

## Clinical Evaluation of the Treatment of Carpal Tunnel Syndrome Conservatively in Pregnant Women

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### Abstract

### Original Research Article

**Background:** Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy. It is more common in the middle age group and more common in women than men. Several factors cause CTS, including pregnancy and lactation. Very few studies have been conducted regarding the treatment of CTS in Bangladesh. So the local data related to the issue are very limited. **Aim of study:** The aim of the study was to evaluate of carpal tunnel syndrome conservatively in pregnant women. **Methods:** This was an observational prospective study. The study was conducted in the Department of Orthopedics of Shaheed M. Monsur Ali Medical College, Sirajganj, Bangladesh during the period from January 2017 to December 2018. In total 60 pregnant women with carpal tunnel syndrome was the study population. Patients were classified into mild, moderate and severe carpal tunnel syndrome according to clinical and nerve conduction grading. **Results:** Based on clinical assessment, 56.67% had mild to moderate CTS and 43.33% had severe CTS. However, as classified by NCS, there were 31.67% patients with mild to moderate CTS and 68.33% with severe CTS. So, a significant number of patients who had mild-moderate CTS on clinical grading actually had severe CTS on electro diagnostic grading ( $p=0.0076$ ). In nerve condition grading we found 30% patients with mild to moderate and 70% with severe condition. **Conclusions:** Carpal tunnel syndrome has a high incidence in females especially in pregnant women. Sensory symptoms (Paresthesia, numbness and nocturnal pain) were more common than symptoms of motor weakness. Dominant hand involvement was more common.

**Keywords:** Carpal, Tunnel, Syndrome, Lactation, Pregnancy, Women.

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## INTRODUCTION

In Bangladesh very few studies have been conducted regarding the treatment of CTS. Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy [1, 2]. It is a common focal peripheral nerve compression. It has an estimated life time risk of 10% with an annual incidence of 0.1% in adults [3]. It has an estimated prevalence of 3-16% with an incidence of 139 per 1,00,000 person years for men and 506 per 1,00,000 person years for women [1, 4]. CTS is more common in the age group of 45-65 years and more common in women than men [5]. Several factors cause CTS, including pregnancy and lactation [6, 7]. Since almost all the females go through childbearing more

than once in their lives, study on their causal or aggravation of CTS can be of value. The compression of median nerve in the carpal tunnel causes the signs and symptoms of CTS. The condition is usually bilateral, but the dominant hand seems to be more severely affected [8]. Numbness and paresthesia in the first three fingers are the classical symptom of CTS [1]. Typically, the symptoms present at night and often awakens the patient from sleep. The common symptoms include: numbness, tingling and burning in median nerve region [2]. In severe cases, there may be weakness when using hands while doing activities like turning keys, opening doorknobs or opening jar lids. In clinical examination, conventional tests for diagnosis of CTS are the Tinels test, Phalens test and the median

nerve compression test [2]. In presence of aggravation of symptoms these tests are considered to be positive. The most accurate test is the electromyogram with a sensitivity of 49-84% and a specificity of 95% [1, 2]. The treatment of CTS depends on the severity and can range from paracetamol, Ibuprofen, Vit B1, B6, B12 application of cock up night wrist splints, physiotherapy to injecting corticosteroids into the carpal tunnel and eventually releasing the median nerve by surgery. Females have a higher incidence of CTS and pregnancy and lactation are risk factors and increase in intensity is seen in future pregnancies. Since invasive methods are avoided during pregnancy, early detection and treatment with noninvasive methods is of utmost importance. Till date studies conducted on CTS in pregnant women have not used standard electrodiagnostic methods [3, 4, 7]. The confirmatory diagnosis of CTS is the electrophysiological study which is specific to the tune of 95%. These are performed for accurate diagnosis, to determine the exact site of entrapment and to preclude alternative diagnosis which mimic CTS in presentation [9]. The aim of the study was to evaluate of carpal tunnel syndrome conservatively in women.

## OBJECTIVES

### General Objective

- To evaluate the treatment of carpal tunnel syndrome (CTS) conservatively in pregnant women.

### Specific Objectives

- To assess the initiatives to increase of the Treatment of carpal tunnel syndrome (CTS) conservatively in Pregnant Women.
- To know more about antenatal care services and present conditions in Bangladesh.

## METHODOLOGY AND MATERIALS

This was an observational prospective study. The study was conducted in the Department of Orthopedics of Shaheed M. Monsur Ali Medical College, Sirajganj, Bangladesh during the period from January 2017 to December 2018. The study protocol was approved by the institutional ethical committee. Each patient was subjected to detailed history and relevant clinical examination with emphasis on elaborate neurological examination. Informed consent regarding participation into the study was taken from the patients. All the information regarding history and examination was recorded in case record form. Patients suspected of suffering from carpal tunnel syndrome were subjected to nerve conduction study. Patients were

classified into mild, moderate and severe carpal tunnel syndrome according to clinical and nerve conduction grading [10]. Apart from electrophysiological study following investigations were performed whenever deemed necessary, CBC, Hb, ESR, T4, TSH, routine serum biochemistry. According to the exclusion criteria, pregnancy < 16 weeks, lactating mothers, patients with history of neurologic disease, hand surgery, hand trauma, diabetes mellitus, cervical spondylosis, osteoarthritis of cervical spine or wrist joint, chronic renal failure, patients with no electrophysiological evidence of carpal tunnel syndrome and those who refused to participate in the study were excluded. Statistical Software SPSS (version 20) and Microsoft Excel were used to carry out the statistical analysis of the data. A p value of <0.05 using chi-square test was considered statistically significant.

## RESULTS

In our study, total study population was 60 in number with carpal tunnel syndrome. The mean age of presentation was 27.50±2.40 years with the range from 20 to 40 years. Majority of the patients were in the age group of 20 to 25 years. The number of patients of this age group was 23 and it was 38.33%. This trend was followed by 20 (33.33%) from 26-30 years age group, 11 (18.33%) from 31-35 years age group and 6 (10%) from 36-40 years age group. In this study we found, Paraesthesias in 43 (71.67%), numbness in 29 (48.33%), pain that worsens at night in 28 (46.67%) participants. It was seen that, sensory symptoms dominated over motor symptoms. Tinel's and Phalen's sign were positive in 45% and 55% patients respectively. The major risk factors or causes were attributed to hypothyroidism (20%), occupational pattern (16.67%) and gout (3.3%). In 13.33% of the patients, the cause could not be identified. Based on clinical assessment, 56.67% had mild to moderate CTS and 43.33% had severe CTS. However, as classified by NCS, there were 31.67% patients with mild to moderate CTS and 68.33% with severe CTS. So, a significant number of patients who had mild-moderate CTS on clinical grading actually had severe CTS on electrodiagnostic grading (p=0.0076). In nerve condition grading we found 30% patients with mild to moderate and 70% with severe condition.

**Table-1: Age distribution of the participants (N=60)**

Age (Years)	n	%
20-25	23	38.33
26-30	20	33.33
31-35	11	18.33
36-40	6	10.00

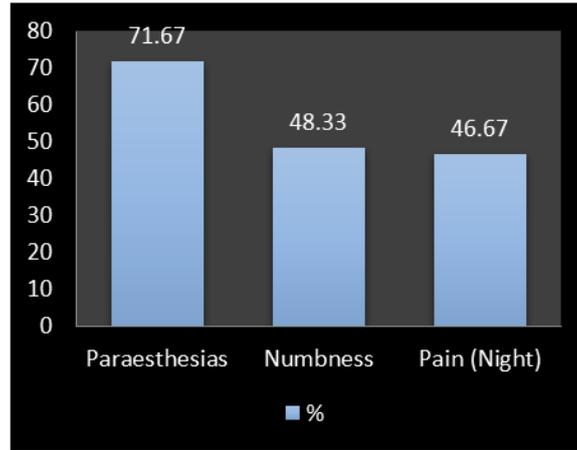


Fig-1: Major symptoms in the participants (N=60)

Table-2: Quantification of the severity of CTS in patients regarding nerve condition grading

Severity	Clinical grading		Nerve conduction grading	
	No.	%	No.	%
Mild to moderate	34	56.67	18	30
Severe	26	43.33	42	70
<b>Chi square=10.871; p-value=0.0076</b>				

## DISCUSSION

Carpal tunnel syndrome (CTS) is a frequent complication of pregnancy. The true prevalence is unknown, but has been reported to be as high as 62% [11-13]. CTS commonly presents during the third trimester, but can occur during the first trimester. It is the most common compression neuropathy of the upper extremity. These changes have been supported by Tupkovic et al in an evaluation of pregnant women in their third trimester pairing them with age- and sex-matched controls [14]. In generally in this type of studies pregnant women of third trimester are selected as study population. This happened because CTS occurs most frequently during the third semester of pregnancy [15, 16]. In the present study the mean age of presentation was 27.50±2.40 years with range from 20 to 40 years. Ali Z et al did a hospital based cross-sectional comparative study to quantify the severity of CTS clinically and electro-diagnostically and to access electro- diagnostic differences between groups with clinically mild to moderate CTS and severe CTS [10] 66 consecutive patients were taken. Out of 66 patients of CTS, females were 72.7% and males were 27.3% and the age ranged from 22-75 years. Bahou YG did a retrospective study on 185 patients with carpal tunnel syndrome over an 18- month period [17]. The mean age of the patients was 45 years with range from 19-80 years. Bicerol B did an electrophysiological and ultrasonographic study of carpal tunnel syndrome [18]. Tay LB carried out a retrospective study and included 134 consecutive patients with CTS and it was found that the majority of patients were females (81.3 percent) [1]. In the present study, paraesthesias were present in 75.60% (n=45), numbness in 63.41% (n=38), pain that worsens at night in 53.65% (n=32) of the patients.

Weakness of Abductor Pollicis Brevis was less frequent (19.51%) (n=12). These results were comparable with studies done by other researchers [9]. Ali Z et al., in their study found paraesthesia (77.3%), numbness (63.6%), pain that worsens at night (56.1%), and weakness of APB in 19.7% of the patients.<sup>10</sup> In present study, Phalen’s test was positive in 57.3% (n=34) patients and Tinel’s test was positive in 48.8% (n=29) of the patients. These results are consistent with reports in the literature [1, 10]. Meta-analysis have shown an average sensitivity of 68% and specificity of 73% for a positive Phalen’s test [2]. A positive Tinel’s sign may be less sensitive (50%) than Phalen’s but has a similar specificity (77%) [2]. Ali Z et al., in their study found that Tinel’s and Phalen’s test were positive in 48.5% and 59.1% respectively [10]. Tay LB et al., found paraesthesia (70.1 percent) and numbness (19.4 percent) were the presenting sensory symptoms [1]. In present study, on the basis of clinical grading, 60% (n=36) patients had mild to moderate grade and 40% (n=24) patients had severe grade of CTS. However, on Nerve Conduction Studies, 30% (n=18) patients had mild to moderate grade and 70% (n=42) patients had severe grade of CTS and this difference between clinical grading and nerve conduction grading was significant (p value = 0.000957). Dominant hand was involved in 89.02% of the cases. Bilateral CTS was present in 65.8% of the cases. These results are comparable with results of other studies [10]. Ali Z et al., found that on clinical assessment, 74.3% had mild to moderate CTS and 25.7% had severe CTS [10]. However, classified by NCS, 62.1% had mild to moderate CTS and 37.9% had severe CTS and this difference between clinical grade and electrophysiological grade was significant (p<0.01). Bilateral CTS was seen in 68.2% of the cases and dominant hand was involved in 87.9% of the cases. In

present study, pregnancy was found to be the most common cause/ risk factor for CTS (35%) (n=21), followed by lactation (31.7%) (n=19). It has been seen that hormonal fluctuations during pregnancy and lactation lead to fluid retention in the carpal tunnel leading to CTS [19]. Literature has shown that prevalence of CTS in pregnancy is significant (as high as 62%) [20]. Bahrami MH *et al.*, evaluated 100 pregnant women by hand symptoms, CTS provocation tests, and standard electro diagnostic studies [21]. It was found that prevalence of CTS in pregnant women was significant (hand symptoms and clinical signs 36% and 26% respectively). In present study, hypothyroidism was found in 18.3% of the patients. In hypothyroidism there is deposition of glycosaminoglycans, hyaluronic acid and some mucopolysaccharides in subcutaneous tissues. Deposition of these substances on median nerve sheath leads to CTS [22]. The higher percentage of patients with hypothyroidism may be due to higher prevalence of hypothyroidism in India<sup>23</sup>. Literature also suggests that association of hypothyroidism with CTS is significant. Karpitskaya *et al.*, in 2002 found association between hypothyroidism and CTS significant (P=0.02) [24]. Daniel H *et al.*, examined the relation between carpal tunnel release and diabetes mellitus, thyroid disease, inflammatory arthritis, hemodialysis, pregnancy use of corticosteroids and hormone replacement therapy [25]. It was found that hypothyroidism and CTS had significant association (OR 1.7; 95% CI 1.1, 2.8). In present study gout was found as a risk factor in 2.4% of the cases. Literature also suggests gout as an infrequent cause for Carpal Tunnel Syndrome [3, 9]. It may be due to lack of patients with Tophaceous gout. Rich JT *et al.*, found that out of 2649 carpal tunnel releases, 15 hands in 13 patients had tophaceous gout in carpal tunnel with an incidence of 0.6% [20]. In present study occupational risk factors as a cause of CTS was found in 15.85% patients. These results were comparable with those found in literature [19].

#### Limitations of the Study

This cross-sectional study was conducted in a single community. It was also based on respondent's personal report on satisfaction. So, the results may not reflect the actual scenarios of the whole community.

#### CONCLUSION AND RECOMMENDATIONS

Carpal tunnel syndrome has a high incidence in pregnant women. Sensory symptoms (Paraesthesia, numbness and nocturnal pain) were more common than symptoms of motor weakness. Dominant hand involvement was more common. Pregnancy and lactation were the most common co-morbid physiological risk factors/ causes for Carpal tunnel syndrome. Nerve conduction studies provide additional objective evidence in diagnosis and severity assessment of Carpal tunnel syndrome.

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