

Prevalence of clinical signs of carpal tunnel syndrome among dentist in Qatar

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Abstract- Background: Carpal tunnel syndrome (CTS) is a common median nerve peripheral neuropathy characterized by pain, paresthesia. The study was done to determine the prevalence of clinical signs of Carpal Tunnel Syndrome (CTS) and its association with biographic and occupational information among dentists in Qatar.

Methods: A cross-sectional study was conducted using a self-assessment questionnaire for the initial assessment of patients presenting with symptoms of CTS. The questionnaire comprises biographic and occupational information and the Symptom Severity Scale (SSS). In the SSS, there are 11 questions; responses may be scored from zero (mildest) point to four (most severe) points. The mean of all 11 scores was used to calculate the result. Therefore, a higher symptom severity score indicates worse symptoms. Obtained data was evaluated with SPSS software version 20.

Result: Sixty-six dentists completed the survey giving an overall response rate of 71.7%. The prevalence of CTS was 24.2% as per the symptom questionnaire. The overall mean (\pm SD) symptom severity scale (SSS) score was 0.70 (\pm 0.74). No statistically significant difference in score was found with biographic and occupational information.

Conclusion: The prevalence of probable CTS among dentists in Qatar was relatively high. Early diagnosis of symptoms and education regarding ergonomic risk may impact the successful management of CTS.

Keywords: carpal tunnel syndrome, dentist; prevalence, signs, symptom severity scale

1. INTRODUCTION

Carpal tunnel syndrome (CTS) is a common median nerve peripheral neuropathy characterized by pain, paresthesia, and numbness in territory of median nerve (D'arcy CA, & McGee. 2000). Recurrent pressure along with wrist movement leads to inflammation of tendons and compresses median nerve. Associated ergonomic risk factors with CTS are repetitiveness of work, forceful exertions, mechanical stress, posture, temperature, and vibration. In dental practice, this form of movements and hand position are frequent and can compress median nerve. Contact stress over the carpal tunnel caused by dental instruments

and due to wrists being held in awkward positions for long periods, these risk factors are noticed in dentists (**Hamann et al. 2001**).

Higher rates of hand and finger pain symptoms are seen among dentists who apparently work longer hours than the general population (**Lam & Thurston 1998**). The cause of CTS in dental profession may be attributed to forceful use of the hand during scaling and extractions, use of vibrating ultrasonic equipment, and frequent working with the wrist in flexion or in extension. Therefore, dental practice is considered as an occupational risk factor for this syndrome. There is a high prevalence of CTS among dental professionals involved in several aspects of dental specialties (**Abichandani et aql. 2013**).

Several studies have addressed CTS and reported its prevalence in dental profession, in particular dentist. The prevalence of probable CTS among dentists in Kelantan, Malaysia was 21.2% (**Munirah et al. 2014**). In a study conducted in Mangalore, India the prevalence of CTS in dentists was 20% (**Mithun Pai et al. 2014**). Another study among Iranian dentists concluded that the prevalence of CTS was 16.7% (**Haghighat et al. 2012**). The total prevalence among the dentists working in Lahore, Pakistan was 15.5% (**Ehsan et al.2016**).

The work carried on certain specialties in dentistry has increased incidence of CTS (**Valachi et al. 2003**). Modern-day dentistry is associated with advanced technology. Introduction of new devices and techniques which perhaps have given rise to the new health complications (**Haghighi et al.2013**). Due to this many dentists deal with symptoms of this syndrome such as pain in upper extremity or work-related paresthesia. Furthermore, this syndrome has not been studied among dentists in Qatar. The aim of this study was to determine the prevalence of clinical signs of CTS and its association with biographic and occupational information among dentists in Qatar.

2. MATERIALS AND METHODS

A cross-sectional study was conducted among dentists in Qatar. The reference population of this study was all dentist working in a public sector hospital. Ethical committee clearance was obtained the medical research center prior to the study (#16074). Informed consent was obtained from the participants. Anonymity and confidentiality were assured. In present study, a self-assessment questionnaire for the initial assessment of patients presenting with symptoms of CTS was used. The questionnaire was established on the Levine et al study. and validated by Kamath and Stothard in secondary care for the diagnosis of CTS (**Kamath & Stothard. 2003**).

The questionnaire comprises biographic and occupational information and the Symptom Severity Scale (SSS). Biographic and occupational information included age, gender, experience, working hours per week, and specialty in the first part and in the second part, the questions related to numbness, tingling and pain in the fingers or hand during the day or night was get filled in by the participants. In the SSS, there are 11 questions; responses may be scored from zero (mildest) point to four (most severe) points.

The average of all 11 scores was used to calculate the result. Thus, a higher symptom severity score indicates worse symptoms. Data was analyzed using Statistical Package for Social Sciences (SPSS), version 20.0 for Windows. In order to estimate the frequency (%), standard descriptive statistical methods were used for the variables. Mean, median, and

standard deviation was calculated. Mann-Whitney U and Kruskal Wallis H tests was used to examine differences in scores related to age, gender, experience, working hours per week, and specialty. A p value of ≤ 0.05 was considered as statistically significant.

3. RESULTS

Out of 92 questionnaires distributed to the dentists, 66 were completed and returned giving an overall response rate of 71.1%. The age of respondents ranged from 26–64 years, with a mean (\pm SD) of 40.24 (± 8.32) years. Females (73.4%, n=47) exceeded males (26.6%, n=17). The mean (\pm SD) age of males and females were 39.87 (± 8.20) and 39.66 (± 7.71) years respectively ($p > 0.05$). Mean (\pm SD) years of practice after dental degree was 14.49 (± 8.48) years and the mean (\pm SD) hour of practice per day was 7.14 (± 1.32) hours. The majority of the respondents were from Endodontic specialty (33.9%, n=21) followed by Pedodontics (27.4%, n=17), Orthodontics (16.1%, n=10), Prosthodontics (14.5%, n=9), Periodontics (6.5%, n=4), and Oral and Maxillofacial Surgery (OMFS) (n=1, 1.5%) from specialty. The prevalence of CTS was 24.2% as per the symptom questionnaire.

Table 1 shows the frequency distribution of 11 questions of symptom severity scale (SSS). The highest frequency of symptoms of CTS was found in ‘Night time numbness or tingling’ (62.1%, n=41) followed by ‘Awakening tingling and numbness’ (60.6%, n=40) and ‘Holding a small object’ (60.6%, n=40) in equal proportion, and ‘Weakness’ (56.1%, n=37). Similarly, in the analysis by question, the highest averages were found for symptom severity scale scores in ‘Awakening tingling and numbness’ (Mean=0.97, Median=1) followed by ‘Holding a small object’ (Mean=0.92, Median=1), ‘Night time numbness or tingling’ (Mean=0.89, Median=1), and ‘Weakness’ (Mean=0.83, Median=1) (Table.2). The overall mean (\pm SD) symptom severity scale (SSS) score was 0.70 (± 0.74).

Table 2 indicates descriptive analysis of Symptom Severity Scale (SSS) scores for numbness, tingling, weakness, pain severity, pain length, frequency.

Table 3 indicates, comparison of mean Symptom Severity Scale (SSS) scores with demographics. Comparison of the mean Symptom Severity Scale (SSS) scores of CTS with gender, age, years of practice, hours of practice per day, and specialty are presented in table 3. Females (0.76 \pm 0.72), 36-45 years old (0.77 \pm 0.76), 11-20 years of practice (0.80 \pm 0.75), 1-4 hours of practice per day (0.80 \pm 1.34), and Periodontics specialty (1.52 \pm 1.19) group had the highest mean (\pm SD) scores. However, the mean differences were statistically not significant ($p > 0.05$) (Table 3).

Table 1. Frequency (%) distribution of Symptom Severity Scale (SSS) (n=66)

Symptom Severity	No symptoms	Mild	Moderate	Severe	Very severe
Numbness	46 (69.7)	13 (19.7)	5 (7.6)	2 (3.0)	0 (0.0)
Tingling	39 (59.1)	17 (25.8)	7 (10.6)	1 (1.5)	2 (3.0)
Weakness	29 (43.9)	26 (39.4)	5 (7.6)	5 (7.6)	1 (1.5)
Night time numbness or tingling	25 (37.9)	27 (40.9)	10 (15.2)	4 (6.1)	0 (0.0)

Night time pain severity	41 (62.1)	19 (28.8)	2 (3.0)	4 (6.1)	0 (0.0)
Holding a small object	26 (39.4)	27 (40.9)	8 (12.1)	2 (3.0)	3 (4.5)
Daytime pain length [^]	45 (68.2)	13 (19.7)	6 (9.1)	2 (3.0)	0 (0.0)
Daytime pain frequency*	42 (63.6)	14 (21.2)	6 (9.1)	4 (6.1)	0 (0.0)
Daytime pain severity	39 (59.1)	18 (27.3)	4 (6.1)	5 (7.6)	0 (0.0)
Awakening tingling and numbness*	26 (39.4)	22 (33.3)	12 (18.2)	6 (9.1)	0 (0.0)
Awakening pain*	34 (51.5)	18 (27.3)	9 (13.6)	5 (7.6)	0 (0.0)

Scale from 1 to 5: no symptoms, mild, moderate, severe, or very severe symptoms.

[^]Pain length scale from 1 to 5: never, < 10 minutes, 10-60 minutes, > 60 minutes, constant.

*Frequency of awakening scale from 1 to 5: none, once, 2-3 times, 4-5 times, more than 5 times.

Table 2. Descriptive analysis of Symptom Severity Scale (SSS) scores (n=66)

Symptom Severity	Mean	SD	Median	Minimum	Maximum
Numbness	0.44	0.78	0	0	3
Tingling	0.64	0.96	0	0	4
Weakness	0.83	0.97	1	0	4
Night time numbness or tingling	0.89	0.88	1	0	3
Night time pain severity	0.53	0.83	0	0	4
Holding a small object	0.92	1.03	1	0	4
Daytime pain length [^]	0.47	0.79	0	0	3
Daytime pain frequency*	0.58	0.90	0	0	3
Daytime pain severity	0.62	0.91	0	0	3
Awakening tingling and numbness*	0.97	0.98	1	0	3
Awakening pain*	0.77	0.96	0	0	3
Mean symptom severity	0.70	0.74	0	0	3

Scale from 1 to 5: no symptoms, mild, moderate, severe, or very severe symptoms.

[^]Pain length scale from 1 to 5: never, < 10 minutes, 10-60 minutes, > 60 minutes, constant.

*Frequency of awakening scale from 1 to 5: none, once, 2-3 times, 4-5 times, more than 5 times.

Table 3. Comparison of mean Symptom Severity Scale (SSS) scores with demographics

		Mean	SD	Minimum	Maximum	p value
Gender (n=64)	<i>Male (n=17)</i>	0.53	0.82	0.00	3.18	0.057
	<i>Female (n=47)</i>	0.76	0.72	0.00	3.18	
Age in years	<i>26-35 (n=14)</i>	0.54	0.82	0.00	3.18	0.061

(n=55)	36-45 (n=30)	0.77	0.76	0.00	3.18	
	46-55 (n=7)	0.70	0.41	0.18	1.18	
	56-65 (n=4)	0.09	0.13	0.00	0.27	
Years of practice (n=65)	1-10 (n=15)	0.54	0.79	0.00	3.18	0.074
	11-20 (n=41)	0.80	0.75	0.00	3.18	
	21-30 (n=5)	0.65	0.70	0.00	1.82	
	31-40 (n=4)	0.09	0.13	0.00	0.27	
Hours of practice (per day) (n=64)	1-4 (n=5)	0.80	1.34	0.00	3.18	0.660
	5-8 (n=59)	0.67	0.70	0.00	3.18	
Specialty (n=62)	<i>Prosthodontics</i> (n=9)	0.67	0.53	0.00	1.36	0.255
	<i>Endodontics</i> (n=21)	0.56	0.45	0.00	1.45	
	<i>Orthodontics</i> (n=10)	0.58	0.77	0.00	2.55	
	<i>Pedodontics</i> (n=17)	0.68	0.73	0.00	2.64	
	<i>Periodontics</i> (n=4)	1.52	1.19	0.36	3.18	
	<i>OMFS</i> (n=1)	0.00	-	0.00	0.00	

4. DISCUSSION

The objective of the present study was to evaluate the sternness scoring of symptoms that were accompanying with CTS. The instrument used in present study, the Boston Carpal Tunnel Questionnaire (BCTQ), is a patient-based outcome measure that has been developed specifically for CTS. It has the Symptom Severity Scale (SSS) of 11 items and uses a five-point rating scale. The BCTQ has been utilized and tested for validity, reliability, and responsiveness for determine the prevalence of CTS. This is the first study in which the BCTQ instrument is used to explore the prevalence and associated symptoms of CTS among dentists in Qatar. Based on the participants' recall of experiences while practicing dentistry, the severity and frequency of the symptoms were identified.

In this study, prevalence of CTS among dentist was 24.2% which was higher than previous studies. A study in America reported that the prevalence of CTS among dentists was only 2.9%. In contrast, study among dentist in Greece found 26% prevalence which was marginally higher than the prevalence in the current study (**Alexopoulos et al. 2004**). A study among Indian dentist reported 32% prevalence of CTS (**Mamatha et al. 2004**). Another study on Lithuanian dentists reported 83.1% with hand problems such as pain and CTS and 30.4% experienced chronic hand problems (**Puriene et al. 2008**). However, caution need to be taken while comparing due to different definition of CTS between the studies. Female gender due to smaller wrists and lower carpal tunnel volumes and certain specialties due to repetitive stress and forceful working of the hand were found to be more prone to this disease. These results of this study are supported by the previous research (**De Krom et al.1992**).

Due to the cross-sectional design, causal inferences cannot be drawn from the findings of this study. Hence, cohort study is recommended to measure causal relationship. In addition, diagnosis of CTS in the present study was derived on the questionnaire which relied on self-reporting as the participants assessed their symptoms based on their recall of experiences. More precise results would be obtained by nerve conduction tests; however, this method is time consuming and needs cooperation from study participants. It is advised to perform systematic preventive and ergonomic strategies before the dental students begin their

clinical work at the dental school. Furthermore, they should undertake neurological tests and obtain suitable information and training on how to safeguard themselves from probable problems in future. Further studies are required to validate the present findings using functional and clinical symptoms.

5. CONCLUSIONS

There was a high prevalence of CTS among dentists in Qatar. Dentists have a higher risk of CTS and care and precautions should be taken to prevent it. Increasing the awareness associated with the risk of CTS may possibly lower the risk of CTS among dentists leading to a improved quality of dental service. Early diagnosis of symptoms and education regarding ergonomic risk may impact the successful management of CTS. Early intervention can be vital for dentist who have symptoms of CTS or are at an increased risk of developing the condition.

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Author Contribution

Sabika Saeed H.S. Al Muraikhi-Conceptualization, Original Draft Preparation, Investigation, Review & Editing

Khalid Esmael M. E. Rahimi -Conceptualization, Methodology, Writing

Ashwin Shetty- Software, Formal Analysis, Supervision,

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