Prevalence of Carpal Tunnel Syndrome (CTS) in Rickshaw drivers of Sargodha (Pakistan).

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Abstract:
There are many problems in wrist joint due to overuse of the wrist joint and peri-articular structures. Chronic overuse of the wrist causes increase in pressure in flexor retinaculum of wrist, this increase in pressure causes compromised mobility of median and ulnar nerve resulting in Carpel Tunnel syndrome, pain, altered sensorium and altered motor functions. The purpose of this research is to determine the prevalence of CTS in rickshaw drivers of Sargodha due to over use of wrist joint. A cross sectional survey was administrated in rickshaw drivers of Sargodha. For this purpose, a well-structured questionnaire was used to investigate about the signs and symptoms present in rickshaw drivers. SPSS software and Microsoft excel was used for Data analysis. Duration of rickshaw driving was the prime factor that leads to severity of signs and symptoms.

Keywords: Cumulative Trauma Disorder (CTD), Prevalence Barrier, Carpel Tunnel Syndrome (CTS).

Conclusion:
We concluded that prevalence of carpal tunnel syndrome is higher in rickshaw drivers. This study reveals that with increase in the total duration of driving the presence of signs/symptoms of carpal tunnel syndrome is increased. Presence of numbness and weakness was more in right hand as compared to left. Symptoms increase during the driving. Rest or off from driving improves the symptoms.

Introduction
The entrapment of medial nerve at the level of flexor retinaculum is called Carpel Tunnel syndrome. A chronic overuse syndrome of the wrist and hand and a common cumulative movement disorder.

Definition:
Carpal tunnel syndrome (CTS) is a medical condition due to compression of the median nerve as it travels through the wrist at the carpel tunnel. The main symptoms are pain, numbness , and tingling, in the thumb, index finger, middle finger, and the thumb side of the ring fingers.[1]

Symptoms:
Symptoms typically start gradually and during the night.[2] Pain may extend up the arm. Weak grip
strength may occur and after a long period of time the muscles at the base of thumb may waste away. In more than half of cases both sides are affected.[2]

Structures Involved:
Tendons of the flexor digitorum superfascialis, flexor digitorum profundus, flexor polices longus and flexor carpiradialis passes around the median nerve. Flexor synovial sheath covers the inferior side of the fossa. Bones, hamate, capitate, trapezoid and trapezious covers the flexor sheath inferiorly, making a closed compartment which is covered anteriorly by retinaculum. Movements of the wrist like flexion/extension and moving the Wrist in extremes of flexion causes these structures to compromise space for median nerve.

Cause of Stenosis:
The causes of Carpel tunnel syndrome are overuse of the wrist joint as in rickshaw drivers (clerks, typing, computer users, unnecessary grasping and pinching of objects over a prolonged time).

Associations:
A variety of patient factors can lead to CTS, including heredity, size of the carpal tunnel, associated local and systematic diseases, and certain habits.[3] Non-traumatic causes generally happen over a period of time, and are not triggered by one certain event. Many of these factors are manifestations of physiologic aging.[3]. Patient factors include rheumatoid arthritis, Myxedema, acromegaly, colle’s fracture, local injuries, tumors, obesity and genetic conditions.[4, 5]

Risk Factors:
Activities like typing, piano playing writing playing badminton. Occupational risk factors of repetitive tasks, force, posture, and vibration have been cited. The relationship between work and CTS is controversial; in many locations, workers diagnosed with carpal tunnel syndrome are entitled to time off and compensation.[6]

Diagnostic Test:
Phallen’s test, Tinnel’s test and durken test is used to diagnose the CTS.

Phallen's Test Procedure:
Phallen’s is performed by flexing the wrist gently as far as possible, then holding this position and awaiting symptoms.[7] A positive test is one that results in numbness in the median nerve distribution when holding the wrist in acute flexion position within 60 seconds. The quicker the numbness starts, the more advanced the condition. Phallen's sign is defined as pain and/or paresthesia in the median-innervated fingers with one minute of wrist flexion. Only this test has been shown to correlate with CTS severity when studied prospectively.[8].

Tinnel’s test:
Tinel's sign is a classic test to detect median nerve irritation. Tinel's sign is performed by lightly tapping the skin over the flexor retinaculum to elicit a sensation of tingling or "pins and needles" in the median nerve distribution. Tinel's sign (pain and/or paresthesia of the median-innervated fingers with percussion over the median nerve).[8]
Durken Test:

carpal compression test, or applying firm pressure to the palm over the nerve for up to 30 seconds to elicit symptoms has also been proposed.[9, 10]

Differential Diagnosis:
Cervical radiculopathy can be mistaken for carpal tunnel syndrome since it can also cause abnormal or painful sensations in the hands and wrist.[11]. Acute compartment syndrome, Diabetic neuropathy, ischemic monomelic neuropathy, leprosy, mononeuritis multiplex, multiple sclerosis, neoplastic brachial plexiopathy and thoracic outlet syndrome.

Treatment:
Generally accepted treatments include: physiotherapy, steroids either orally or injected locally, splinting, and surgical release of the transverse carpal ligament. [12] Limited evidence suggests that gabapentin is no more effective than placebo for CTS treatment. [2] There is insufficient evidence for therapeutic ultrasound, yoga, acupuncture, low level laser therapy, vitamin B6, and exercise. [13] Change in activity may include avoiding activities that worsen symptoms. [14]

Treatment Include
• Splints
• Corticosteroids
• Surgery
• Physiotherapy

Occupational CTS
A syndrome of hand and wrist numbness or paresthesia due to entrapment of the median nerve due to entrapment of median nerve caused by ones occupation.

Literature Review:
1. Prevalence of Carpal Tunnel Syndrome in Motorcyclists by Harvey R. Manes, MD. According to him those who drive motorcycle for more than 5 hours have more probability of developing CTS. 30% having CTS on right hand and 6% having CTS on left hand. Michel.[15]

2. Rossignol, Susan Stock, Louis Patry, Benedict Armstrong in Motreal Island studied Carpal Tunnel syndrome: what is attributable to work? Concluded that, Among manual workers on the island of Mon-treal, 55% of surgical CTS in women and 76% in men was attributable to work. Increased risk of surgical CTS was found in seven occupational groups. [16]

3. Rahul Kumar Gupta, Swati S Bedekar, Ashutosh Chaturvedi in the current study, it was observed that 46% were between 36-40 years, 38% were 31-35 age, and 13% were between 41-45 with least about 2% were ranging from 46-50 years. According to religion 54 subjects accounting for 77% were Hindus, 14 subjects or 20% subjects were Muslims and 2 subjects or 3% were Christian. Among 70 subjects 16% were not attended school, 58% had studied up to primary school and 26 % had studied up to middle school. While assessing economic status 59% subjects were of lower middle class, 40% subjects were poor class whereas only 1% subjects were in very poor class. Major subjects in the current study represented in the lower middle class society. Result shown n current study stress evaluation was limited to the physical stress which is responsible for the changes at
wrist joint therefore further stress can be evaluated with special consideration to both physical and mental stress.[17]

4. The prevalence of musculoskeletal disorders and their association with risk factors in autorickshaw drivers a survey in Guntur city Rahul Shaik, Christie Kiran Gotru, Chintada Ganapathi Swamy, R. Sandeep stated that Lower back, knee, neck and ankle troubles are more prevalent in auto rickshaw drivers. Increasing age, work experience, maximum working hours per week, increased left shoulder to handle distance and greater driver’s seat vibrations are increasing the risk of musculoskeletal disorders. Restricted lower cabin space and reduced shoulder to handle distance on right side also increased the risk of musculoskeletal disorders.[18]

5. Keith T Palmer and his colleagues (2006) conducted a systemic literature review to assess the occupational risk factor for carpal tunnel syndrome. They reviewed the systemic researches of EMBASE and MEDLINE. They concluded that regular and prolonged use of hand held vibratory tools increases the risk by two fold and even higher risk from prolonged and high repetitions of flexion and extension of wrist especially when allied with forceful grip. So their study provides evidence on the need of prevention policies aimed at avoiding highly repetitious hand work.[19]

6. M Sabeti and his colleagues (2008) did a prospective study on motorcyclists through random sampling technique and assessed their clinical symptoms through a questionnaire and VAS scale for pain status. They concluded that 50% of all riders complained of pain and paresthetic sensations in their hands.[20]

**Methodology:**
We had conducted a qualitative research by using self-constructed questionnaire. We have used a symptom severity scoring scale published by Boston group*. A cross-sectional survey was administrated in the rickshaw drivers of Sargodha at different places. Rickshaw drivers were asked about their signs and symptoms and about the duration they have been driving rickshaw and daily hours for which they drive rickshaw.

**Study design:** Observational cross-sectional survey

**Sample size:** 120 rickshaw drivers

**Sampling technique:** Convenience probability sampling

**Setting:** City Sargodha

**Inclusion criteria:** Rickshaw drivers driving in Sargodha.

**Exclusion criteria:**
- Drivers having any underlying systemic illness.
- Drivers that have history of any recent trauma.
- Drivers having arthritis of any type.

**Ethical considerations:** It was an observational study. Drivers were voluntarily involved after an informed consent. Study did not give any physical, social or psychological harm to the professionals. All medical ethics were considered.

**Rationale:** To investigate the Occupation related disorder in drivers. To determine the hazards in quality of life of Drivers. To find out the reason of absenteeism of Drivers.
Measurements:

Data collection procedure: Observational cross-sectional survey

Data collection tool: Questionnaire (close ended).

Statistical Analysis:
All the data was demonstrated as Mean and percentage. Data was analyzed using SPSS (Statistical package for social sciences) and MS Excel expressed in form of charts and graphs.

Results:

Age:
All of the participants were male and age range was between 17-65-year-old (Figure 2). The greater ratio of participants was driving rickshaw for less than six years. 35.8 % were driving for less than two years and 35.8 % were driving rickshaw for two to six years. 8 % were driving for six to ten years and 20.0 % were driving for more than 10 years. (Figure 3).

Figure 1 Participants Age Histogram

Total Duration of Rickshaw Driving:

Majority of Rickshaw drivers were driving rickshaw for less than six years. 35.8 % were driving for less than two years and 35.8 % were driving rickshaw for two to six years. 8 % were driving for six to ten years and 20.0 % were driving for more than 10 years.

Figure 2: Total Duration of Rickshaw Driving
Daily Duration of Rickshaw Driving:

Majority of drivers were driving rickshaw for more than 10 hours daily. 38.3% drivers were driving for more than ten hours a day. 32.5% were driving for four to seven hours a day. 15% were driving for less than four hours a day & 14.2% were driving for four to seven hours a day (Figure 3).

Figure 3: Daily Duration of Driving

<table>
<thead>
<tr>
<th>Daily Duration of Rickshaw Driving</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than four hours</td>
<td>18</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Four to Seven</td>
<td>39</td>
<td>32.5</td>
<td>32.5</td>
<td>47.5</td>
</tr>
<tr>
<td>Seven to Ten</td>
<td>17</td>
<td>14.2</td>
<td>14.2</td>
<td>61.7</td>
</tr>
<tr>
<td>More than Ten hours</td>
<td>46</td>
<td>38.3</td>
<td>38.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
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</tbody>
</table>

Numbness in Hands:

40% participants were having numbness in right hand & 20 percent of participants were having numbness in their left hand.

Numbness in Right hand

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
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<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>48</td>
<td>40.0</td>
<td>40.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Valid No</td>
<td>72</td>
<td>60.0</td>
<td>60.0</td>
<td>100.0</td>
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<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
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</table>
Weakness in Hands:
40.8 % percent participants had weakness in their Right hand and 19.2 % percent had numbness in their left hand. (Figure 6 A&B). Weakness was assessed objectively by a question in questionnaire.
Relation of symptoms severity with duration of rickshaw driving:

40.8 percent participants said that there symptoms increases with duration of driving. 42.5 \% participants said that symptoms doesn’t increase during driving. While 16.7 \% said that there is no link between driving duration and symptoms.

Relation of symptoms severity with duration of rickshaw driving

<table>
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<tr>
<th>Frequency</th>
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<tr>
<td>yes</td>
<td>49</td>
<td>40.8</td>
<td>40.8</td>
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<tr>
<td>No</td>
<td>51</td>
<td>42.5</td>
<td>83.3</td>
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<tr>
<td>There is no relation</td>
<td>20</td>
<td>16.7</td>
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</tr>
<tr>
<td>Total</td>
<td>120</td>
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</table>

Extremes of Symptoms:

13.3 \% said extremes of symptoms are felt at start of driving, 13.8 \% said at the end of driving, 26.7 \% said during driving hours & 46.7 \% said that there is no relation of symptoms with driving or rest. (Figure 8)
Extremes of Symptoms

<table>
<thead>
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<th>Percent</th>
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<th>Cumulative Percent</th>
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<tr>
<td>At Start of driving</td>
<td>16</td>
<td>13.3</td>
<td>13.3</td>
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<tr>
<td>At End of driving</td>
<td>16</td>
<td>13.3</td>
<td>13.3</td>
<td>26.7</td>
</tr>
<tr>
<td>At Mid of driving</td>
<td>32</td>
<td>26.7</td>
<td>26.7</td>
<td>53.3</td>
</tr>
<tr>
<td>No relation</td>
<td>56</td>
<td>46.7</td>
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<td>Total</td>
<td>120</td>
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in symptoms when taking a Day off:

81.7 percent participants said that they feel better when they take a day off from driving rickshaw & 22% said they don’t feel difference.

Relief in Symptoms after Day off

<table>
<thead>
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<td>81.7</td>
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<tr>
<td>No</td>
<td>22</td>
<td>18.3</td>
<td>18.3</td>
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<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
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Phallen’s Test:

29.2 % participants were having positive phallen’s test and 70.8 % had negative phallen’s test. (Figure 10)
**Figure 9: Phallen’s Test 1**

**Symptoms Severity Scale:**

On Symptoms Severity Scale scoring max score for right hand was 33 and for left hand it was 25. More than 50 % subjects were below 11 in their left hand while 50 percentile for right hand was on score 14.

**Statistics**

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<th>SSS Left</th>
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<td>120</td>
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<tr>
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<tr>
<td>Mean</td>
<td>17.2833</td>
<td>12.8833</td>
</tr>
<tr>
<td>Minimum</td>
<td>11.00</td>
<td>11.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>33.00</td>
<td>25.00</td>
</tr>
<tr>
<td>Percentiles 50</td>
<td>14.0000</td>
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**Right Hand:**

**Statistics**

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<td>Mean</td>
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<td>Maximum</td>
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**Left Hand:**

**Statistics**

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<td>Mean</td>
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<tr>
<td>Std. Deviation</td>
<td>3.66492</td>
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<tr>
<td>Minimum</td>
<td>11.00</td>
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<tr>
<td>Maximum</td>
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Variability of SSS scores with Total duration:

In SSS scoring system the result shows that, subjects who were driving rickshaw for less than 2 years had less score as compare to those who were driving for longer period of time. There was clear increase score noticed in those who were driving rickshaw for more than 10 years.

Right Hand:

Variability of SSS scores with Daily Duration:

In SSS scoring system the result shows that, subjects who were driving rickshaw for less than 2 hours had less score as compare to those who were driving for longer period of time. There was clear increase score noticed in those who drive rickshaw for more than 10 hours daily.

Right Hand:
Discussion:
The main focus of study was to inquire the Prevalence of Carpel tunnel Syndrome in Rickshaw drivers of Sargodha. This study assesses the main symptoms of median nerve compression and presence of sign & symptoms in Rickshaw drivers.

It also explores the dependence of signs/Symptoms on the total duration & daily duration of rickshaw driving.

Findings of research show that increase duration at driving rickshaw increases the prevalence of median nerve compression at carpal tunnel. This compression is greater in Right hand due to presence of accelerator in Pakistani rickshaws. In compliance to Questionnaire, respondents who have been selected from Sargodha city were rickshaw driver on probability sampling.

Data indicates 100% participants were males and there were no females. At present, males are the dominant part of earning community in a city like Sargodha.100% ratio of males indicates their interest towards earning as because of burdensome responsibility to run their families.

In research, Majority of the drivers were from villages and towns nearby Sargodha because of less job opportunities in towns or villages.

Age range was between 17-65-year-old. The greater ratio of participants was driving rickshaw for less than six years. 35.8 % were driving for less than two years and 35.8 % were driving for two to six years. 8 % were driving for six to ten years and 20.0 % were driving for more than 10 years.

Majority of drivers were driving rickshaw for more than 10 hours daily. 38.3 % drivers were driving for more than ten hours a day. Greater number of participants was having numbness in their right hand i-e 40%, while subjects experiencing numbness in left hand were 20 %.weakness was present in 40.2 % subjects in their right hand & 19.8 percent were experiencing weakness in left hand.
When taking a day off from driving 81.7% subjects feels relief in their signs/symptoms.40.8 % said that their signs/symptoms are linked to the duration of driving.29.2 % were positive when phallen’s test was performed.

Ergonomic improvements in the structure of rickshaws and knowledge about the signs and symptoms of median nerve compression (CTS) can decrease the prevalence of carpal tunnel syndrome in rickshaw drivers.

**Conclusion:**

We concluded that prevalence of carpal tunnel syndrome is higher in rickshaw drivers. This study reveals that with increase in the total duration of driving and with increase in daily duration of driving the presence of signs/symptoms of carpal tunnel syndrome is increased. Presence of numbness and weakness was more in right hand as compared to left. Symptoms increase during driving and are at peak during the driving. Rest or off from driving improves the symptoms.

The Health care organizations need to focus on the necessity of allocation of resources that may help the Rickshaw drivers to combat the problems occurring due to signs/symptoms of median nerve compression. Companies assembling or manufacturing Rickshaws should focus on ergonomic principals to avoid the risk of median nerve compression. There is a need to motivate and to improve rickshaw driver’s interest/knowledge about signs and symptoms of CTS through seminars and mass communication. Considering that Pakistan is a developing country, by introducing better replacements, there are better opportunities for rickshaw drivers and a healthy competitive environment in society.

**Acknowledgements:**

The author would like to thank Afro Asian Institute, Lahore Affiliated with Government College University Faisalabad (GCUF) for the support provided to carry the research work presented in this paper.

**References:**


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