

Prevalence of Carpal Tunnel Syndrome Among Dentists Working in Tertiary Care Hospitals of Peshawar, Pakistan

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ABSTRACT

Objective: To determine the prevalence of Carpal Tunnel Syndrome among dentists working in tertiary care hospitals of Peshawar

Methodology: A cross-sectional survey was conducted on 132 dentists working in tertiary care hospitals of Peshawar, Pakistan. The data was collected from four public and three private tertiary care hospitals via convenience sampling technique. A standard Boston Carpal Tunnel Questionnaire, Kamath and Stothard Carpal Tunnel Questionnaire, Numeric Pain Rating Scale and Phalen's Test were used. The data was collected and analyzed by using SPSS version 25. Frequency and percentage were calculated for categorical variables and chi-square test was applied to find the association between variables.

Results: A total of 132 dentists participated in this research out of whom 65 (49.2%) were males while 67 (50.8%) were females. Twenty-eight (21.2%) respondents reported the symptoms of Carpal Tunnel Syndrome. Fifteen (11.4 %) respondents had mild pain and 13 (9.8%) had moderate pain. The participants' ages ranged between 25 and 30 years (66.7%), and 107 (81.1%) had a working experience of less than 10 years. Ninety-one (68.9%) dentists were working for 6-8 hours per day and 57 (43.2%) of the participants had a normal body mass index (BMI) ratio.

Conclusion: Dentists who work in hospitals of Peshawar appear to suffer from Carpal Tunnel Syndrome. Dentists who have more hours of contact time with patients per day have increased risk of CTS symptoms but no association was found between gender and CTS symptoms. Furthermore, the symptoms of CTS increased with age.

Keywords: Carpal tunnel syndrome, Median neuropathy, Dentist, Tertiary Healthcare

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INTRODUCTION

Carpal Tunnel Syndrome (CTS) affects more than eight million Americans¹. Workers who perform their jobs using their upper extremities like hands, wrists, and fingers are more prone to CTS. This disorder widely affects dental professionals which in turn affects their efficiency and their lives. Dental practitioners work in a static posture for a prolonged period during a normal day. Their job demands that they stay in one place to

handle small dental instruments with precision, instead of changing their posture frequently¹. Carpal Tunnel Syndrome is a neuromuscular disorder of the median nerve compression in the wrist². CTS is the most common entrapment neuropathy of the median nerve and accounts for 90% of the neuropathies³. Common signs and symptoms of CTS include numbness and a tingling sensation⁴. On the Phalen's Test, it will show pain, numbness, and tingling like sensations in the thumb, index, and middle finger⁵. Historically, it was thought that injury due to the repetitive movements cause nerve damage and may make one prone to developing CTS⁶. The most common work-related risk factors to CTS are forceful excursion, awkward wrist/hand postures, repetitive movements, and vibrating tools⁷. A study shows that workers who have CTS lose their grip strength⁸. Another study shows that a higher risk for CTS is in lifting heavy objects^{9,10}. The well-known fundamental related risk factors with CTS are diabetes mellitus, hypothyroidism, old wrist fracture, and rheumatoid arthritis¹¹.

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The first-line diagnostic test for CTS is electromyography (EMG) or ultrasound but EMG is the gold standard¹². Nerve conduction study (NCS) is considered a powerful confirmatory test due to its high specificity⁴. The commonest provocative tests are Tinel's Test, Phalen's Test, and Durkan Test¹³.

According to several studies, Carpal Tunnel Syndrome is common among dentist population and the prevalence of CTS in dentists, hairdressers and computer users were reported in Kelantan Malaysia (21.2 %)¹⁴, Iran (16.7%)¹⁵, Saudi Arabia (30.5%)¹⁶, and Lahore, Pakistan (15.5%)¹⁷. Another study was conducted in Karachi, Pakistan which shows that the prevalence of CTS among dentists was 10.13%¹⁸.

In Pakistan, very limited data are available on the prevalence of CTS. CTS affect daily activities so the impact of this research on society is that dental professionals will become aware and could potentially reduce the incidence of CTS. Prevention of CTS would result in better quality dental services. Therefore, this study was designed to determine the prevalence of Carpal Tunnel Syndrome among dentists working in tertiary care hospitals of Peshawar.

METHODOLOGY

A cross-sectional study was conducted at the tertiary care hospitals of Peshawar. The four public hospitals included Hayatabad Medical Complex, Khyber Teaching Hospital, Lady Reading Hospital, and the Khyber College of Dentistry, and three private hospitals were Northwest General Hospital, Sardar Begum Dental Hospital, and Rehman College of Dentistry, Peshawar. The study was approved by IRB (Institutional Research Board) of the Northwest Institute of Health Sciences (Ref.#: 02/11/06/NWIHS-COPT/IRB/2020). The calculated sample size was 132 using W.H.O. sample size calculator with prevalence of carpal tunnel syndrome (30.5%)¹⁶, margin of error (d)=7.9%, and confidence level (C.I) = 95%. A non-probability convenience sampling technique was used to recruit participants. The inclusion criteria were: male and female dentists with ages between 25 and 45 years, at least one year's experience of working as a dentist, and working for more than six hours per day. The exclusion criteria were: dentists with pregnancy related obesity, known cases of diabetes, arthritis of hand, thyroid gland disease, and any recent trauma such as wrist fracture.

Data was collected via Kamath and Stothard Carpal Tunnel Questionnaire, Boston Carpal Tunnel Questionnaire, Phalen's Test and Numeric Pain Rating

Scale. Kamath and Stothard's Questionnaire is based on nine questions for conducting survey and the authors suggest that this Questionnaire can be used as a substitute for NCS. This survey has sensitivity of 85% and 92% for NCS with a positive predictive value of 90% for the scored survey and 92% for NC studies¹⁹. The Boston Carpal Tunnel Questionnaire (BCTQ) Score is a patient-revealed questionnaire that inspects symptom severity and by and large useful status of patients with CT disorder. The Symptom Severity Scale (SSS) with 11 inquiries is scored on a Likert measure of 1-5 and the Functional Status Scale (FSS) with 8 inquiries is scored from 1-5 with 1 as no trouble and 5 as troublesome.

According to a systematic review by Leite et al, BCTQ is considered to be a legal, dependable, satisfactory, and approachable instrument and ought to be used as an essential result measure in CTS preliminaries²⁰. Phalen's Test is utilized to survey for CT disorder. The positive manoeuvre while flexing the wrist to 90 degrees for 1 moment inspires manifestations in the MN nerve dissemination. People with CT disorder will encounter numbness and tingling in the fingers inside 60 seconds. Phalen's Test has a sensitivity and specificity of 67.2% and 92.9% respectively²¹. Numeric Pain Rating Scale (NPRS) is a fragmented numeric interpretation of the Visual Simple Scale (VAS) in which a defendant chooses an entire number (0–10 whole numbers) that best mirrors the severity of his/her pain. The NPRS is tied down by positions portraying the seriousness limits of the torment. According to a systematic review, NPRS is the recommended tool to measure pain intensity on the basis of higher compliance rates, ease of use, better responsiveness, and good applicability²². All data were entered and analysed using Statistical Package for Social Sciences (SPSS) version 25. A categorical variable like gender, marital status, pain, and Carpal Tunnel Syndrome was calculated in the form of frequency and percentages. Chi-square test was used to find the association between variables.

RESULTS

The total of 132 dentists participated in this study. Among them, 21.2% reported the symptoms of Carpal Tunnel Syndrome, 78.8% of participants were asymptomatic, 11.4 % dentists had mild pain, and 9.8% dentists had moderate pain, while no severe pain was reported in our study.

Out of 132 dentists, 65 (49.2%) were male while 67 (50.8%) were female. As many as 88 (66.7%) participants were 25-30 years of age while 14 (10.6%) were =41 years. Most of the participants, 107 (81.1%)

had a working experience of 1-9 years. Ninety-one (68.9%) dentists were working for 6-8 hours per day. Total 57 (43.2%) participants had a normal body mass index (BMI) ratio, while 28 (21.2%) were underweight. The rest of the frequency and percentage of demographics are mentioned in Table 1.

Table 1: Showing Percentage and Frequency of Demographic Data of Dentists

Variables	Frequency (n = 132)	Percentage
Age range		
25-30	88	66.7
31-40	30	22.7
41-45	14	10.6
Working experience		
01-09 yrs	107	81.1
10-18 yrs	11	8.3
19-25 yrs	14	10.6
Working hours/week		
6-8 hrs	91	68.9
9-15 hrs	41	31.1
Gender		
Male	65	49.2
Female	67	50.8
Marital status		
Married	67	50.8
Unmarried	65	49.2
BMI		
Normal	59	44.7
Underweight	28	21.2
Overweight	27	20.5
Obese	18	13.6
Phalen's Test		
Positive	22	16.7
Negative	110	83.3

Table 2 shows that 116 (87.9%) dentists had scored less than 3 base on Kamath and Stothard CTQ which indicates 100% negative NCS. Four (3%) dentists scored in the range 3 or 4, which indicates that participants should undergo the NCS. Only 12 (9.1%) respondents had a score in the range of 5 or more, which indicates a positive NCS (limitations are mentioned according to questionnaire.)

Base on NPRS, 94 (71.2%) dentists had no pain, while 25 (18.9%) had mild pain at the time of data collection. The data of previous week showed that 77 (58.3%) dentists had no pain, while 38 (28.8%) had mild pain (table 2).

Base on BCTQ, the scores of symptoms severity scale show that 104 (78.8%) participants were asymptomatic, 15 (11.4%) were mild, while 13 (9.8%) were moderate.

Table 2: Showing Pain Intensity on Numeric Pain Rating Scale (NPRS) at the Time of Survey

Variables	Frequency	Percentage
NPRS at the time of survey		
No pain	94	71.2
Mild	25	18.9
Moderate	13	9.8
Severe	0	0
Very Severe	0	0
NPRS in previous week		
No pain	77	58.3
Mild	38	28.8
Moderate	16	12.1
Severe	1	.8
Very Severe	0	0
BCTQs		
SSS Score		
Asymptomatic	104	78.8
Mild	15	11.4
Moderate	13	9.8
Severe	0	0
Very Severe	0	0
FSS Scoring		
Asymptomatic	109	82.6
Mild	10	7.6
Moderate	13	9.8
Severe	0	0
Very severe	0	0

* NPRS = Numeric Pain Rating Scale

Functional status of dentists shows that approximately 109 (82.6%) were asymptomatic, 10 (7.6%) were mild, while 13 (9.8 %) were moderate (Table 2). According to Phalen's Test results, 22 (16.7%) participants had positive Phalen's Test while 110 (83.3%) had negative Phalen's Test (table 2).

Table 3: Association of SSS Score with Demographics

Demographic	Asymptomatic	Mild	Moderate	p-Values
Age				.000
25-30	74	12	2	
31-40	24	0	6	
41-45	6	3	5	
Gender				.067
Male	52	10	3	
Female	52	5	10	
Working Hours				.007
6-8	76	11	4	
9-15	28	4	9	
Working Experience				.000
1-9	91	12	4	
10-18	8	0	3	
19-25	5	3	6	

*Applied Chi-square test

Table 3 shows the association of symptom severity scores with demographics. Statistical difference was found between symptom severity and age, working hours and working experience of dentists ($P < 0.05$). Table 4 shows the frequency and percentage of the sub-domains of functional severity scale. Most of the dentists had a little difficulty in writing (9%), buttoning (8%), holding book (13%), and gripping (6%).

experienced the symptoms of CTS¹⁶. A study conducted in Lahore, Pakistan by Muhammad et al. in 2013, reported a 15.5% frequency of CTS among dentists, while the same type of study conducted in Karachi by Khan et al. found 10.13% prevalence of CTS among dentists^{17,18}.

Table 4 : Frequency and Percentage of FSS

FSS Questions	No Difficulty	Little Difficulty	Moderate	Intense Difficulty	Cannot Perform
Writing	117 (88.6%)	12 (9.1%)	3 (2.3%)	0 0	0 0
Buttoning	117 (88.6%)	11 (8.3%)	4 (3.0%)	0 0	0 0
Holding a book	111 (84.1%)	18 (13.6%)	3 (2.3%)	0 0	0 0
Gripping	116 (87.9%)	8 (6.1%)	7 (5.3%)	1 (0.8%)	0 0
Opening jars	118 (89.4%)	8 (6.1%)	6 (4.5%)	0 0	0 0
Household Chores	119 (90.2%)	6 (4.5%)	6 (4.5%)	1 (0.8%)	0 0
Carrying Objects	116 (7.9%)	10 (7.6%)	4 (3.0)	2 (1.5%)	0 0
Bathing	119 (90.2%)	7 (5.3%)	5 (3.8%)	1 (0.8%)	0 0

DISCUSSION

This study was conducted to assess the prevalence of Carpal Tunnel Syndrome among dentists working in tertiary care hospitals of Peshawar. The findings of present study are that 21.2% of dentists reported the symptoms of Carpal Tunnel Syndrome. Out of these, 78.8% of participants were asymptomatic, 11.4% had mild pain and 9.8% had moderate pain, while no severe pain was reported in our study.

A study conducted in Chennai, India by Deepika et al. in 2020 using BCTQ on 120 dentists, reported that 25.7% of respondents were diagnosed with CTS, out of whom 15% lied in the mild category of CTS, 9.1% lied in moderate category, and 1.6% were in severe category of CTS²³. Another study conducted in India by Ravi et al. using BCTQ on 100 dentists, reported that assessment on the symptoms severity scale of the wrist indicated that 63% of the participants were asymptomatic, 18% had mild symptoms, 10% had severe symptoms while 5% had extremely severe symptoms²⁴. Similarly, another study conducted in Riyadh by Faisal et al. in 2019 using the BCTQ on 179 dentists, reported that 30.5% dentists had

The present study shows that a significant association exists between the CTS symptoms and dentists' experience ($P < 0.05$) and significant association is also seen between working hours and CTS symptoms ($P < 0.05$) (Table 8). A study conducted on 240 dentists in Isfahan by Abbas et al., reported that dentists with more working hours per week and having more experience, were more prone to CTS¹⁵.

Another study conducted in Riyadh by Al Hussain et al. using BCTQ on 223 dentists, reported that CTS symptoms were greater among female dentists than in male dentists (90). In the current study, there is no significant association between genders and CTS symptoms ($P > 0.05$) (Table 8).

In another study conducted in Kelantan Malaysia using Kamath and Stothard CTQ on 109 dentists, the author reported that the prevalence of probable CTS among dentists was 21.2% based on Kamath and Stothard (2003) Questionnaire scoring of 3 or above¹⁴. Whereas, the current study concludes that the prevalence of CTS based on Kamath and Stothard was 12.1%. A study conducted by Dananton et al. in the United States, reveals that increasing age showed higher risks to develop CTS²⁵. Present study also shows that there is

a strong significant association between age and CTS symptoms.

Our survey was conducted on a small sample size. Future research should be conducted on a larger sample and should find the risk factors of CTS development among dentists. Future research should focus on intervention and prevention measures for dentists to work safely and efficiently.

CONCLUSION

In conclusion, dentists who work in hospitals of Peshawar appear to suffer from Carpal Tunnel Syndrome. Dentists having longer duration work are at increased risk of CTS. Dentists who have more hours of contact time with patients per day have increased risk of CTS symptoms but no association was found between gender and CTS symptoms. Furthermore, the symptoms of CTS increased with age.

Conflict of interest: The authors of the current study declare no conflict of interest.

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Authors' contribution: MZ: collected data and wrote manuscript, PK: Collected and analyzed data and helped in writeup, SS: Performed statistical analysis and proofreading, UA: Conceptualized and designed study layout, revised and approved manuscript for publication, SZA: Conceptualized and designed study layout, revised and approved manuscript for publication, AK: Data analysis and Manuscript preparation.

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