Original Article

Frequency of Carpal Tunnel Syndrome and Related Functional Status in Computer Operators

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[1] *Conception of study*
[3,4] *Experimentation/Study conduction*
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Abstract

Objective: To find out the frequency of Carpal Tunnel Syndrome (CTS) and associated functional limitations in computer operators.

Materials & Methods: This cross-sectional study was conducted on the premises of DUHS, Ojha Campus, Karachi. The duration of study is from 1st Dec 2019 to 29th February 2020. Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) was used to evaluate the frequency of CTS in computer users, total sample size taken was 95 including males 65 and females 30 between the age group of 25 to 50 years that were working on the current job for more than 2 years with computer usage of greater than 3 hours, members that were <25 or >50 years were excluded from the study.

Results: The study indicated that based on the severity of symptoms, the frequency of CTS in computer operators is 35.8% which is out of the total research population of 95, 34 people who suffer from CTS leading to functional limitations. Moreover, according to the functional status scale, 23.0% (N=22) of the study population exhibited severe functional limitations whereas mild to moderate difficulty in performing day-to-day activities was found to be 55.8% (N=53) and 21.1% (N=20) respectively.

Conclusion: This study survey indicated that using a computer for long hours results in developing CTS symptoms with increased severity and profound functional limitations, also the likelihood of developing CTS symptoms increases with increasing age irrespective of gender.

Keywords: Carpal Tunnel Syndrome, frequency, computer users, functional limitations.

Introduction

Since computer use has increased over the past few decades the incidence of musculoskeletal problems associated with it has also increased and is increasing[1-2] repeated trauma due to the occupational work has put many people at risk for the development of musculoskeletal diseases the use of mouse and keyboard to work on the computer with unusual wrist angles can be a possible risk factor for causing wrist pain and other musculoskeletal disorders.[3-4] According to a study on an episode of MSD prevalence of MSD among computer engineering students the majority faced at least one severe MSD episode that caused decreased classroom performance.[5] Among all the musculoskeletal problems CTS is one of the two most common neuropathy of the upper limb along with cubital tunnel syndrome reported mainly by the computer professionals.[6-7] Carpal tunnel syndrome is caused by the compression of the median nerve at the wrist in carpal tunnel[7], it is described by sensory and less commonly motor symptoms in the lateral distribution of the median nerve.[8]

Many studies have been published on the association of CTS with computer use and the results are contrary, according to two studies there is a strong association between CTS and intensive computer use7-9 whereas others fail to establish any association between CTS and computer use.[10]

Symptoms of CTS include pain, numbness, or tingling in the 1st, 2nd, or lateral half of the 3rd finger, along with the wasting of hand muscles and prominent cause of work disability[11] Pain can radiate to the arm or shoulder, with visible wasting of thenar muscles, along with sensation loss in the fingers.[12]

Postural stressors play a major role in the incidence of musculoskeletal problems, less ergonomic working environment such as the inappropriate location of monitor and keyboard, handheld vibratory tools or repetitive movements forceful muscle contraction all can contribute to the incidence of CTS.[12-13]

According to a study, the prevalence of carpal tunnel syndrome in the general population is <1.5[13], higher incidence of CTS is found in the employed population as compared to the non-employed population.[14] Tinel sign, Phalen test is used for the diagnosis of CTS whereas nerve conduction test (NCV) is considered to be a gold standard in diagnosing CTS.[15] Since the result of various studies regarding CTS severity in relation to computer use differs. Therefore, there is a need to research to check the frequency of CTS among computer operators whose work requires long hours of computer use and also assess the functional limitations.

Materials and Methods

This cross-sectional study was conducted in the premises of DUHS, Ojha campus, Karachi the duration of this study is from 1st December 2019 to 29th February 2020. The population included both male and female employees including IT professionals, information assistants, and data entry personnel, office assistants between the age group of 25-50 years who are working in the current job for > 2 years and whose usage of computers per day within working hours is greater than 3 hours. A pre-designed self-administered standard questionnaire i.e., Boston Carpal Tunnel Questionnaire (BCTQ) was used to check the severity of the symptoms of CTS and functional status in computer operators. After taking the informed consent from the participants, a standard questionnaire i.e., Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) was given as per the sample size of 95 for the assessment of symptoms severity and functional status in carpal tunnel syndrome. It consists of a total of 19 questions divided into 2 sections based on a 5-Likert scale from mild to severe. A purposive sampling technique was used. Data was entered and analyzed using SPSS version 21 (SPSS Inc., Chicago). Descriptive statistics (mean, standard deviation) were calculated for numerical data and frequencies and percentages for categorical variables. The frequency of Symptom Severity Scale (SSS) and Functional Status Scale (FSS) was reported using categorized based on percentiles, where to 50th percentile was labeled as Mild, 50th-75th percentile as Moderate, and >75th percentile as severe. Association between categorical variables like age and gender and CTS was explored using an Independent sample t-test and ANOVA (Analysis of Variance). A p-value of less than 0.05 was considered significant.

Results

A total of 95 participants whose computer usage is greater than 3 hours and are on their current job for more than 2 years were included in the study, with a mean age of 33.61 ± 6.98 years. Table 1 represents descriptive statistics for socio-demographic characteristics of the study population. Of the total respondents, most the participants were young. The age range was 25 to 50 years, with a mean age of 33.61 ± 6.98 years, 91.6% (n=87) belonged to the younger age

group (≤45 years) and 8.4% (n=8) to the older age group (>45 years).

Majority of the respondents, 68.4% (n=65) were males. Whereas females were 31.6% (n=30). Of the total, 46.3% (N=44) respondents had mild severity symptoms, followed by 17.9% (n=17) and 35.8% (n=34) with moderate and severe symptoms, respectively. Among the fifty one respondents reporting moderate to severe symptoms, the frequency of each reported symptom is; pain 23.2% (n=22), sleeplessness due to pain 21.1% (n=20), daytime pain 22.2% (n=21), frequency of daytime pain 16.9%(n=16), duration of daytime pain 13.7% (n=13), numbness 8.5%(n=8), weakness 16.9% (n=16), tingling 11.6% (n=11), severity of numbness & tingling at night 12.6% (n=12), sleeplessness due to numbness & tingling 21% (n=20), difficulty in grasping and use of small objects 9.5% (n=9) (Table 2(a), Figure 1).

Through the functional severity scale, 55.8 % (n=53) respondents had a mild functional impairment, whereas, moderate to severe difficulty in performing day to day activities were found in 21.1% (n=20) and 23.0% (n=22) respondents respectively. Of the total respondents reporting moderate to severe difficulty in performing their day to day activities; the frequency of each function and reported difficulty is: writing 12.7% (n=12), buttoning clothes 3.2% (n=3), holding a book while reading 14.8% (n=13), gripping of telephone handle 12.6% (n=12), the opening of jars 16.9% (n=16), household chores 10.5% (n=10), carrying of grocery basket 22.2% (n=21), bathing and dressing 10.5% (n=10) (Table 2(b), Figure 1).

Measures of Difference in average SSS based on sociodemographic characteristics were performed using independent sample t-test and ANOVA. A marked significant difference (p-value 0.030) in the mean SSS was observed with the age (years) of the participants. Young (25-35 years) respondents had increased SSS (mean =19.54, SD= ±7.82) as compare to respondents aged 35-45 years (mean = 14.65, SD = ±5.00), whereas an increased score was again observed in the later age of >45years (mean = 20.12, SD = ±7.62).

The comparison of mean values of the SSS showed no statistically significant difference in relation to gender. Male (mean = 18.43, SD = ±7.57) and females (mean =18.83, SD= ±7.52) scored almost same on the SSS. (Table 3). Measures of Difference in average FSS based on socio-demographic characteristics were performed using independent sample t-test and ANOVA.

No significant difference was observed in the mean FSS in relation to Gender (p-value 0.185) and Age (p-value 0.060). A decreasing trend was observed in the average FSS score as the age increased; with 25-35 years (mean = 13.18, SD = ±5.87), 35-45 years (mean = 10.15, SD = ± 2.73) and >45years (mean = 11.12, SD = ±4.15). In addition, no significant mean difference was observed among male (mean = 12.06, SD = ±4.83) and female (mean = 13.03, SD = ±6.38) gender. (Table 4)

Table 1: Baseline Characteristics of Study Population (N=95)

		N	*%*
Gender			
	Male	65	68.4
	Female	30	31.6
Age (years)	Mean ± Sd:	33.61 ± 6.98	
	25-35	67	70.5
	35-45	20	21.1
	45-50	8	8.4

Table 2(a): Frequency of symptoms severity among Enrolled Respondents

Variables	*Normal*	*Slight*	*Medium to very severe*
	N (%)	N (%)	N (%)
Pain in the wrist at night	45(47.4%)	28(29.5%)	22(23.2%)
Sleeplessness due to the pain in past 2 weeks*	56(58.9%)	19(20.0%)	20(21.1%)
Pain in your hand or wrist during the daytime	46(48.4%)	28(29.5%)	21(22.2%)
Frequency of pain during daytime**	52(54.7%)	27(28.4%)	16(16.9%)
Average duration of pain during daytime***	52(54.7%)	30(31.6%)	13(13.7%)
Numbness (loss of sensation) in hand	47(49.5%)	40(42.1%)	8(8.5%)
Weakness in hand or wrist	52(54.7%)	27(28.4%)	16(16.9%)
Tingling sensations in hand	45(47.4%)	39(41.1%)	11(11.6%)
Severity of numbness or tingling at night	55(57.9%)	28(29.5%)	12(12.6%)
Sleeplessness due to numbness or tingling in past 2 weeks*	52(54.7%)	23(24.2%)	20(21%)

**sleeplessness scale from 1 to 5: normal, once, 2 to 3 times, 4 to 5 times, more than 5 times.*

***daytime pain scale: normal, 1-2 times/day, 3-5 times/day, more than 5 times, continued.*

****daytime pain duration scale: normal, <10 min, 10-60 min, >60 min, continued.*

Table 2(b): frequency of reported functional difficulty among enrolled respondents

Variables	*No Difficulty*	*Little Difficulty*	*Moderate Difficulty to Cannot perform activity at all*
	N (%)	N (%)	N (%)
Writing	60(63.2%)	23(24.2%)	12(12.7%)
Buttoning of Clothes	76(80.0%)	16(16.8%)	3(3.2%)
Holding a book while Reading	45(47.4%)	36(37.9%)	13(14.8%)
Gripping of telephone Handle	59(62.1%)	24(25.3%)	12(12.6%)
Opening of Jars	58(61.1%)	21(22.1%)	16(16.9%)
Household Chores	58(61.1%)	27(28.4%)	10(10.5%)
Carrying of Grocery Basket	49(51.6%)	25(26.3%)	21(22.2%)
Bathing and Dressing	71(74.7%)	14(14.7%)	10(10.5%)

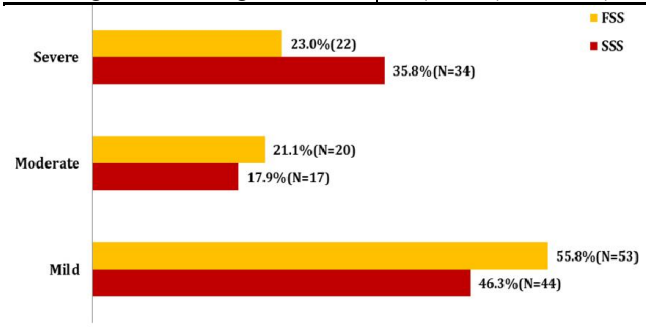

Figure 1: Distribution of Systems Severity Scale and Functional Severity Scale Categories

Table 3: Mean Comparison of Symptom Severity for Carpal Syndrome across socio-demographic characteristics

		Symptom Severity Scale		
		Mean (sd)	**Difference**	**p-value**
Gender				
	Male	18.43 (7.57)	-0.40	0.584
	Female	18.83 (7.52)		
Age (years)				
	25-35	19.54 (7.82)	-4.88	0.030
	35-45	14.65 (5.00)		
	45-50	20.12 (7.62)		

Table 4: Mean Comparison of Functional Difficulty for Carpal Syndrome across socio-demographic characteristics

		Functional Status Scale		
		Mean (sd)	**Difference**	**p-value**
Gender				
	Male	12.06 (4.83)	-0.972	0.185
	Female	13.03 (6.38)		
Age (years)				
	25-35	13.18 (5.87)		0.066
	35-45	10.15 (2.73)		
	45-50	11.12 (4.15)		

Discussion

The purpose of our study was to investigate the symptoms severity and functional limitations caused by CTS in computer professionals of DUHS. In our study, we used the BCTQ (Boston Carpal Tunnel Questionnaire) including its sensory and functional domain, which is a standard questionnaire to check the prevalence of CTS with good reliability, responsiveness, and validity.[16-18] The frequency of CTS among computer professionals in our study based on the severity with moderate to severe symptoms is 17.9%(N=17) and 35.8%(N=34) respectively and the result of our study showed that there is a significant statistical difference in the mean SSS with respect to age(years) of participants, for young respondents of age 25-35 and above 45 old age group have increased symptom of CTS as compared to the age group of 35-45, the mean and standard deviation was calculated for both male and female genders and its association was checked by independent sample t-test that showed no statistically significant difference. While the previous study which was conducted in Faisalabad in 2019 by Kashan Aslam et al showed an overall prevalence of CTS in computer professionals is 61.1%, 48.1% in males and 13.5% in females and their results showed that the majority of participants having CTS is from age of 36-45 [19], Another study estimated 13.1% which implies 1 out of 8 computer professionals suffer from this condition.[20]

The usually reported symptom according to our study was nighttime wrist pain, daytime wrist pain, and sleeplessness due to pain Table 2(a] which contradicts the results of a study conducted in Malaysia by Nurul Hidayah Mat Zain *et al*. in 2014 according to which the most commonly reported symptom were numbness, tingling, and weakness. Another study conducted in 2006 reported the highest calculated averages in question-related to pain i.e. frequency of pain during

daytime and duration of pain, weakness of the hand and wrist was also a high scored symptom.[21-22]

The prime affected function according to our study was carrying grocery baskets, opening jars, and holding a book while reading Table 2(b), which are more or less consistent with the findings of the previously mentioned studies in 2014 and 2006 according to which highly affected function were carrying of grocery basket, writing, household chores and opening of jars.[23-27]

Conclusion

This study indicated that using a computer for long hours results in developing CTS symptoms with increased severity and profound functional limitations. According to our study, the frequency of CTS based on symptom severity is found to be 35.8% also the risk of CTS increases with increasing age.

Future Recommendations:

Further studies should be conducted to check the frequency of CTS in computer users with a large sample size that should be taken from more than one institute or organization so that its results could be generalized to the whole population, in the same manner, comparative studies should be conducted to compare the frequency of CTS between either gender or computer users or non-users.

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