

Assessing the Frequency of Carpal Tunnel Syndrome among Dentists and Investigating their Perceived Self-Management Strategies

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Abstract

Objective: To assess the frequency of carpal tunnel syndrome among dentists and investigate their perceived self-management strategies

Methods: In this cross-sectional study, the diagnosis of Carpal Tunnel Syndrome (CTS) was determined based on the symptoms reported by the participants, categorized as asymptomatic, mild, moderate, and severe using a clinical diagnosis questionnaire. Data was collected from 120 dentists working in private and government institutes in Lahore, utilizing a convenient sampling technique. The participants completed the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) and a structured questionnaire for perceived self-management strategies. The collected data were then entered and analyzed using SPSS version 22.0.

Results: The frequency of Carpal Tunnel Syndrome (CTS) among the dentists was as follows: 22.5% asymptomatic, 64.2% mild symptoms, 10.8% moderate symptoms, and 2.5% severe symptoms of CTS. Among perceived self-management strategies, pain management techniques were prevalent, with 35.0% utilizing hot or cold packs and medications. Ergonomic modifications were employed by 23.3%, while exercise-based strategies were practiced by 15.0% of dentists

Conclusion: This study reported a notable prevalence of carpal tunnel syndrome among dentists functioning within governmental and private medical facilities in Lahore. The study demonstrated that dentists employ a range of self-management strategies for carpal tunnel syndrome, including pain management techniques, wrist splints, ergonomic modifications, and exercise-based interventions.

Keywords: Carpal tunnel syndrome • Dentist • Perceived self-management • CTS

Introduction

Dentistry, an esteemed branch of medical science, is dedicated to the meticulous preservation and comprehensive care of the intricate oral cavity [1]. Per Google dictionary, a dentist is a professional with a four-year medical degree, proficient in specializing in diverse pathological conditions that affect the periodontal tissues and dental structures. They possess advanced skills in intricate dental procedures including restorative dentistry, dental extractions, and the integration of prosthetic dental prostheses [2].

Dentists endure arduous physical exertion involving prolonged periods of postural strain, intricate manual dexterity, and forceful hand maneuvers during patient care, exposing them to a multitude of occupational perils. Despite the inconspicuous nature of these challenges, they demand diligent scrutiny and due regard [3].

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Dental surgeons experience higher rates of musculoskeletal issues compared to general surgeons or physicians, with approximately 60% of dentists reporting symptoms in multiple body sites. These conditions are attributed to repetitive dental work, the need for precise hand movements, and prolonged periods in uncomfortable postures, resulting in a unique working position for dentists throughout their day [4].

Carpal Tunnel Syndrome (CTS) occurs due to median nerve compression within the narrow palmar passageway known as the carpal tunnel [5]. This tunnel, comprised of the proximal carpal bones as the floor and the transverse carpal ligament as the roof, houses ten structures including the median nerve, flexor pollicis longus tendon, and tendons of flexor digitorum superficialis and flexor digitorum profundus [6]. CTS primarily affects the median nerve and can be induced by exposure to vibrations. Its prevalence in the general population ranges from 5% [7].

CTS is prevalent among dental personnel, attributed to the repetitive and forceful actions involving flexion and extension of the wrist, as well as prolonged grip tasks. These factors substantially elevate the susceptibility of dental professionals to carpal tunnel syndrome [8].

The comprehensive study conducted by Alhusain FA, et al. revealed a substantial prevalence of symptoms related to Carpal Tunnel Syndrome (CTS) among dentists practicing in Riyadh, with a prevalence rate of 30.5% [9]. The groundbreaking research conducted by Pattusamy R yielded a profound conclusion, demonstrating an overwhelming prevalence of Carpal Tunnel Syndrome (CTS) among a cohort of 90 dentists, reaching an astonishing rate of 82.2% [10].

Despite the vast body of international research dedicated to exploring the intricate dynamics of Carpal Tunnel Syndrome (CTS) among dentists, the availability of studies focusing specifically on this condition within Pakistan, particularly in Lahore, remains notably limited. While investigations in cities such as Peshawar [11] and Faisalabad [12] have shed some light on the subject, revealing CTS prevalence rates of 21.2% and 60% among dentists respectively, the scarcity of comprehensive data necessitates further inquiry into this pressing matter.

The primary objective of this study is to investigate the frequency of carpal tunnel syndrome among dentists, a prevalent occupational health condition in the dental profession. Additionally, this research aims to explore the perceived self-management strategies employed by dentists in coping with carpal tunnel syndrome symptoms. By understanding the frequency and self-management strategies, this study holds significance in raising awareness about the occupational risks faced by dentists and can contribute to the development of preventive measures and effective interventions for carpal tunnel syndrome. The findings will provide valuable insights for healthcare professionals, policymakers, and dental organizations in improving the occupational health and well-being of dentists.

Materials and Methods

Study design

It was a cross sectional survey.

Study settings

The study was conducted at various sites in Lahore, including government and private hospitals such as Punjab Dental Hospital, CMH, Nawaz Sharif Hospital, Services Hospital, as well as private dental practitioners

Study duration

The study spanned a period of four months, capturing valuable data and insights within its defined timeframe.

Study population

The study specifically targeted dental practitioners as the study population, including professionals from diverse dental specialties and practice settings.

Sampling technique

Data collection employed a convenient (non-probability) sampling method to gather information from dental practitioners in the selected study sites.

Sample size

A sample size of 120 dentists employed in both private and government hospitals of Lahore was included in the study.

Selection criteria

Inclusion criteria: Dental practitioners working for at least an year

- Age 23-50
- No underlying systemic disease

Exclusion criteria: Dentists with on-going systemic disease such as diabetes, thyroid disease and rheumatoid disease.

- Obesity
- Pregnancy
- Dentists who have recently wrist fractures

Data collection tool

The Boston Carpal Tunnel Questionnaire (BCTQ) and a structured questionnaire of self-management strategies were utilized as the data collection tool in this study.

Data collection procedure

A comprehensive survey was undertaken across multiple government and private healthcare institutions, encompassing the acquisition of written

consent from each establishment. A detailed exposition regarding the research protocol was provided to all dental professionals within each respective setting, culminating in the attainment of informed consent. Explicit emphasis was placed on the voluntary nature of participant involvement. Robust measures were implemented to address any concerns or inquiries pertaining to the administered questionnaires. Following completion by the participants, the questionnaires were duly collected, and meticulous safeguards were employed to ensure the preservation of data integrity and the safeguarding of personal information. The ensuing dataset was subjected to advanced statistical analysis utilizing SPSS version 16, whereby mean and standard deviation emerged as the preferred descriptors for the presentation of socio-demographic variables.

Results

A cross-sectional survey was conducted to assess the prevalence of Carpal Tunnel Syndrome (CTS) among dentists, utilizing a sample of 120 dental practitioners employed in diverse government and private hospitals in Lahore. Employing statistical analysis through SPSS software, the investigation yielded the following demographic insights: a distribution of 37.5% males and 62.5% females, with 59.2% of participants falling within the age range of 20-25, 23.3% within 26-30, 7.5% within 31-35, 3.3% within 36-40, 2.5% within 41-45, and 4.2% within 45-50. Regarding their professional experience, 79.2% had practiced for 1-5 years, 14.2% for 6-10 years, 2.5% for 11-15 years, and 4.2% for 16-20 years. With respect to daily work hours, the distribution entailed 63.3% working 4-7 hours, 32.5% working 8-11 hours, and 4.2% working 12-15 hours (Figures 1-4).

Table 1 presents the epidemiological assessment of diverse carpal tunnel syndrome symptoms within the participant cohort. Findings indicate that during nocturnal periods, 61.7% exhibited an absence of nocturnal nociception in their hand or wrist, while 21.7% encountered mild pain, 11.7% experienced moderate pain, 2.5% endured severe pain, and 2.5% endured markedly severe pain. Pertaining to sleep disturbance provoked by hand or wrist pain, the majority (72.5%) reported unimpeded sleep, with 17.5% experiencing a single awakening, 7.5% enduring 2 to 3 awakenings, 1.7% encountering 4 to 5 awakenings, and 0.8% facing more than 5 awakenings. Diurnal manifestations encompassed

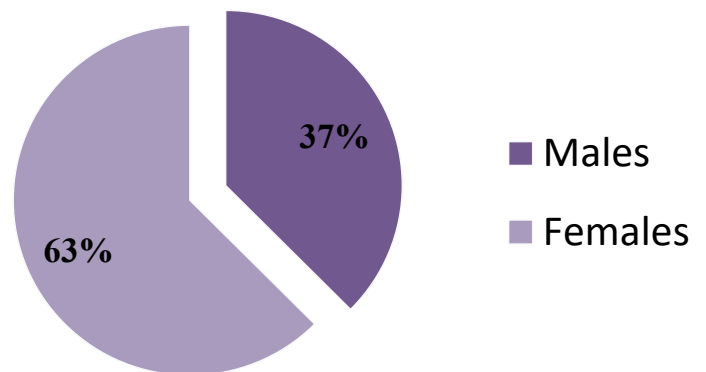


Figure 1. Gender.

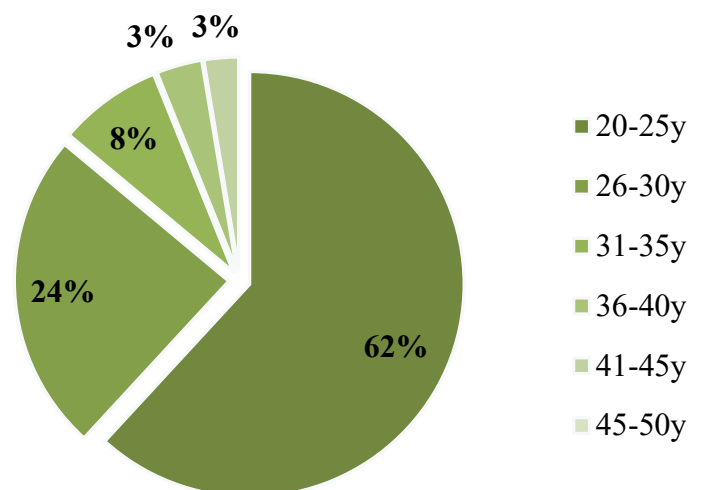


Figure 2. Age.

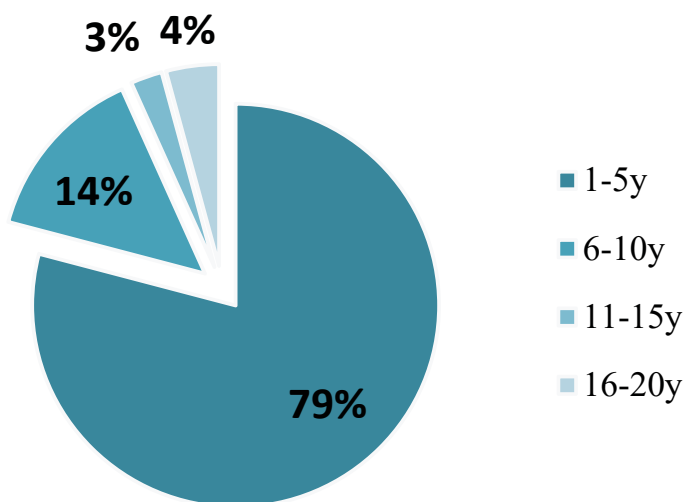


Figure 3. Duration in practice.

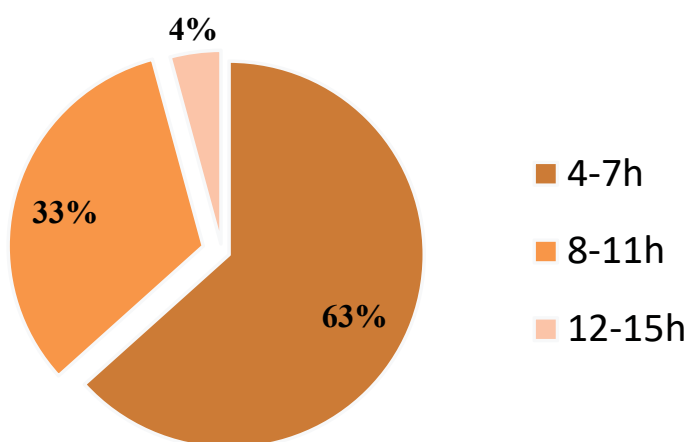


Figure 4. Working hours.

varying proportions of pain intensity, namely 58.3% reported painlessness, 30.8% exhibited slight pain, 6.7% suffered moderate pain, 3.3% grappled with severe pain, and 0.8% communicated the presence of highly severe pain. Sensory disturbances were reported as follows: 67.5% experienced numbness, 22.5% reported mild numbness, 7.5% acknowledged moderate numbness, 1.7% described severe numbness, and 0.8% endured profoundly severe numbness. Additionally, 57.5% of participants exhibited no weakness in their hand or wrist, 30.8% experienced mild weakness, 10.0% demonstrated moderate weakness, and 1.7% reported severe weakness. Notably, tingling sensations were reported by 67.5%, mild tingling by 16.7%, moderate tingling by 10.8%, severe tingling by 4.2%, and highly severe tingling by 0.8%. Furthermore, the participants faced challenges with activities such as manual dexterity tasks (8.3% experienced minor difficulty, 8.3% encountered moderate difficulty, and 1.7% encountered substantial difficulty), as well as other tasks including writing, buttoning clothes, holding a book while reading, gripping a telephone handle, opening jars, performing household chores, and carrying a grocery basket. In the domain of dressing and bathing, 11.7% encountered minor difficulty, while 5.0% experienced moderate difficulty (Table 1).

The study conducted an in-depth analysis of the overall prevalence of Carpal

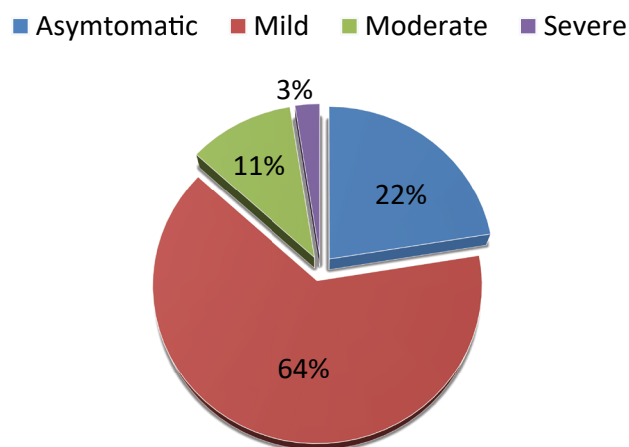


Figure 5. BCTQ overall score.

Table 1. Frequency and percentages of participants' responses in Boston carpal tunnel questionnaire.

| | | | | | |
|---|---------------------------|--------------------------|------------------------------|---------------------------|--------------------------|
| Severity of hand/ wrist pain at night | Normal | Slight | Medium | Severe | Very Severe |
| | 74(61.7%) | 26(21.7%) | 14(11.7%) | 3(2.5%) | 3(2.5%) |
| Frequency of hand/wrist wake you up at night from 2 weeks | Normal | Once | 2 to 3 times | 4 to 5 times | More than 5 times |
| | 87(72.5%) | 21(17.5%) | 9(7.5%) | 2(1.7%) | 1(0.8%) |
| Pain in hand/wrist at daytime | No pain | Slight | Medium | Severe | Very serious |
| | 70(58.3%) | 37(30.8%) | 8(6.7%) | 4(3.3%) | 1(0.8%) |
| Frequency of hand/wrist pain during daytime | Normal | 1-2 times/day | 3-5 times/day | More than 5 times | |
| | 84(70%) | 28(23.3%) | 6(5%) | 2(1.7%) | |
| Duration of pain in daytime | Normal | < 10 minutes | 10-60 continuous | > 60 minutes | Continuous |
| | 74(61.7%) | 33(27.5%) | 7(5.8%) | 4(3.3%) | 2(1.7%) |
| Numbness in hand | Normal | Slight | Medium | Severe | Very serious |
| | 81(67.5%) | 27(22.5%) | 9(7.5%) | 2(1.7%) | 1(0.8%) |
| Weakness in hand/wrist | Normal | Slight | Medium | Severe | |
| | 69(57.5%) | 37(30.8%) | 12(10%) | 2(1.7%) | |
| Tingling in hand/wrist | Normal | Slight | Medium | Severe | Very serious |
| | 81(67.5%) | 20(16.7%) | 13(10.8%) | 5(4.2%) | 1(0.8%) |
| Severity of numbness /tingling at night | Normal | Slight | Medium | Severe | |
| | 85(70.8%) | 20(16.7%) | 11(9.2%) | 4(3.3%) | |
| Frequency of numbness/tingling interfering sleep at night | Normal | Once | 2 to 3 times | 4 to 5 times | More than 5 times |
| | 94(78.3%) | 12(10%) | 11(9.2%) | 2(1.7%) | 1(0.8%) |
| Difficulty in grasping or use of small objects | Without difficulty | Little difficulty | Moderately difficulty | Very difficulty | |
| | 94(78.3%) | 14(11.7%) | 10(8.3%) | 2(1.7%) | |
| Difficulty in writing | No difficulty | Little difficulty | Moderate difficulty | Intense difficulty | |
| | 87(72.5%) | 23(19.2%) | 7(5.8%) | 3(2.5%) | |

| | | | | | |
|--|----------------------|--------------------------|----------------------------|---------------------------|-----------------------------------|
| Difficulty to button the clothes | No difficulty | Little difficulty | Moderate difficulty | | |
| | 93(77.5%) | 20(16.7%) | 7(5.8%) | | |
| Difficulty in holding book while reading | No difficulty | Little difficulty | Moderate difficulty | Intense difficulty | |
| | 89(74.2%) | 23(19.2%) | 5(4.2%) | 3(2.5%) | |
| Difficulty in gripping telephone handle | No difficulty | Little difficulty | Moderate difficulty | Intense difficulty | |
| | 89(74.2%) | 21(17.5%) | 7(5.8%) | 3(2.5%) | |
| Difficulty in opening jars | No difficulty | Little difficulty | Moderate difficulty | Intense difficulty | |
| | 81(67.5%) | 25(20.8%) | 13(10.8%) | 1(0.8%) | |
| Difficulty to perform household chores | No difficulty | Little difficulty | Moderate difficulty | Intense difficulty | |
| | 80(66.7%) | 30(20.5%) | 7(5.8%) | 3(2.5%) | |
| Difficulty in carrying grocery basket | No difficulty | Little difficulty | Moderate difficulty | Intense difficulty | Unable to perform activity |
| | 73(60.8%) | 30(25%) | 11(9.2%) | 5(4.2%) | 1(0.8%) |
| Difficulty in bathing/ dressing | No difficulty | Little difficulty | Moderate difficulty | | |
| | 100(83.3%) | 14(11.7%) | 6(5.0%) | | |

Table 2. Perceived self-management strategies (n=120).

| Categories | Perceived Strategies | f (%) |
|----------------------------|---|-----------|
| Ergonomic modifications | Adjusting chair and workstation height | 28(23.3%) |
| | Using ergonomic hand instruments | |
| | Taking frequent micro-breaks | |
| Exercise-based strategies | Wrist stretches and range of motion exercises | 18(15.0%) |
| | Hand and finger strengthening exercises | |
| | Thumb opposition exercises | |
| Pain management techniques | Applying ice or cold packs | 42(35.0%) |
| | Applying heat or warm compresses | |
| | Using over-the-counter pain relievers | |
| Splints or braces | Wearing wrist splints during rest | 24(20%) |
| | Wearing wrist splints during work | |
| Other strategies | Seeking professional therapy or treatment | 8(6.7%) |

Tunnel Syndrome (CTS) among dentists. The findings indicated that a notable proportion of dentists, specifically 22.5%, were found to be asymptomatic for CTS, while a majority of 64.2% exhibited mild symptoms. Furthermore, 10.8% of the participants reported experiencing moderate symptoms of CTS, and 2.5% presented with severe symptoms of the condition (Figure 5).

Table 2 highlights the utilization of perceived self-management strategies among dentists for the management of Carpal Tunnel Syndrome (CTS) pain. Within the participant cohort (n=120), pain management techniques emerged as the predominant modality, with 35.0% employing hot or cold packs and over-the-counter medications. Notably, 20% utilized wrist splints as a means of pain alleviation. Ergonomic modifications, such as adjusting chair and workstation height, utilizing ergonomic hand instruments, and incorporating frequent micro-breaks, were acknowledged by 23.3% of participants. Exercise-based strategies, encompassing wrist stretches, range of motion exercises, hand and finger strengthening exercises, and thumb opposition exercises, were employed by 15.0% of the dentists. Seeking professional therapy or treatment was reported by a smaller proportion of participants (6.7%) as an alternative self-management strategy. These findings underscore the diversification of self-care approaches utilized by dentists in their endeavour to mitigate CTS-related pain (Table 2).

Discussion

This research endeavour aimed to ascertain the prevalence of Carpal Tunnel Syndrome (CTS) among dentists employed in both government and private hospitals in Lahore. Notably, a substantial portion of the collected data comprised female participants, indicating a higher incidence of symptomatic CTS among females compared to males. Our study corroborates the findings of Alhusain FA, et al. highlighting a pronounced gender disparity, wherein female dentists exhibited a significantly higher predisposition (OR 2.13; 95% CI 1.09-4.17) towards developing symptoms associated with Carpal Tunnel Syndrome (CTS) when compared to their male counterparts [9].

The aforementioned study yielded results indicating that only (11.4%) of dentists experienced mild pain and (9.8%) reported moderate pain. In contrast, our current investigation revealed a significantly higher prevalence of mild symptoms of Carpal Tunnel Syndrome (CTS) among dentists, with 64.2% affected, along with 10.8% experiencing moderate symptoms and 2.5% enduring severe symptoms, while 22.5% remained asymptomatic [11].

Regarding the duration of daily work hours, the distribution revealed that 63.3% of participants worked for 4-7 hours, 32.5% worked for 8-11 hours, and 4.2% worked for 12-15 hours. Aligning with the findings of a study conducted by Teo SJN, et al. it was concluded that the prevalence of Carpal Tunnel Syndrome (CTS) was notably higher among older dentists. Moreover, advancing age and increased weekly working hours were identified as additional factors that augment the risk of developing CTS [13].

In the present study, the participants encountered impediments pertaining to activities requiring fine motor skills, with 8.3% experiencing minor impediment, 8.3% encountering moderate impediment, and 1.7% grappling with substantial impediment. Furthermore, participants faced challenges encompassing writing, buttoning garments, grasping a book while reading, manipulating a telephone handle, opening jars, executing household chores, and carrying a grocery basket. Intriguingly, prior research findings unveiled that among dentists, a cumulative proportion of 25.7% manifested symptoms indicative of Carpal Tunnel Syndrome (CTS), with 15% exhibiting mild functional impairment, 9.1% displaying moderate functional impairment, and 1.6% evincing severe functional impairment [14].

Previous literature showed that nonsurgical interventions for Carpal Tunnel Syndrome (CTS) encompass a range of treatment options, including splinting, steroid injections, and manual therapy [15]. In the recent study, pain management techniques were the most commonly employed approach, with 35.0% of participants utilizing hot or cold packs and over-the-counter medications. Wrist splints were utilized by 20% of participants, while ergonomic modifications and exercise-based strategies were employed by 23.3% and 15.0% of dentists, respectively.

Conclusion

In conclusion, the findings of this study underscore the notable prevalence and clinical significance of Carpal Tunnel Syndrome (CTS) within the dental profession, particularly among practitioners operating in governmental and private healthcare facilities in Lahore. The study demonstrated that dentists employ a range of self-management strategies for carpal tunnel syndrome, including pain management techniques, wrist splints, ergonomic modifications, and exercise-based interventions.

Limitations

- Firstly, the findings are based on self-reported data, which may be subject to recall bias.
- Secondly, the study focused only on dentists, limiting the generalizability of the results to other population.
- Additionally, the study relied on a relatively small sample size, which may limit the statistical power and generalizability of the findings.
- Lastly, the study did not assess the duration or severity of carpal tunnel syndrome symptoms, which could impact the choice and effectiveness of self-management strategies

Recommendations

- Firstly, future studies should strive to include larger and more diverse samples to enhance the generalizability of the findings to the broader population of dentists.
- Secondly, incorporating objective clinical assessments alongside self-reported symptoms would provide a more comprehensive understanding of carpal tunnel syndrome prevalence and severity. Long-term follow-up studies are also warranted to investigate the natural progression of symptoms and identify potential risk factors.
- Additionally, expanding the research scope beyond Lahore to encompass multiple regions and healthcare settings would contribute to a more comprehensive understanding of the prevalence and impact of carpal tunnel syndrome among dentists.
- Organizing awareness seminars or workshops focusing on self-management strategies for Carpal Tunnel Syndrome (CTS). These educational sessions can provide valuable knowledge and practical skills to effectively manage and prevent CTS symptoms
- Finally, it is important for dental clinics and institutions to implement policies and practices that promote a healthy and ergonomic work environment, including regular breaks and appropriate equipment.

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Conflict of Interest

The authors declare no conflicts of interest in relation to this study.

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