



# Occupation-related musculoskeletal disorders among dental professionals

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## Abstract

**Background and aim.** Dentists are exposed to a wide range of work-related factors that may result in various occupational diseases of which musculoskeletal disorders (MSDs) are common. The purpose of this study was to determine the prevalence and distribution of MSDs among dental professionals of our institution and to compare the prevalence of MSDs among the various dental specialists.

**Methods.** A self-administered questionnaire, which included basic demographic details, work experience in dentistry, and work profile related questions along with the Standard Nordic Questionnaire, was administered to the study participants. Statistical analysis for the data obtained was performed using SPSS Version 16.0 (Chicago, SPSS Inc.). The chi-square test was applied to test the association between MSD and variables such as gender, designation, type of dentistry and usage of computers. The Mann Whitney U test was used to assess the relationship between MSD and age, experience, sick leave, number of patients attended per day. A p-value < 0.05 was considered significant.

**Results.** 151 subjects participated in the study, and the prevalence of MSD in the last 12 months among dental professionals was 58.3% (88 out of 151 subjects). The most common site affected by MSD was the neck (66.7%). Also, it was noted that among various dental specialists, the Endodontists suffered the maximum (88.02%) musculoskeletal pain. Fifty individuals (33.11%) suffered from pain in multiple sites.

**Conclusion.** Work-related musculoskeletal disorders and pain can be reduced through proper operator-patient positioning, taking adequate breaks between patients, maintaining good physical health through regular exercises.

**Keywords:** musculoskeletal diseases, ergonomics, dentistry, pain, neck

## Introduction

Dentistry is a demanding profession that requires a high degree of precision and wide range of skills. Dental surgeons are exposed to a plethora of work-related risk factors due to their prolonged work hours, long dental appointments and exposure to body fluids [1]. Musculoskeletal disorders (MSDs) are one of the most common occupational disorder amongst dentists due to awkward work posture. The musculoskeletal pain experienced by an individual could be due to intrinsic factors such as age, genetic predisposition, obesity, mental stress, and extrinsic factors such as repetitive movements, prolonged static postures, suboptimal lighting

conditions, and improper positioning of the operator or patient. These factors can negatively impact their physical, social as well as psychological well-being and can lead to inefficient/restricted work delivery, frequent absence from daily work duties, and early retirement [2].

The Centre for Disease Control and Prevention defines MSDs as injuries or disorders of the muscles, nerves, tendons, joints, and supporting structures of the upper and lower limbs, neck, and lower back that are caused, precipitated or exacerbated by sudden exertion or prolonged exposure to physical factors such as repetition, force, vibration, or awkward posture. The prevalence of MSDs in the

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general population in India is about 7.08% [3]. T Rambabu and K Suneetha evaluated the prevalence of MSDs among physicians, surgeons and dental surgeons and observed that dentists suffered from maximum musculoskeletal pain (61%) followed by general surgeons (37%) and physicians (20%) [2]. Very few studies have evaluated the prevalence of musculoskeletal disorders among the various specialties of dentistry and lifestyle factors that could contribute to the development of such physical ailments, which would thus lead to inefficient work productivity. Hence, this study aimed to determine the prevalence of musculoskeletal disorders among dental professionals from various dental specialties of this institution as well as to assess the knowledge regarding the ergonomics among them.

**Methods**

This cross-sectional study was conducted after the approval from the Institutional Ethics Committee (IEC 47/2016). The study subjects included interns, postgraduate students, and the faculty of our institution. All the faculty members included in the study practiced exclusively their dental specialty. The collection of the research data was carried out from January to February 2016. The participants were informed regarding the study and written informed consent was obtained from those who were willing to participate in the study. Exclusion criteria for the study subjects were those with physical ailments such as rheumatoid arthritis and fibromyalgia. Incompletely filled questionnaires were also excluded from the study. A self-administered questionnaire, which included basic demographic details, questions related to work profile related and lifestyle practices along with the Standard Nordic Questionnaire [4] was administered to the participants. The principal investigator handed over the printed questionnaire in person to the study participants. 190 questionnaires were distributed to the dental professionals of the institution and they were asked to answer the questionnaire. The completed questionnaires were collected back within a week. 39 subjects were excluded from the study (13 incompletely filled questionnaires, 26 subjects had pre-existing physical ailments) after the initial screening.

Data entry was performed in Microsoft Excel and the statistical analysis was carried out using SPSS Version 16.0 (Chicago, SPSS Inc.). The chi-square test was applied to test the association between MSD and variables such as gender, designation, type of dentistry and usage of computers. The Mann Whitney U test was used to assess the relationship between MSD and age, experience, sick leave, number of patients attended per day. A p-value < 0.05 was considered significant.

**Results**

A total of 151 subjects (47 interns, 67 postgraduate students, and 37 teaching staff belonging to various dental specialties) were included in the study out of which 101

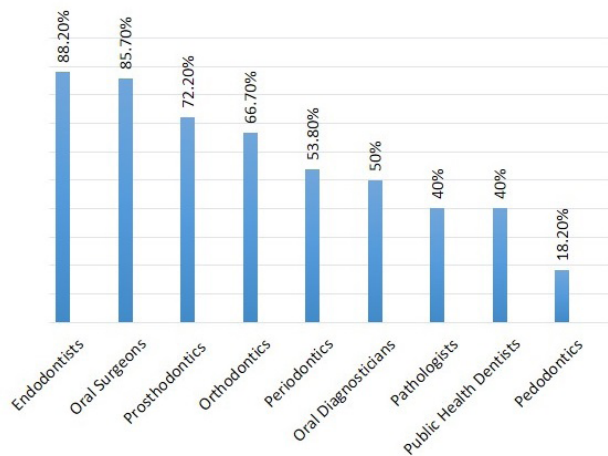
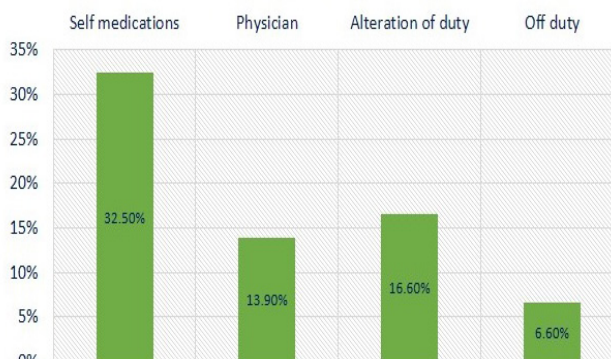
participants were females (66.9%), and 50 were males (33.1%). The mean age of the respondents was 27.34 years (range: 22-64 years). The most commonly followed type was a combination of sitting and standing dentistry in 65.6% (n=99) of the study participants, while 29.1% (n=44) subjects followed sitting dentistry and only 5.3% (n=8) followed a standing type of dental practice while treating patients. Since this was an institution-based study, the maximum working period was eight hours per day. 45.7% (n=69) of the individuals used computers for about 2-4 hours a day. 64% (n=97) of the subjects had regular physical exercise of more than 30 minutes for at least 4 to 5 days a week as a part of their daily lifestyle (Table I). The prevalence of MSD in the last 12 months among the dental professionals of our institution was 58.3% (88 out of 151 subjects). The most common site affected by MSD was the neck reported in 58 subjects (66.7%) followed by the lower back in 46 subjects (52.9%), shoulder 38 subjects (43.7%), hands and legs in 16 (18.4%) and 9 (10.3%) respectively. Fifty individuals (33.11%) suffered from pain in multiple sites (Table II). 55.6% of the study subjects were well aware about the ill effects of improper posture while treating dental patients and its long-lasting consequences. It was noted that among the various dental specialties, the Endodontists suffered the maximum (88.02%) musculoskeletal pain (Figure 1). 32.5% of the participants took self-medication to alleviate their pain originating from MSD (Figure 2).

**Table I.** Distribution of participants according to age, gender, designation, type of dentistry, awareness about MSD, physician consultations and altered duty due to MSD, number of sick leave and daily usage of computers.

Variable	Results	Number (%)
Age	<25 years	58 (38.4)
	26-50 years	92 (61.0)
	>50 years	01 (0.6)
Sex	Male	50 (33.1)
	Female	101 (66.9)
Designation	Staff	37 (24.5)
	PG	67 (44.4)
	Intern	47 (31.1)
Type of dentistry	Standing	8 (5.3)
	Sitting	44 (29.1)
	Combination	99 (65.6)
Awareness about MSD	Very much aware	84 (55.6)
	Fairly aware	66 (43.7)
	Not at all	1 (0.7)
MSD in the last 12 months	Yes	88 (58.3)
	No	63 (41.7)
Physician consultations for MSD	No	130 (86.1)
	Yes	21 (13.9)
Altered duty due to MSD	No	126 (83.4)
	Yes	25 (16.6)
Off duty due to MSD	No	141 (93.4)
	Yes	10 (6.6)
Computers	0 hours	1 (0.7)
	1 hour	28 (18.5)
	2-4 hours	69 (45.7)
	>4hours	53 (35.1)
Physical activities	Yes	96 (64)
	No	54 (36)

**Table II.** Site of musculoskeletal pain in study subjects in the last 12 months.

Site of musculoskeletal pain	Number (%)
Neck	58 (66.7)
Shoulder	38 (43.7)
Lower back	46 (52.9)
Hand/wrist	16 (18.4)
Legs	9 (10.3)

**Figure 1.** Prevalence of musculoskeletal disorders among various dental specialists.**Figure 2.** Measures taken by the study subjects for musculoskeletal pain.

The sociodemographic variables of the study participants in relation to the presence of musculoskeletal disorders is depicted in table III. The chi-square test showed a significant correlation between MSD and the female gender ( $p=0.004$ ). The Mann-Whitney U test showed no significant correlation between MSD and variables such as age and number of years of experience in dentistry.

**Table III.** Sociodemographic variables of the study participants in relation to the presence of musculoskeletal disorder.

Sociodemographic variables	Presence of MSD	P value
Age (mean years)	26.8	0.239
Sex (%)		
Male	21(23.9)	0.004**
Female	67(76.1)	
Designation (%)		
Staff	17 (19.3)	0.097
Post graduate student	45 (51.1)	
Intern	26 (29.5)	
Experience (mean years)	6.37	0.997
Type of dentistry (%)		
Sitting	28 (31.8)	0.644
Standing	5 (5.7)	
Combination	55 (62.5)	
Number of patients/day	5	0.037**
No. of sick leaves (days)	1.72	0.001**
Usage of computers/laptops (%)		
1 hour	17 (19.3)	0.689
2-4 hours	40 (45.5)	
>4hours	31 (35.2)	

\*\* Statistically significant

## Discussion

This cross-sectional observational study aimed to assess the prevalence of occupation-related musculoskeletal disorders among dental professionals practicing various specialties of dentistry.

In the present study, a majority of the dental specialists (65.6%) followed a combination of sitting and standing dentistry while treating their patients. However, this parameter showed no significant correlation for the occurrence of musculoskeletal pain. A recent institution-based questionnaire study [5] among 200 dental specialists showed that 72% dentists practiced in sitting position, 9% in standing position and 19% in both positions whereas observations by Dabholkar et al. revealed that only 5% of the dentists used a combination of standing and sitting postures [6]. A study in Poland showed that most of the dentists followed sitting dentistry (66.8%) [7]. However, Valachi and Valachi suggested that the notable shift in the style of practice from standing to sitting dentistry did not reduce the rate of MSDs, but the site of pain changed from the back to the neck, shoulders, and arms. This pain could be attributed to the static postures along with repetitive and forceful movements involved while treating patients [8].

In the present study, a positive correlation was noted between the number of patients treated per day and the occurrence of MSD, where the dental professionals who treated more than five patients per day were at a higher risk of developing musculoskeletal pain.

Nowadays computers and laptops form an integral role in everyone's daily life. Incorrect postures and

prolonged working hours with computers and laptops could cause as well as aggravate musculoskeletal pain [9]. In the present study, 45.7% (n=69) of the individuals used computers for about 2-4 hours a day after their working hours; however, this did not significantly contribute to the development of MSD.

The neck was the most common site affected by MSD in our study (66.7%). A recent study in South Karnataka educational institution showed that dental professionals suffered most commonly from shoulder pain (52%) [5].

It was noted that 64% (n=97) of the subjects performed some form of regular exercise for more than 30 minutes at least 4 to 5 days a week. Kierklo et al. found that 10% of the dentists exercised regularly to obtain relief from muscular pain, 68% performed exercises occasionally, and 23% of the respondents did not perform any physical exercises at all [7]. Yi J observed that dentists who performed physical exercises and those who took a break between patients suffered from lesser musculoskeletal pain [10]. Kumar et al. reported that only 10.07% of the subjects were involved in regular physical activity such as yoga, exercises, and aerobics or walking [11].

The prevalence of musculoskeletal disorders noted in the present study was 58.3% (88 out of 151 subjects) which is much less when compared to those experienced by dental professionals in China, Saudi Arabia [10,12] and even other parts of India [1,6,11]. On the contrary, the prevalence of MSD in our study was higher than that of dental professionals in Peshawar which was reported to be 47% [13]. A recent study conducted in Bhopal, India, reported a high prevalence of MSD in 92% of the study participants who reported pain and discomfort in at least one part of their body [14].

In the present study, only 13.9% of subjects sought medical assistance for managing musculoskeletal pain. On the other hand, Muralidharan et al. noted that 47% of subjects with low back and shoulder pain had doctor consultations to manage their muscular pain [1]. Kumar et al. observed that 35.07% of the dental professionals took medications for symptomatic relief, and 15.85% of them visited a general practitioner/orthopedic surgeon/physical therapist at some point in time for the musculoskeletal pain [11]. A recent study showed that about 63 % of dentists took measures to reduce the pain (17% used drug treatment, 34% exercise, and 12% used physiotherapy) [5].

The mean number of sick leaves due to MSDs availed by the subjects of the present study accounted for about 1.07 days/ year, and this relationship was found to be statistically significant. In contrast, another study suggested that dental professionals availed 1-7 sick leaves per year due to musculoskeletal pain [1].

It was noted in the present study that among the various dental specialties, the Endodontists suffered the maximum (88.02%) musculoskeletal pain followed by the Oral surgeons. Kierklo et al. made a similar observation

in China, where Endodontists were most commonly affected by musculoskeletal disorders (92.6%) followed by the Periodontists (90.76%) [7]. On the contrary, a study conducted in Andhra Pradesh showed that all Orthodontists (100%) and oral physicians suffered from musculoskeletal pain in the neck [1].

We did not find any significant association between MSDs and variables such as age, years of experience in dentistry, the designation of the subject (Intern, postgraduate student, staff), the type of dentistry practiced, and the number of hours of computer usage even though a female predilection was noticed. Shaikhji N et al. found a positive correlation between musculoskeletal pain and variables such as the number of workdays per week, the average number of patients treated per day. They found that the intensity of pain was associated with the average number of workdays per week [15]. Kierklo et al. found a significant association of MSDs with the sex (female affected more than male), years of practice, type of practice (standing dentistry) and working without breaks whereas there was no significant relationship between the development of MSDs and the knowledge of professional preventive exercises that reduce physical disorders [7]. Dabholkar et al. observed an inverse relationship between MSD and the age of dental professionals but not with the gender of the practitioner [6].

Hence, it is suggested that musculoskeletal disorders and pain can be reduced through proper operator-patient positioning, taking adequate breaks between patients, maintaining a good physical health through exercises. Care should be taken to avoid postures such as leaning head forward, rounding the shoulders and bent back position. Recommendations include [16]:

- Operator - patient positioning: Operator positioned with feet flat on the floor and thighs parallel to the floor. Dental assistants seated at 10–15 cm (4–6 inches) higher than the operator with footrest on the stool;
- Patient in a fully reclined position, with the mouth at the elbow level of operator for maxillary arch tasks, and a 20-degree angulation while working on the mandibular teeth.
- Using an adjustable ergonomic stool with rotational facility and lumbar support.
- Further, a recent study recommended a new ergonomic position (2o clock position) for the extraction of mandibular right posterior teeth (second and third molars) [17].

A healthy lifestyle including aerobic exercises or any form of physical activities maybe performed three to four times a week for at least 20 minutes to improve the flow of nutrients and oxygen to the muscles [16].

### Conclusion

The occurrence of musculoskeletal disorders among the dental professionals is on the rise and it has been

evidenced that Endodontists suffer from the maximum musculoskeletal pain. We found a significant relationship between MSD and female gender and number of patients treated per day. Involvement in regular physical activities such as sports, exercises every day has shown to reduce the risk of developing MSD. Hence, the importance of maintaining a proper posture while treating patients and the need to engage in regular physical exercises should be advocated.

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