain, numbness and tingling would be expected to have this disorder^[6]. Also, a prospective population-based study conducted in Netherlands in 1985 among 715 participants aged

25 to 74 years revealed that the prevalence of CTS was 0.6% in men and 5.8% in women^[7]. One more study done in the general practice setting using data from Dutch National Survey to study the incidence of CTS in 1987 and 2001 showed that the crude incidence rate was 1.3 per 1000 in 1987, and 1.8 per 1000 in 2001^[8]. The incidence rate was higher among females (female:male ratio was 3.1:1) during both years of their study, and its peak was among the 45 - 64 years age group. Moreover, the overall incidence of this condition in Minnesota, United States of America (USA), was 376 per 100,000 person-years in 1981-2005^[9]. In western Saudi Arabia, a retrospective study involving 135 patients without

Address correspondence to:

Yousef Marwan, Department of Orthopedic Surgery, Jaber Al-Ahmad Armed Forces Hospital, Ministry of Defense, Kuwait. P O Box 24923, Safat 13110 Kuwait. Tel: 00965-94060660. E-mail: yousefmarwan@hotmail.com

any predisposing condition to CTS, and diagnosed as CTS using electrophysiological studies revealed that the male:female ratio was 1:4.9 and the condition was commonest among the age group 45 - 54 years^[10]. The economic costs of medical and surgical treatment of CTS were very high in the USA^[11-12]. An estimated one million cases require medical treatment for CTS, while more than 400,000 cases require surgical treatment. This huge number of operations costs more than \$2 billion per year. In the United Kingdom (UK), the surgical operation rates for CTS are 43 to 74 operations per 100,000 per year^[13].

CTS is caused by various occupational and non-occupational causes^[14]. Repetition, force, posture, external pressure and vibration are physical factors that were demonstrated to cause CTS. On the other hand, the non-occupational causes can be categorized into local, regional and systemic. The local causes include inflammation (*e.g.*, tenosynovitis and infections), trauma (*e.g.*, Colle's fracture and dislocation of the carpal bones), tumors (*e.g.*, hemangiomas and ganglion), and anatomical anomalies (*e.g.*, thickened transverse carpal ligament and bony abnormalities). Osteoarthritis, rheumatoid arthritis, amyloidosis and gout are considered regional causes of CTS, while diabetes, obesity, hypothyroidism, pregnancy, menopause, systemic lupus erythematosus, scleroderma and acromegaly, among other conditions, are considered systemic causes.

Patients with CTS may present with tingling, numbness, burning sensation and pain over the distribution of the median nerve that typically increase during sleep, and resolve by shaking and moving the wrist^[2]. On physical examination, sensory deficits (*e.g.*, diminished pinprick sensation), and thenar muscle atrophy and weakness might be noted^[15]. Moreover, Phalen's test (flexion of the wrist for 30 - 60 seconds to induce or increase the symptoms) and Tinel sign (tapping over the site of the median nerve to induce tingling) are commonly used to aid in the diagnosis of CTS^[16-18]. Other physical examination signs, such as carpal tunnel compression test and hand elevation test, can also be used. Furthermore, adding data from nerve conduction studies (NCS), electromyogram (EMG) and ultrasonography (US) confirm the diagnosis of CTS^[2,19-21].

The treatment of CTS can be non-surgical or surgical depending on the severity of the disease and the patient's preference^[14,22]. Splinting, rehabilitation modalities (stretching and strengthening, and therapeutic ultrasound), oral medication (*e.g.*, corticosteroids, vitamin B6, vitamin B12, and non-steroidal anti-inflammatory drugs) and local injection of corticosteroids are options for conservative management. On the other hand, the surgical treatment

of CTS can be either open or endoscopic carpal tunnel release.

In Kuwait, it was reported that the prevalence of CTS among office workers is 18.7%; however, no studies described the demographic pattern and clinical features of this syndrome in Kuwait^[23]. By conducting this study, we aimed to provide a description of the demographic pattern and clinical features of patients with CTS presenting to orthopedic outpatient clinics of Jaber Al-Ahmad armed forces hospital in Kuwait.

SUBJECTS AND METHODS

We retrospectively reviewed the medical records of Kuwaiti patients who presented to our orthopedic outpatient clinics and were diagnosed with CTS from January 2006 to December 2010. Our hospital is the only military hospital responsible for the care of employees of the Ministry of Defense and their relatives in Kuwait. Patients with suspected CTS presenting to doctors from other departments in our hospital are transferred to orthopaedic surgeons for diagnosis and treatment; however, it is the patient's choice to continue treatment in this hospital or to be transferred to other hospitals belong to the Ministry of Health in Kuwait (Neurosurgery and Orthopedic hospitals). The diagnosis of CTS was based on a combination of findings from the patient's history (sensory symptoms of the hands and digits such as numbness, tingling, pain and nocturnal paresthesia) and physical examination (signs of median nerve disease such as thenar muscle bulk and strength, abnormal sensation over the median nerve distribution, Phalen's test and Tinel sign) that was further confirmed by EMG and NCS of the median nerve^[24]. Files with incomplete information were excluded. The study protocol was reviewed and ethically approved by our institutional projects' review committee.

One hundred and seventy-five patients were included in the study. Nineteen patients were excluded from the study because of missing data in their files. We gathered the demographic data along with the clinical features of CTS for each patient. This included age, gender, symptoms, physical examination findings and the site of CTS. We also collected data about possible causes or risk factors of CTS in our patients. These data were analyzed using the Statistical Package for Social Sciences (SPSS), and were presented using frequencies and percentages.

RESULTS

Table 1 demonstrates the demographic pattern and clinical features of CTS in our cohort of patients. The age of our sample ranged from 25 to 70 years (mean \pm standard deviation = 43.68 ± 8.737), with a peak age of 46 - 50 years (40; 22.9%). Out of the 175 patients,

Table 1: Demographic pattern and clinical features of patients with carpal tunnel syndrome in Kuwait, 2006-2010

Characteristic	n	%
Age (years)		
< 35	30	17.1
36 – 40	36	20.6
41 – 45	38	21.7
46 – 50	40	22.9
> 50	31	17.7
Mean ± SD*	43.68 ± 8.737	
Gender		
Male	43	24.6
Female	132	75.4
Daytime symptoms		
Present	172	98.3
Absent	3	1.7
Nocturnal symptoms		
Present	175	100.0
Absent	0	0.0
Sensation (during physical examination)		
Abnormal	150	85.7
Normal	25	14.3
Phalen's test		
Positive	161	92.0
Negative	14	8.0
Tinel sign		
Present	129	73.7
Absent	46	26.3
Thenar muscle bulk		
Wasted	17	9.7
Normal	158	90.3
Thenar muscle power		
Decreased	91	52.0
Normal	84	48.0
Site of final diagnosis		
Right CTS*	24	13.7
Left CTS*	10	5.7
Bilateral CTS*	141	80.6

*SD = Standard deviation, CTS = Carpal tunnel syndrome

114 (65.2%) developed CTS between the age of 36 to 50 years. Forty-three (24.6%) patients were male and 132 (75.4%) were female, with a male to female ratio of 1:3.1.

Symptoms were present in 172 (98.3%) patients during the daytime, while nocturnal symptoms were present in all patients (Table 1). Physical examination revealed abnormal sensation in 150 (85.7%) patients and a positive Phalen's test in 161 (92.0%). Tinel sign was present in 129 (73.7%) patients. Moreover, wasting (17; 9.7%) and decreased power (91; 52.0%) of the thenar muscle was found in some patients. Bilateral CTS was diagnosed in 141 (80.6%) patients, and unilaterally in 34 (19.4%). In unilateral cases, right side (24; 13.7%) was involved more than the left side (10; 5.7%).

Factors known to be associated with increased risk of CTS in our patients are shown in Table 2. The most

Table 2: Factors associated with increased risk of carpal tunnel syndrome among patients in Kuwait, 2006-2010

Associated factor	n	%
Idiopathic / no factors	43	24.6
Occupational‡	22	12.6
Local		
Recurrence of surgically released CTS*	1	0.6
Trauma	4	2.3
Regional		
Gout	1	0.6
Osteoarthritis	1	0.6
Rheumatoid arthritis	3	1.7
Systemic		
Acromegaly	1	0.6
Diabetes	49	28.0
Hypothyroidism	7	4.0
Obesity	66	37.7
Pregnancy	8	4.6

*CTS = Carpal tunnel syndrome; ‡ = Occupational factors include jobs involving repetitive and forceful use of the hands and wrists such as using computers and vibrating hand tools

common associated factors of CTS in this sample were obesity (66; 37.7%) and diabetes (49; 28.0%). On the other hand, recurrence of CTS after surgical treatment, gout, osteoarthritis and acromegaly were the least common associated factors (1; 0.6%). No associated factor for CTS (idiopathic) was found in 43 (24.6%) patients.

DISCUSSION

This is the first study of the demographic pattern and clinical features of CTS patients in Kuwait; however, it is limited by the small number of patients which may result in data that are not representative of the whole population of Kuwaiti CTS patients. As expected, excess of females over males was noted; however, the male to female ratio (1:3.1) was more than UK (1:2.07) and USA (1:2.2) but less than Eastern province of Saudi Arabia (1:4.6), Argentina (1:10) and Korea (1:23)^[9,10, 25-26]. Moreover, the age of diagnosis (middle-age) and the site of involvement (most commonly bilateral, and right hand more than left hand) were similar to what was reported elsewhere^[9,14-15,22-23]. The common bilateral involvement of CTS in our sample is most probably due to the high prevalence of diabetes mellitus and obesity among these patients^[27-28]. In Saudi Arabia, bilateral CTS were found to be more common than unilateral because obesity and diabetes mellitus were highly prevalent in their population (84% and 30% respectively)^[29]. The minor differences noted in the demographic data are probably due to the different modalities used to diagnose CTS among different researchers and the sample size of each study.

Regarding symptoms of CTS in our patients, only 1.7% did not complain of daytime symptoms,

while all patients had nocturnal complaints. This is similar to what was reported by Kendall, where few patients reported symptoms only during the day^[30]. Also, similar to Kendall's patients, almost all (85.7%) patients in our study had abnormal sensation during physical examination. The results of Phalen's test (positive in 92.0%) and Tinel sign (present in 73.7%) among our patients reflect the higher sensitivity of the test^[16-18]. In addition, motor examination abnormalities, which are thenar muscle wasting (9.7%) and weakness (52.0%), were reported less than sensory abnormalities because motor symptoms and signs are known to be late manifestations of CTS^[15].

The literature suggests that in only 50% of patients a possible cause / associated factor for CTS is not found^[14]. A possible cause / associated factor of CTS in our study was not identified in about one quarter of patients; however, these patients did not have imaging examination (*e.g.*, US and magnetic resonance imaging) of the wrist which can identify a cause of CTS in some cases^[31]. Obesity and diabetes were present in more than 25% patients. Increasing cases of CTS resulting from obesity and diabetes is expected in Kuwait and other countries in the middle-east and western countries where obesity and diabetes are highly prevalent.

CONCLUSION

In conclusion, this sample of CTS patients in Kuwait share similar demographic pattern and clinical features to CTS patients elsewhere with minor differences in male to female ratio. The syndrome was more common in females and middle-aged individuals. The majority of cases had bilateral disease, most probably because of the high prevalence of systemic diseases, such as diabetes mellitus and obesity, among our population. Sensory symptoms and signs were more common than the motor ones. The most common causes / risk factors of CTS in Kuwait were obesity and diabetes.

REFERENCES

- Patijn J, Vallejo R, Janssen M, *et al.* Carpal tunnel syndrome. *Pain Pract* 2011; 11:297-301.
- Klauser AS, Faschingbauer R, Bauer T, *et al.* Entrapment neuropathies II: carpal tunnel syndrome. *Semin Musculoskelet Radiol* 2010; 14:487-500.
- Omer GE Jr. Median nerve compression at the wrist. *Hand Clin* 1992; 8:317-324.
- Patterson JD, Simmons BP. Outcomes assessment in carpal tunnel syndrome. *Hand Clin* 2002; 18:359-363, viii.
- Katz JN, Simmons BP. Clinical practice. Carpal tunnel syndrome. *N Engl J Med* 2002; 346:1807-1812.
- Atroshi I, Gummesson C, Johnsson R, Ornstein E, Ranstam J, Rosén I. Prevalence of carpal tunnel syndrome in a general population. *JAMA* 1999; 14:282:153-158.
- de Krom MC, Knipschild PG, Kester AD, Thijs CT, Boekkooi PF, Spaans F. Carpal tunnel syndrome: prevalence in the general population. *J Clin Epidemiol*. 1992; 45:373-376.
- Bongers FJ, Schellevis FG, van den Bosch WJ, van der Zee J. Carpal tunnel syndrome in general practice (1987 and 2001): incidence and the role of occupational and non-occupational factors. *Br J Gen Pract* 2007; 57:36-39.
- Gelfman R, Melton LJ 3rd, Yawn BP, Wollan PC, Amadio PC, Stevens JC. Long-term trends in carpal tunnel syndrome. *Neurology* 2009; 6:72:33-41.
- Abumunaser LA. Demographic pattern of carpal tunnel syndrome in western Saudi Arabia. *Neurosciences (Riyadh)* 2012; 17:44-47.
- Tanaka S, Wild DK, Seligman PJ, Behrens V, Cameron L, Putz-Anderson V. The US prevalence of self-reported carpal tunnel syndrome: 1988 National Health Interview Survey data. *Am J Public Health* 1994; 84:1846-1848.
- Palmer DH, Hanrahan LP. Social and economic costs of carpal tunnel surgery. *Instr Course Lect* 1995; 44:167-172.
- Burke FD. Carpal tunnel syndrome: reconciling "demand management" with clinical need. *J Hand Surg [Br]* 2000; 25:121-127.
- Aroori S, Spence RA. Carpal tunnel syndrome. *Ulster Med J* 2008; 77:6-17.
- Phalen GS. The carpal-tunnel syndrome. Seventeen years' experience in diagnosis and treatment of six hundred fifty-four hands. *J Bone Joint Surg Am* 1966; 48:211-228.
- Kuhlman KA. Sensitivity and specificity of carpal tunnel syndrome sign. *Am J Phys Med Rehabil* 1997; 76:451-457.
- Naranjo A, Ojeda S, Mendoza D, Francisco F, Quevedo JC, Erasquin C. What is the diagnostic value of ultrasonography compared to physical evaluation in patients with idiopathic carpal tunnel syndrome? *Clin Exp Rheumatol* 2007; 25:853-859.
- Amirfeyz R, Gozzard C, Leslie IJ. Hand elevation test for assessment of carpal tunnel syndrome. *J Hand Surg Br* 2005; 30:361-364.
- Werner RA, Andary M. Electrodiagnostic evaluation of carpal tunnel syndrome. *Muscle Nerve* 2011; 44:597-607.
- Fowler JR, Gaughan JP, Ilyas AM. The sensitivity and specificity of ultrasound for the diagnosis of carpal tunnel syndrome: a meta-analysis. *Clin Orthop Relat Res* 2011; 469:1089-1094.
- El Miedany YM, Aty SA, Ashour S. Ultrasonography versus nerve conduction study in patients with carpal tunnel syndrome: substantive or complementary tests? *Rheumatology (Oxford)* 2004; 43:887-895.
- Wilson JK, Sevier TL. A review of treatment for carpal tunnel syndrome. *Disabil Rehabil* 2003; 25:113-119.
- Raman SR, Al-Halabi B, Hamdan E, Landry MD. Prevalence and risk factors associated with self-reported carpal tunnel syndrome (CTS) among office workers in Kuwait. *BMC Res Notes* 2012; 5:289.
- Rempel D, Evanoff B, Amadio P, *et al.* Consensus criteria for the classification of carpal tunnel syndrome

- in epidemiologic studies. *Am J Public Health* 1998; 88:1447-1451.
25. Bland JD, Rudolfer SM. Clinical surveillance of carpal tunnel syndrome in two areas of the United Kingdom, 1991-2001. *J Neurol Neurosurg Psychiatry* 2003; 74:1674-1679.
26. Ahn DS, Yoon ES, Koo SH, Park SH. A prospective study of the anatomic variations of the median nerve in the carpal tunnel in Asians. *Ann Plast Surg* 2000; 44:282-287.
27. Zambelis T, Tsigoulis G, Karandreas N. Carpal tunnel syndrome: associations between risk factors and laterality. *Eur Neurol* 2010; 63:43-47.
28. Werner RA, Albers JW, Franzblau A, Armstrong TJ: The relationship between body mass index and the diagnosis of carpal tunnel syndrome. *Muscle Nerve* 1994; 17:632-636.
29. Awada A, Amene P, Abdulrazzak M, Obeid T. Carpal Tunnel Syndrome: A prospective clinical study of one hundred cases. *Saudi Med J* 1998; 19:166-169.
30. Kendall WW. Results of treatment of severe carpal tunnel syndrome without internal neurolysis of the median nerve. *J Bone Joint Surg Am* 1988; 70:151.
31. Uchiyama S, Itsubo T, Nakamura K, Kato H, Yasutomi T, Momose T. Current concepts of carpal tunnel syndrome: pathophysiology, treatment, and evaluation. *J Orthop Sci* 2010; 15:1-13.