



**ORIGINAL RESEARCH PAPER**

**Physiotherapy**

**“PREVALENCE OF CARPAL TUNNEL SYNDROME (CTS) IN COMPUTER WORKERS IN GOA AND ITS IMPACT ON HEALTH RELATED QUALITY OF LIFE (HRQoL) : A CROSS SECTIONAL STUDY”**

**KEY WORDS:** Carpal tunnel syndrome, Health related quality of life, Computer workers, Entrapment neuropathy

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**ABSTRACT**

**Background:** Carpal tunnel syndrome (CTS) is an entrapment neuropathy caused by compression of the median nerve as it travels through the wrist's carpal tunnel. It is characterized by numbness, tingling and pain in the hand, loss of grip and pinch strength and muscle dysfunction. CTS can be caused due to occupational activities, such as repeated and forceful movements of the hand and wrist and additionally by doing work in an awkward posture. Present study is focused on studying the prevalence of CTS in computer workers in Goa and its impact on health related quality of life.

**Materials and methods:** The study was conducted on 150 computer workers in Goa. The cross sectional study was done using 2 questionnaires, conducting a physical examination that involved Manual Muscle testing, Phalen's test and grip strength was measured using a hand-held dynamometer.

**Results:** Out of 150 sample representatives, 67 sample representatives had CTS (clinical diagnosis) with a prevalence of 44.11%. In 38.6% of the sample representatives, pain interfered with normal work. According to our study, of the six categories estimated by means of the SF-36 questionnaire the largest problems involved are pain, physical health and emotional health issues.

**Conclusion:** The findings of this study implicate that CTS is an important musculoskeletal problem among computer workers in Goa. Our study also estimated that CTS can have an impact on the quality of life. Considering the above, it is critical to make an early diagnosis of CTS among computer workers based on symptoms and clinical evaluation to prevent progression to occupation induced disability.

**INTRODUCTION**

CTS is described as a complex of signs and symptoms which occurs as a result of compression of the median nerve in the wrist's carpal tunnel . Symptoms of median nerve compression encompass pain, numbness or tingling along the index, middle and lateral half of the ring finger. It commonly leads to decreased handgrip or pinch strength and nocturnal signs such as hand or arm pain and numbness. Provocative tests such Tinel's sign, Phalen's sign, and two point discrimination are often used for diagnosing this condition. <sup>(1)</sup>

As the use of computers in workplace throughout the planet for the past few years has been increasing, workforce has been involved in the utilization of computers for an extended period of time. <sup>(1)</sup>

Several research studies have shown excessive affiliation among computer use and development of CTS. <sup>(1)</sup>

Major occupational risk factors that have been identified to be responsible for the development of CTS are:

- 1) repetitive movements of the wrist and hand.
- 2) forceful and gripping activities.
- 3) extreme wrist postures. <sup>(2)</sup>

**Posture-related variables included**

- (1) abnormal mouse position.
- (2) abnormal keyboard position.
- (3) forearm/wrist.
- (4) whether the work desk chair had been adjusted suitably. <sup>(3)</sup>

**MATERIALS AND METHOD**

**Sources of collection of data:** Computer workers from various offices and factories in Goa.

**Method of collection of data:**

**Method of sampling:** Convenience sampling

**Type of study:** Cross sectional study

**Proposed sample size:** 150

**Procedure of data collection**

An ethical clearance was obtained from the ethical committee of Goa Medical College. Males and females satisfying the inclusion and exclusion criteria were chosen for the study. Purpose of the study was explained, and an agreed consent was obtained from the participants. The chosen participants were given the Carpal Tunnel Symptoms Severity Scale and the SF-36 questionnaire to be filled individually. Information obtained from the form was used for data analysis.

**Inclusion Criteria:**

- 1) Age group.
- 2) Gender: Both males and females.
- 3) Work experience as a computer worker for more than 1 year.
- 4) Willingness towards participation.
- 5) Hours of computer usage.
- 6) Transportation.

**Exclusion Criteria:**

- 1) Presence of any postural deformities.
- 2) History of trauma/injuries.
- 3) Riding bike.
- 4) Previous surgery involving the wrist or the hand.
- 5) Pregnancy.

**Statistical method:**

The prevalence will be depicted using graphs and diagrams.

**Material Required:**

- 1) Consent form.
- 2) Pre-participation proforma.
- 3) Carpal Tunnel Symptom Severity Scale.
- 4) Short form 36 questionnaire (SF-36).

**Methods used to assess Carpal Tunnel Syndrome:**

- 1) Signs and Symptoms.
- 2) Phalen's maneuver.
- 3) Manual Muscle Testing.
- 4) Distribution of carpal tunnel symptom severity scale and SF-36 questionnaire.

5) Tinel's sign

**RESULTS**

**Following are the results of the study:**

Out of 150 sample representatives, 67 sample representatives had CTS (clinical diagnosis) with a prevalence of 44.11%.

**Out of the clinically diagnosed sample representatives:**

1) Based on Symptom Severity Scale.  
41.8% of the sample representatives had pain in the wrist and hand region.

53.9% of the sample representatives had numbness in the wrist and hand region.

54.3% of the sample representatives had weakness in the wrist and hand region.

55.2% of the sample representatives had tingling sensation in the wrist and hand region.

52.1% of the sample representatives had difficulty grasping or using small objects.

**2) Based on SF-36.**

48.6% of the sample representatives, pain interfered with normal work.

**3) Based on Phalen's Maneuver.**

74.1% of the sample representatives had positive Phalen's maneuver.

**4) Based on MMT.**

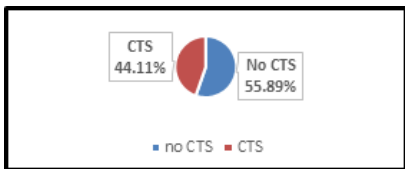
MMT showed that 96% of the sample representatives had muscle strength of less than or equal to 3.

**5) Based on Tinel's sign.**

90% of the sample representatives showed a positive Tinel's sign.

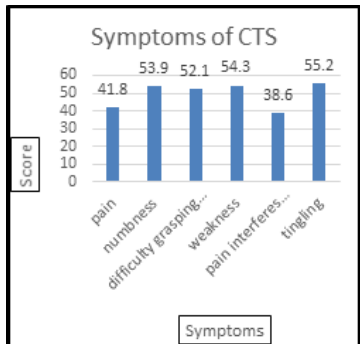
Tingling sensation in the wrist and hand region was the most common symptom reported followed by weakness in the wrist and hand region.

CTS also affects the quality of life of the affected sample representatives. Of six categories estimated by means of the SF-36 questionnaire, the largest problems involved are pain, physical health and emotional health issues.



**1. Figure below shows the prevalence of CTS amongst computer workers in Goa.**

In our study involving 150 sample representatives, the prevalence of CTS amongst computer workers in Goa was found to be 44.11%



**2. Figure below shows the symptoms of CTS.**

Based on Symptom Severity Scale

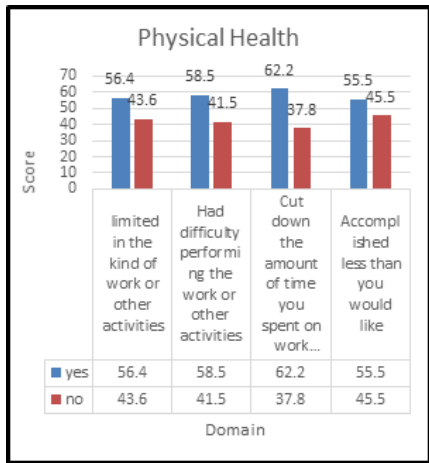
41.8% of the sample representatives had pain in the wrist and hand region.

53.9% of the sample representatives had numbness in the wrist and hand region.

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55.2% of the sample representatives had tingling sensation in the wrist and hand region.

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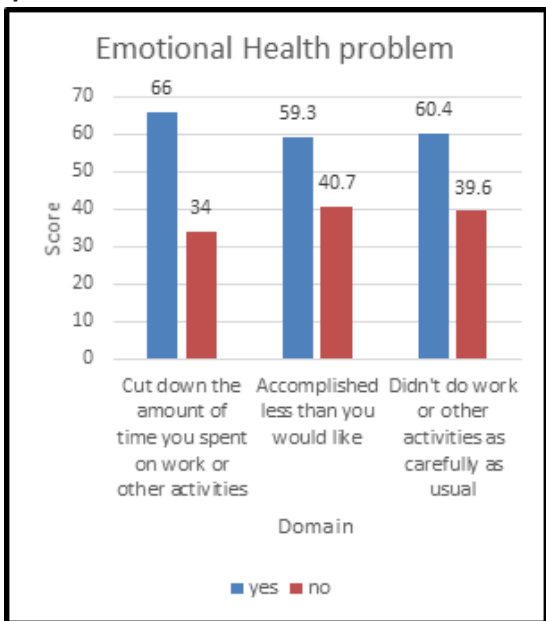
**3. Figure below shows physical health domain of SF-36 questionnaire.**

56.4% of the sample representatives had to limit work or other activities.

58.5% of the sample representatives had difficulty performing work or other activities.

62.2% of the sample representatives had to cut down the amount of time spent on work or other activities.

55.5% of the sample representatives accomplished less than they liked.

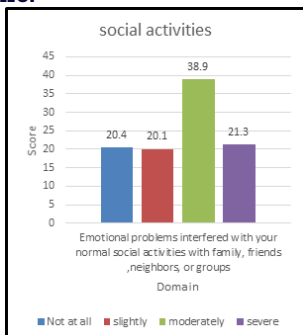


**6. Figure below shows Emotional health problem domain of SF-36 questionnaire.**

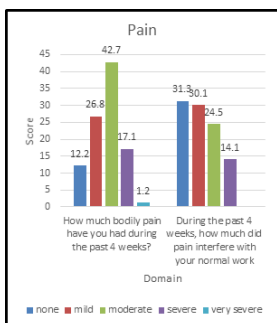
66% of the of the sample representatives had to cut down the amount of time spent on work or other activities.  
59.3% of the sample representatives accomplished less than they liked.

60.4% of the sample representatives had didn't do work or activities as carefully as usual.

**7. The figure below shows social activities domain of SF-36 questionnaire.**



In 60.2% of the sample representatives, social activities were affected.

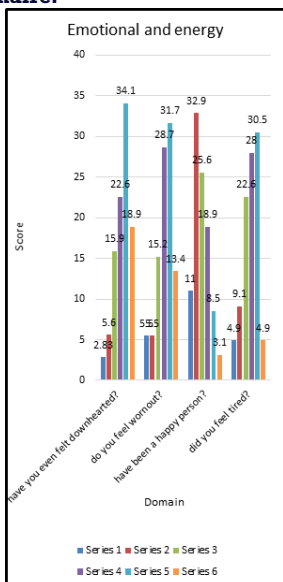


**8. The figure below shows pain domain of SF-36 questionnaire.**

61.8% of the sample representatives had pain in the past 4 weeks.

In 38.6% of the sample representatives, pain interfered with normal work.

**9. The figure below shows energy and emotions domain of SF-36 questionnaire.**



49.7% of the sample representatives stated that they feel full of energy.

79.4% of the sample representatives stated that they have been a very nervous person.

73.4% of the sample representatives stated that they have felt so down that nothing could cheer them up.

40% of the sample representatives stated that they felt calm and peaceful.

46.2% of the sample representatives stated that they have a lot of energy.

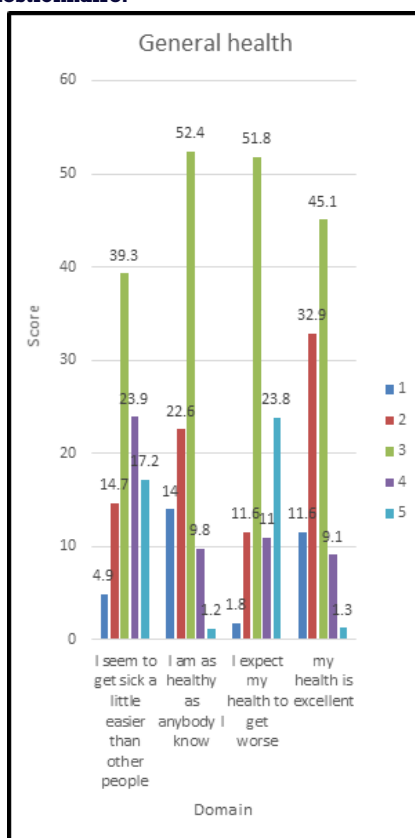
75.6% of the sample representatives stated that they felt downhearted and blue.

73.8% of the sample representatives stated that they felt worn out.

30.5% of the sample representatives stated that they are happy persons.

63.5% of the sample representatives stated that they feel tired.

**6. The figure below shows the general health domain of SF-36 questionnaire.**



41.1% of the sample representatives stated that they seem to get sick a little easier than others.

10.8% of the sample representatives stated that they are as healthy as anybody they know.

34.8% of the sample representatives stated that they expect their health to get worse.

11.1% of the sample representatives stated that their health is excellent.

**DISCUSSION**

CTS is an entrapment neuropathy that occurs as a result of compression of median nerve as it travels through the carpal tunnel of the wrist and is brought on by repetitive stress, physical injury, or a medical condition.<sup>(13)</sup>

In this study, we found the prevalence of CTS amongst computer workers in Goa is 44.11%.

Comorbid conditions such as diabetes and hypothyroidism, which are commonly associated with CTS, were an exclusion criteria and hence people with such comorbidities were ruled out.

**The clinical evaluation in our study included:**

1. Signs and symptoms.
2. Manual muscle testing of wrist and hand muscle.
3. Phalen's test.
4. Distribution of Carpal Tunnel Symptom Severity Scale and Short form 36 Questionnaire.
5. Tinel's sign.

The 2 scales used in our study were highly reliable with reliability coefficient being 96% for CTS symptom severity scale and 85% for SF-36.

According to several studies, more than half of CTS instances are linked to occupational variables. Repetitive wrist flexion and extension, as well as gripping actions of the hand, are hypothesized to cause nerve injury by compressing the median nerve between the tendons and carpal bones. Tendonitis and tenosynovitis are more likely to develop as a result of such repetitive movements at the wrist joint. CTS can be triggered by repetitive heavy manual labor or light manual work.<sup>(13)</sup>

We found occurrences of CTS in our study that were linked to occupation. The prevalence of CTS in computer workers in Goa is depicted in the pie chart above (Fig 1).

Professional work and extended computer work hours per day have been identified as risk factors for CTS. Workers in the data network industry are working longer hours. Additional strain and stress due to continuous use of a mouse and typing are seen to induce symptoms in the sample representatives. This implies that a higher level of computer job intensity increases the risk of CTS.

In our study, we found that longer duration of work hours increased the risk of developing CTS.

In a similar study done by **Nakazawa T et al.** showed that out of 25,000 workers who used visual display terminal (VDT) for data input and mental arithmetic activities, the number of physical complaints increased as the duration of daily VDT use increased. The physical symptom score was linearly related to the duration of daily video display terminal (VDT) use. According to another study conducted by **Matias AC et al.** also showed that increasing daily work duration increased the incidence of CTS among VDT operators.

According to the concept of the World Health Organization (WHO), the quality of life is related to all aspects of human function. It defines the effects of the disease or a condition and the symptoms that accompany it on people's functions in different areas. The appearance of pain and changes in organ function are related to changes in lifestyle and performance of certain movements. One of the symptoms of this condition is poor sleep quality, leading to disturbances in normal life. Pain and dysfunction in the hands resulted in limited mobility in many areas. This is related to the functions of the physical, psychological and social realms. Carpal tunnel syndrome most commonly occurs in people between 30 and 60 years of age.<sup>(16)</sup>

Atroshi et.al. carried out investigations on life quality of patients suffering from the carpal tunnel syndrome. They estimated that CTS had an impact on physical, social and emotional functioning which impaired person's ability to perform ADL's.<sup>(16)</sup>

According to our study, of the six categories estimated by means of the SF-36 questionnaire the largest problems involved are pain, physical health and emotional health issues.

**CONCLUSION:**

In our study, involving 150 sample representatives, the prevalence of CTS amongst computer workers in Goa was identified to be 44.11%. Tingling and weakness in the wrist and hand region were the most common symptoms reported. In addition, through our study we estimated that development of CTS is associated with longer periods of work hours. Our study also appraised that CTS can have an impact on the quality of life. We can therefore conclude that CTS is an important musculoskeletal problem among computer professionals which can have a major impact on the quality of life of the affected individual.

Considering the above, it is critical to make an early diagnosis of CTS among computer workers based on symptoms and clinical evaluation to prevent progression to occupation induced disability.

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