

# Prevalence of clinical findings of carpal tunnel syndrome in Isfahanian dentists

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## Abstract

**Background:** Carpal tunnel Syndrome (CTS) is the most common compression neuropathy. Jobs with frequent and repetitive hand movements are one of the risk factors for this syndrome. The aim of this study was to determine the prevalence of CTS in Isfahanian dentists.

**Materials and Methods:** In this cross-sectional descriptive study, 240 dentists were evaluated for CTS. Diagnosis was made according to both questionnaire and clinical tests of Phalen and Tinel. Age, sex, years of experience, working hours per week and the type of procedure were considered as dependent variables. All data were analyzed by Chi-square and T-test using SPSS software 11.5 ( $\alpha=0.05$ ).

**Results:** Among the dentists who were studied, 173 (72%) were male and 67 (28%) were female. 16.2% of males and 17.9% of females had symptoms of CTS and there wasn't any significant difference between them ( $P>0.05$ ). the prevalence increased with advancing age. In a way that it reached to 22.2% in ages more than 55 in contrast to 6% among individuals between 25–34 years old. With increasing of experience to 15 years the risk of CTS increased but an unexpected reduction was observed with more than 15 years of experience.

**Conclusion:** This study showed the prevalence of CTS was 16.7% among dentists and was more common in older dentists. CTS prevalence was increased with age. The dentist population with more working hours per week and more experience years were more susceptible for this syndrome. Using suitable gloves, wrist splints and short periods of resting during vigorous continuous working can decrease the symptoms of this disease.

**Key Words:** Carpal tunnel syndrome, clinical findings, dentists

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## INTRODUCTION

Carpal tunnel syndrome is the most common median nerve peripheral neuropathy that causes paresthesia, pain, and numbness in territory of median nerve (thumb, index, middle, and lateral half of the ring finger). Pain increases during working hours or at night. Generally, any factor that causes increasing the pressure of content or decreasing of carpal tunnel capacity leads to signs of this syndrome.<sup>[1-4]</sup> Physiologically this syndrome is caused by ischemia

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of median nerve that follows increasing internal canal pressure and vein circulatory disorder. Second theory is tenosynovitis of tendons near this nerve.<sup>[5]</sup> One of the most important problems in pathogenesis is size of wrist canal. Some studies showed that cases with wrist ratio (i.e., anterior-posterior diameter to medio-lateral diameter of wrist) of more than 0.7 are more at risk for developing this syndrome.<sup>[6]</sup>

In most of the cases, the reason of this syndrome is idiopathic but some of identified reasons are connective tissue disorder, metabolic disease, infections, pregnancy, obesity, hand wrist bone fracture, and dislocation.<sup>[6]</sup> CTS occur more commonly in dominant hand but it could occur in both hands too. Frequent pressure with wrist movement makes inflammation of bending tendons and compresses median nerve.

Occupational reasons include repetitive bending movements of wrist, to catch devices forcefully with ulnar deviation of hand and repetitive pressure on palm. In dentistry practices, these movements (especially repetitive movements of wrist) are used during exfoliation and canal cleaning that can compress median nerve. Generally type of movements and hand position are repetitive in dental practice. Dentists use ring finger as fulcrum and they keep their fingers forcefully when they are doing exfoliation, extraction, canal cleaning, and movement of hand wrist. This pressure on fingers and repetitive movements of wrist will cause this feeling. Hence, dental practices are one of the occupational risk factors for this syndrome. Getting rid of pain is essential for continuation of daily tasks.

Regarding that many dentists deal with symptoms of this syndrome such as work-related paresthesia or pain in upper extremity and this syndrome has not been studied in Iranian dentists. The aim of this study was to determine the prevalence of clinical signs of CTS in dentists and recommend some instructions to control it.

## MATERIALS AND METHODS

This analytical descriptive study was conducted on

240 dentists in Isfahan by randomized sampling. Biographic and occupational information of dentists included gender, age, experience, working hours per week, type of activity and clinical symptoms of carpal tunnel syndrome such as pain and hand paresthesia were recorded. Dentists suffering from diabetics, rheumatoid arthritis, thyroid gland disease, and wrist fractures were excluded. Signs for CTS consisted of numbness or pain in territory of median nerve and positive clinical tests of Phalen and Tinel. At first the procedures were explained for the dentists. For Phalen test, dentists were requested to put their hands tangent in front of chest with vertical angle in location of wrist. They were asked to bend their wrist for 1 min. For the Tinel test, the median nerve was percussed at wrist while the dentist's palm was upward. The tests were considered as positive if there was a sensory complaint in median nerve territory. The wrist ratio was measured by colis (Mitutoyo, Japan). Finally, all data were analyzed by chi-square and *t*-test using SPSS software. ( $\alpha=0.05$ ).

## RESULTS

Among dentists who met criteria 173 (72%) were men and 67 (28%) were women. Totally prevalence of CTS was 16.7%.

16.2% of men and 17.9% of women had carpal tunnel syndrome and chi-square showed that there wasn't any significant difference between them (*P* value >0.05).

According to the age range, studied dentists were classified into four groups. Frequencies in these groups were 45, 135, 51, and 9, respectively. In this study, CTS prevalence increased from 6.6% for the age range of 25–34 years old to 22.2% for dentists older than 55 [Table 1].

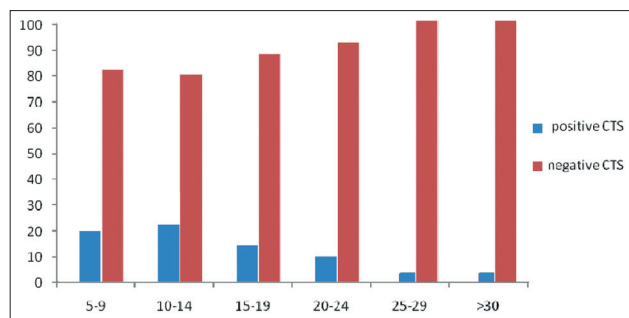
Seventy two percent of dentists were general practitioner and 28% were specialist.

According to job experience, dentists were classified to six groups. Prevalence of CTS in the group by 10–14 years of job experience was 21%, but in group

**Table 1: Prevalence of CTS in studied dentists based on different age groups**

Result of test Age groups (years)	CTS positive		CTS negative		Total	
	Frequency	Frequency (%)	Frequency	Frequency (%)	Frequency	Frequency (%)
25-34	3	6.6	42	93.4	45	18.8
35-44	25	18.5	110	81.5	135	56.2
45-54	10	19.5	41	80.5	51	21.2
>55	2	22.2	7	77.8	9	3.8
Total	40	16.7	200	83.3	240	100

CTS: Carpal tunnel Syndrome



**Figure 1:** Prevalence of CTS in dentists based on different years of job experience

having more than 15 years of experience, reduction was shown. In two groups of having more than 25–29 and more than 30 years of job experience, no cases for CTS were found [Figure 1].

Among studied dentists, there were no women having more than 20 years of job experience. Based on the type of activity, root canal and operative therapy were at higher risk of CTS [Figure 2].

The most common signs for CTS are numbness and paresthesia in fingers that in this study was seen in 70% of dentists. Other signs were paresthesia (50%) and pain (27.5%).

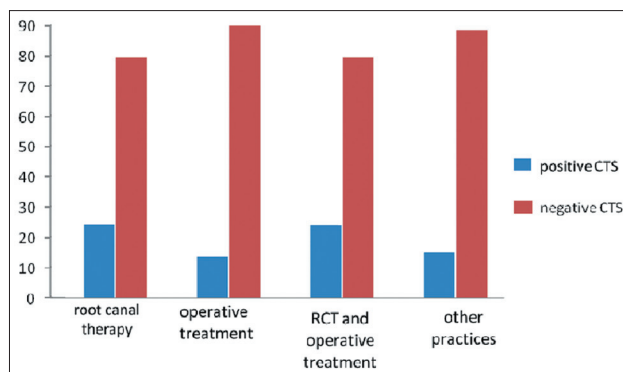
Among 40 dentists who had signs of CTS, 47.5% of them (19 dentists) declared that they had CTS signs during their dentistry practice and 22.5% (nine dentists) had these signs while sleeping, but others did not mention any certain time.

Considerably noted, 12% (30 dentists) declared that they have been taught necessary recommendations for preventing work-related musculo-skeletal problems among whom only two dentists were reported to be CTS positive.

Considering wrist-ratios of more than 0.7, 12% of dentists had CTS signs, but 5% of dentists with ratios of less than 0.7 had CTS; however, there were no significant differences between them ( $P$  value=0.076).

## DISCUSSION

In this study, prevalence of CTS was 16.7% among dentist. In a vast study for estimating the prevalence of CTS conducted in Netherlands its prevalence was reported 0.6% in men and 6.8% in women.<sup>[6]</sup> CTS prevalence in general population of the United States is not clear but according to physicians' visit, prevalence of syndrome was estimated 55–125 cases in 100 000. Recent studies have shown 2.7% of population have



**Figure 2:** Prevalence of CTS in dentists based on types of activities

clinical and electrodiagnostic findings of CTS.<sup>[6]</sup> This disease is more common among middle-aged people at the age of 30 to 60 years.<sup>[7]</sup> Women dramatically predispose to this disease more than men (3:1 to 10:1).<sup>[8]</sup> Considering that CTS is an occupational disease, in recent years some studies have been conducted to find the prevalence of this disease in various jobs. In 2001, 257 computer users were evaluated at Mayo clinic by Stevens *et al.*<sup>[3]</sup> all of them were working averagely 6 h a day and it was reported that 30% of users were suffering from paresthesia.

Work-related musculo-skeletal problems usually co-exists with upper extremity movements in sitting or standing positions especially in dental practice.<sup>[9-11]</sup> Researches about skeletal and muscular disease prevalence among dentists are increasing. In Nebraska State of America more than 29% of 1000 dentists had signs of peripheral neuropathy in upper extremity and neck. These dentists announced fixed prosthesis exfoliation made more problems than other practices.<sup>[9]</sup> In Rice VJ study, 75.6% of the dental workers reported at last one or more symptoms that related to CTS and in 11% of them CTS were diagnosed.<sup>[12]</sup> In Hamann *et al.* study, 1079 dentists were studied for CTS risk. Eighty four percent of these dentists were men with 1 to 58 years of experience. Thirteen percent had median nerve neuropathy signs.<sup>[13]</sup> Anton D *et al.*<sup>[14]</sup> shown age, BMI, and number of patients treated per day are important factors that related to increasing risk of CTS. In their study, 42% of dentists had symptoms of CTS. Also in study by Kesson *et al.* was shown musculoskeletal disorders of the wrists or hands developed with increasing years of practice.<sup>[15]</sup> This study showed that CTS signs exist in 17.9% of female dentists and 16.2% in males. Based on past studies it was anticipated that women were more at risk, but this study shows no significance difference. The reasons can be the fewer number of studied female dentists (67 out of 240), studying younger female dentists and fewer working hours and job experience among studied female dentists. The most common signs of CTS are

paresthesia and pain that appear while working. According to previous studies, it is expected that prevalence of CTS increase as dentists' age does. So that in Lalumandier JA study,<sup>[16]</sup> manifestation of CTS was 1.9 times more in dentists with more than 10 years experience. In this study, it was shown that prevalence of CTS from 6.6% at the age of 25–34 increases to 22.2% at the ages more than 55, which there was a significant difference ( $P$  value<0.05).

Regarding the relationship between CTS prevalence and years of job experience it was shown that CTS prevalence increases up to 15 years of job experience, but the prevalence was reduced by increasing job experiences more than 15 years. The reason can be fewer numbers of dentists whose experience is more than 15 years. On the other hand some dentists stop working due to muscular and skeletal problems related to their occupation, so logically some of them that continue their job do not have any signs of CTS.

In the past studies, the relationship between CTS frequency and type of activity was not evaluated. In this study, it is shown that the prevalence of CTS is higher among root canal and operative therapy activities (22.4%) and dentists with other activities were less affected. Because root canal therapy practices related to repetitive movements of wrist and inserting in a special position that is more related to CTS risk. In this study, it was demonstrated that prevalence of CTS in dentists with wrist-ratio of more than 0.7 was more that approves the past studies.

Carpal tunnel syndrome is identified as a bothering disease in dentistry. Appropriate training must be included during educational periods and even after. Dentists should repeatedly be examined and suspicious cases must be followed due to treatment and prevention of further problems. The appropriate selection of protective gloves that dentists wear for long hours is very important. Size and substance of them should be appropriate and flexible. Adjustment of the working conditions should be considered.<sup>[17]</sup> Wrist splints can be helpful, if CTS signs like numbness, paresthesia, and pain in fingers or wrist persist.

## CONCLUSION

According to results of this study, it was concluded that the prevalence of Carpal Tunnel syndrome was 16.7% among Isfahanian dentists and it was more common in older dentists. Increasing age and hours of working per week enhance risk of syndrome. Preventive training

should be considered for reducing risk of syndrome among dentists.

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