

# CLINICAL AND ELECTROPHYSIOLOGICAL PROFILE OF CARPAL TUNNEL SYNDROME: A STUDY IN A TERTIARY CARE HOSPITAL

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### Abstract:

**Introduction:** Carpal tunnel syndrome (CTS) is a clinical syndrome that results from compression of median nerve within the carpal tunnel at the wrist. The aim of this study was to review the clinical and demographic characteristics and electrophysiological patterns of CTS patients who presented to a tertiary care hospital in Bangladesh.

**Methodology:** A descriptive cross-sectional study was conducted on 150 CTS patients at the neurology department, Dhaka Medical College Hospital between January, 2019 to March, 2020. All the subjects had clinical evaluation and standardized nerve conduction studies of upper limbs (300 limbs) using the same protocol.

**Results:** 228 hands were found to have clinical and electrophysiological features consistent with CTS. There was female predominance (90%) and the highest occurrence of CTS was in the 45-55 years age group. Bilateral CTS was found in the majority of cases ie 78 (52%) and the rest had unilateral CTS. Among those with unilateral CTS, right hand was affected more (41, 57%) than left hand (31, 43%). Most of the cases were idiopathic. Neurophysiological studies showed most patients had mild CTS (121 hands, 53%). Most of the cases were idiopathic (102, 68%). Where a risk factor was found diabetes was commonest one (32) followed by hypothyroidism (12) and pregnancy (4).

**Conclusion:** There was marked female predominance and the 45-55 years age group was predominantly affected. Majority of cases had mild CTS. Bilateral involvement was more common. Right hand was more affected than the left hand.

**Key words:** Carpal tunnel syndrome, nerve conduction study.

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### Introduction:

Carpal tunnel syndrome (CTS) is a clinical syndrome that results from compression of median nerve within the carpal tunnel at the wrist. Of all the entrapment neuropathies, CTS is the most prevalent with a life time risk of 10%. Its clinical presentation is paresthesia and numbness in hand, affecting the lateral side of hand. In more severe cases there may be

weakness and wasting of median nerve innervated muscles of the hand.

CTS is an important cause of long term morbidity and disability. The personal, social and economic burden due to CTS is considerable. It accounts for a higher number of days away from work than all other work-related musculoskeletal disorders <sup>1</sup>

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Females are more commonly affected by CTS than males. Certain clinical conditions may predispose a person to CTS including diabetes mellitus, rheumatoid arthritis, hypothyroidism, acromegaly and obesity.

The diagnostic signs include loss of sensation in the median nerve innervated area of the hand and in more severe cases wasting of abductor pollicis brevis (APB) muscle. Certain clinical signs ( eg Tinel's sign and Phanel's sign at the wrist ) may also aid in the diagnosis of CTS. However, the diagnostic sensitivity and specificity of these clinical signs are rather low.

Nerve conduction study plays an important role in the diagnosis and management of CTS. Management of CTS may be medical or surgical. Surgery is generally reserved for more severe cases while milder cases usually respond to medical treatment.

The aim of the current study is to analyze the clinical and electrophysiological profiles of CTS patients who presented at neurology department, Dhaka Medical College Hospital and compare them with previous studies.

**Methods**

This descriptive, cross-sectional study was conducted at the neurology department, Dhaka Medical College Hospital (DMCH) from January, 2019 to March, 2020. 150 consecutive cases referred to the neurophysiology lab, DMCH, who had clinical and electrophysiological features of CTS were included in the study.

For each patient, relevant history was taken and physical examination was done. Relevant demographic and clinical data (including age, sex, risk factors, symptom duration, symptomatic side, presence/ absence of motor symptom, wasting) were recorded in a predefined data sheet.

Every patient underwent NCS of upper limb with a NK MEB 2002 machine. Motor and sensory NCS of median and ulnar nerves were done for every patient. Patients were grouped as having mild, moderate , severe and very severe CTS according to American Association of Neurodiagnostic Medication (AAEM) severity grading as-

- 1) Mild CTS- prolonged distal sensory peak latency (SNAP) with/without decreased sensory amplitude
- 2) Moderate CTS- abnormal median sensory peak latency with prolonged distal motor latency
- 3) Severe CTS- prolonged sensory and motor distal peak latency either with low compound motor action potential (CMAP) and/or reduced /absent sensory nerve action potential (SNAP)
- 4) Very severe CTS – absent thenar motor or sensory response either with a present or absent lumbrical response

Data was analyzed by using Microsoft Excel version 7 on personal computer and subjected to descriptive analysis. Categorical data was analyzed as number (percentage).

**Ethical Issues:**

The study was approved by Ethical Committee of Dhaka Medical College Hospital. The authors declare no conflicts of interest.

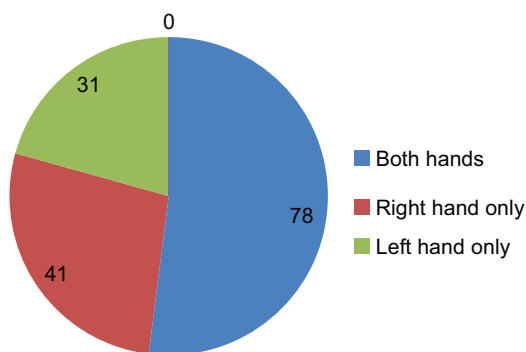
**Results:**

A total of 150 patients were included in the study. Among them 135 (90%) were females and 15(10%) were male with a female: male ration of 9:1.The mean age+- standard deviation for was 45+-13.3 years (range 23-78 years), for all patients, irrespective of gender. The overall peak of CTS was found in the age group 45-55 years (Table 1).

**Table 1**  
*Demographic profile of (n=150) of study population*

Sex	Number	percentage
Female	135	90
Male	15	10
Age group (years)		
15-25	8	5
25-35	33	22
35-45	39	26
45-55	49	33
55-65	15	9
>65	6	5

Among the study patients 78 patients (52%) had involvement of both hands while 72 patients (48%) had involvement of only one hand. Among the patients with unilateral involvement majority (41, 57%) had involvement of the right hand.



**Fig.-1:** Pattern of hand involvement

Majority of cases (102, 68%) were idiopathic. Where a risk factor was found, diabetes was the commonest risk factor (32 patients), followed by hypothyroidism (12 patients) and pregnancy (4 patients).

Regarding clinical features paresthesia was the commonest symptom present in the majority of the patients (140 ie 93%). The paresthesia was worse at night in the majority of patients (115, 76%). In addition to paresthesia, 51 patients (34%) complained of numbness of the affected hands. 2 patients complained of itching of the hands. 12 patients (8%) had wasting of APB. (Table-II)

**Table-II**  
*Clinical features of the study population*

Clinical features	Number of patients
Parasthesia	140(93%)
Numbness	51(34%)
Itching	2 (0.013%)
Nocturnal symptoms	115 (76%)
Sasting	12(8%)

NCS was done in 300 hands and 228 hands were found to have electrophysiological features consistent with CTS. Among the affected hands

neurophysiologically mild form of CTS was found to be the commonest one (121 hands, 53%) followed by moderate form (79 hands, 35%). Severe and very severe CTS was less commonly encountered (28, 12%) (Table-III)

**Table-III**  
*Categorization of patients according to CTS severity grading*

Severity grade	Right hand	Left hand
mild	63	58
moderate	40	39
Severe/ very severe	16	12

**Discussion:**

CTS is the commonest entrapment neuropathy. It leads to considerable social and economic burden and sometimes needs surgical intervention. Several studies have found marked female preponderance for CTS. Stevens et al found the incidence rate of CTS to be 3 times higher among women<sup>2</sup>. Another study by Lutf A Abumunaser including 135 patients found that CTS was 4.9 times more common in women<sup>3</sup>. In our study there was higher predominance of CTS in women with a female: male ratio of 9: 1. This was higher than the mentioned studies. The actual cause of the higher incidence of CTS in females is unknown but the difference of volume of carpal tunnel between males and females probably plays a role<sup>4</sup>.

Gelfman *et al*, found the prevalence of CTS to be highest in the age group of 50-59 years followed by the age group of 41-49 years for the females, and for the males, the prevalence was more in the age group of 70-79 years<sup>-5</sup>. A study by AS Bahar-Moni et al in Malaysia had similar findings; the incidence of CTS was highest in the 41-60 years age group<sup>6</sup>. In our study, the presentation of CTS was highest in the 45-55 years age group which was similar to those studies.

90 percent of the study population was right handed and the right hand was affected in the majority of the study patients (119, ie 79%) with or without involvement of the left hand. This result was consistent with the study by

Bagatur *et al*, where they suggested that CTS was a bilateral disorder and showed that the dominant hand involvement was more<sup>6</sup>.

Diabetes was the most frequently observed comorbidity found in 32 patients. This was followed by hypothyroidism and pregnancy found in 12 and 4 patients respectively. This was similar to several other previous studies<sup>7, 8</sup>. However, several other risk factors for CTS observed in those studies ( eg rheumatoid arthritis, acromegaly) were not found in the present study. This may be due to the small size of our study population.

The classic symptoms of CTS including numbness and paresthesia were present in the majority of the patients. However, wasting of APB was present only in 8% patients. This was lower than that observed by some other studies including Zafar *et al*.<sup>9</sup>

Our study has several limitations. Firstly, the sample size was small. Secondly, all the patients were not screened to exclude all important comorbidities. Further larger studies are required to corroborate our findings and to determine the demographic pattern and important risk factors for CTS in Bangladeshi population.

#### **Conclusion:**

Carpal tunnel syndrome was more common in the female and in the middle aged. The dominant hand was more commonly involved. Our study findings were mostly similar to previous studies regarding demography and

electrophysiological features of CTS. However, higher involvement of females was found compared to several previous studies.

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