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## Original Article

# Occupational Risk Factor for Carpel Tunnel Syndrome Related to Computer Usage: A Descriptive Cross-Sectional Study

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## ABSTRACT

Carpal tunnel syndrome (CTS) is triggered by compression of the median nerve as it travels through the wrist's carpal tunnel. CTS is also more likely to occur if you work in certain occupations such as Related with clerical and administrative work on Computer. **Objective:** To identify the frequency and pattern of CTS among clerical and administrative workers using computer. **Methods:** A descriptive cross-sectional study was started from October 2021 to January 2022 between 20-50 years of age at five Private colleges in Lahore city. The participants fulfilling the inclusion criterion were using computer for more than 6 hours a day, having co-operative attitude, weren't taking any analgesics and had no associated comorbidities. After informed consent 200 participants were enrolled using convenient sampling method. Sample size was calculated by taking average from previous research publications. A designed questionnaire was given among the participants to obtain information about demographics and Phalen's test for CTS. Data were entered and analyzed in SPSS version 21.0. **Results:** The Results shows that 5 participants have Positive CTS in 20-30, 10 in 31-40, 14 in 41-50 age group. Positive CTS was considered positive via Phalen's Test. Males have higher frequency of CTS as 21 Males and 8 Females with Positive Phalen's test. **Conclusions:** CTS is related with an occupational factor in terms of computer usage. It is common in males because of excess workload and job duties.

## INTRODUCTION

Carpal tunnel syndrome (CTS) is triggered by compression of the median nerve as it travels through the wrist's carpal tunnel. Sensory and frequently motor symptoms and indications in the peripheral distribution of the median nerve characterize illness. CTS is also more likely to occur if you work in certain occupations such as Related with clerical and administrative work on Computer [1]. Compression of the median nerve at the wrist causes this common condition that compromises hand function [2]. The carpal tunnel is produced by the several bones in the wrist as well as the transverse carpal ligament, which

serves as the roof of the carpal tunnel. The carpal tunnel contains the median nerve and nine tendons [3]. CTS is caused by inflammation and development of the median nerve and inflammation in tendons in because of expansion and thickness of the transverse carpal ligament. The presence of a mass lesion can be a tumor or cysts within the carpal tunnel. It can be a combination of many other factors and pathologies [4]. Whatever the exact cause, pressure on the median nerve and dysfunction are the end results [5]. Research studies have associated computer professionals to overall population of various occupational



categories did not account occupational risk factors in their estimates [6, 7]. Thus, office workers who use computers infrequently or not at all are a more acceptable comparison group than the overall population or multiple occupational groupings [8]. According to the findings of this meta-analysis, excessive computer use can be an occupational risk factor for CTS [9]. There is a need for more prospective research among office workers with reliably measured keyboard and mouse use, as well as CTS symptoms or indicators confirmed by a nerve conduction study [10]. The carpal tunnel can be constricted and irritated by a wrist fracture, as well as the swelling and inflammation caused by rheumatoid arthritis [11]. CTS is a condition that can be caused by a variety of factors. A combination of risk factors is most likely to blame for the illness's start [12]. CTS prevalence in the general US population is assessed to be 3.72 percent, reflecting a larger pool of afflicted people than previously thought [13]. The carpus has a concave bony structure on its flexor face, which is covered by the flexor retinaculum [14]. The bony carpus forms the carpal tunnel's floor and walls, with the stiff flexor retinaculum functioning as its roof. The flexor retinaculum is connected to the scaphoid tubercle, trapezium ridge, and ulnar side of the hamate and pisiform hooks by the transverse carpal ligament [15, 16]. Certain occupational groups have higher prevalence rates of CTS [17]. The provocative test known as Phalen's Maneuver is utilized in the identification of carpal tunnel syndrome. This is sometimes referred to a flexion test for wrist [18]. The Phalen's test is a stimulating test that can be used to diagnose Carpel Tunnel Syndrome. When the median nerve is crushed or constricted at the wrist, this happens [19]. The discomfort is usually at its worst at night. The patient rests her contracted elbows on a table, enabling her wrists to reach their full range of motion. The patient is instructed to press the dorsal surfaces of her hands together for half a minute. The median nerve will be compressed amongst the transverse carpal ligament and the forward edge of the distal end of the radius in this posture which is increasing the pressure in the carpal tunnel [20]. Computer work contact was linked to an increase of Carpal tunnel syndrome. Ergonomic considerations are critical in ensuring proper hand positioning while working on a computer.

This study explained the Occupational factor in occurrence of Carpel Tunnel syndrome. It will also help the computer users to get awareness as primordial prevention and early symptomatic management in patients for early cure.

## METHODS

It is a descriptive cross sectional study conducted from October 2021 to January 2022 among computer users (of clerical staff) aged between 20-50 years at five Private

colleges in Lahore city .The participants fulfilling the inclusion criterion i.e. (using computer for more than 6 hours a day, having co-operative attitude, weren't taking any analgesics and had no associated co-morbidities)were enrolled whereas participants having non-co-operative attitude, using computer for less than 6 hours a day, were taking regular analgesics and having other comorbidities for example recent fracture or surgery, pregnancy and infectious diseases were excluded. 200 participants were enrolled in the study via simple convenient sampling method. The sample size was calculated using formula of adjusted sample size:

$$N=(S)/[1+(S-1)/Population]$$

where, S = sample size for infinite population, Z = Z score, P = population proportion (Assumed as 50% or 0.5) with 95% confidence interval.

A written permission was obtained from Concerned Departments and ethical considerations were considered. A specially designed questionnaire was given among the participants to obtain demographic data and information regarding Phalen's test of CTS. Data were entered and analyzed in SPSS version 21.0 and Descriptive statistics were applied for frequencies and percentages.

## RESULTS

The study was conducted to evaluate the frequency of CTS among computer users of operating computer for more than 6 hours a day, having co-operative attitude, were not taking any analgesics and had no associated co-morbidities. A total of 200 participants were included and considered for Phalen's Test which is a stimulating test that can be used to diagnose CTS once the median nerve is crushed or constricted at the wrist. The patients were instructed to press the dorsal surfaces of their hands together for 30-60 seconds. The frequency and percentages were calculated showing participants positive with Phalen's Test.

Demographic data such as age was distributed in three groups 20-30, 31-40, 41-50 as mentioned in table 1.

**Table 1:** Frequency Distribution regarding Age Groups

Age (years)	Frequency (%)	Valid Percent	Cumulative Percent
20-30	92 (46.0)	46.0	46.0
31-40	63 (31.5)	31.5	77.5
41-50	45 (22.5)	22.5	100.0
<b>Total</b>	200 (100.0)	100.0	-

The age has a significant role in CTS as the age increases it increased with age and showing CTS-positive via Phalen's Test mentioned in table 2 and for those who had negative, Phalen's Test was resulted as negative.

**Table 2:** Cross Tabulation of Age with CTS

Age Groups of Computer Users	Carpel Tunnel Syndrome		Total	p-value
	Positive with Carpel Tunnel Syndrome N (%)	Negative with Carpel Tunnel Syndrome N (%)		
20-30	5 (3.5)	91 (45.5)	96 (48)	0.000
31-40	10 (5)	52 (26)	62 (31)	
41-50	14 (7)	28 (14)	42 (21)	
<b>Total</b>	29 (14.5)	171 (85.5)	200 (100)	

Out of 200, 80 were females and remaining 120 were male and among both populations, males had higher frequency of CTS as mentioned in Table 3.

**Table 3:** Cross Tabulation of Gender with CTS

Gender	Carpel Tunnel Syndrome		Total	p-value
	Positive with Carpel Tunnel Syndrome N (%)	Negative with Carpel Tunnel Syndrome N (%)		
Female	8 (4)	72 (36)	80 (40)	0.140
Male	21 (10.5)	99 (49.5)	120 (60)	
<b>Total</b>	29 (14.5)	171 (85.5)	200 (10)	

## DISCUSSION

CTS is a common complaint among computer users, and it is triggered by severe pressure on the median nerve during repeated wrist movements and a persistent stress-inducing wrist posture, such as the extended wrist position. The international discussion over the link between CTS and occupational tasks are still ongoing. Occupational Safety and Health Administration (OSHA) guidelines and regulations on cumulative trauma disorders had been enacted. Repetitive tasks, force, posture, and vibration have all been identified as occupational risk factors. The National Institute for Occupational Safety and Health (NIOSH) directed a review of available scientific data and found that occupation responsibilities involving highly repetitive manual items or specific wrist postures were linked to incidents of CTS, but interconnection could not be established [21]. Increased work load, lack of rest intervals, lack of postural awareness, and adoption to unhealthy and sedentary lifestyles have all been linked to job-related neuromuscular illnesses in the previous two decades. Computer typists have a job that demands only repetitive use of wrist joint along with constant sitting posture that in addition to CTS results in low back ache, cervical muscles spasm and work induced headache. The fine wrist movements requiring high precision are reportedly known as the sole source of overuse syndrome i.e., CTS. In a Study by Shiri *et al.*, published a meta-analysis in 2015 has described the use of computer in CTS [9]. The goal of his meta-analysis was to see if computer use causes CTS. Computer/typewriter usage was inversely linked with Carpel Tunnel Syndrome in a meta-analysis of six studies. In this study computer workers with other people

belonging different occupations were compared. This Meta-Analysis had similar Results with the current study in which 29 Participants had Positive Phalen's test showing positive CTS out of 200 participants doing Computer Related work. Another study by Lee *et al.*, published in 2019 explains that CTS remains a complaint that affects people of all ages and genders. His Study Results are related with the current study showing that Males are more prone to Develop CTS because of more occupational exposure and work load [8]. A Recent study by Feng *et al.*, published in 2021 A cross-sectional surveys of 969 respondents considered from 17 to 49 years from 30 offices was undertaken in a Chinese metropolitan city [13]. Clinically proven CTS patients were evaluated based on symptomatic responders' histories, skin sensory testing, Phalen's test and Tinel Sign. CTS was shown to be prevalent in 9.6% of people in his study. Wrist and hand symptoms were shown to be prevalent in 22 and 15% of people, respectively. Young office workers in China have a high frequency of work-related clinically validated CTS symptoms and increases with age, which is similar to the current study. Working in discomfort on a regular basis is linked to clinically verified CTS. Wrist and hand discomfort are linked to prolonged computer use and no breaks at work.

## CONCLUSIONS

It is concluded that CTS is more prevalent among computer users in maximum age groups. CTS are related with an occupational factor in terms of computer usage. It is common in males because of excess workload and job duties. Wrist and hand discomfort are linked to prolonged work on computer having no breaks. There are no confirmed ways for preventing carpal tunnel syndrome; nevertheless, frequent breaks can help reduce tension on your hands. Gentle stretching and bending hands and wrists periodically and maintaining good posture could be beneficial.

## Authors Contribution

Conceptualization: TAF

Methodology: AB, NF

Formal analysis: NJ, MJ

Writing-review and editing: TAF

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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