

Prevalence Of Work-Related Musculoskeletal Disorders Among Dental Practitioners In Kanpur, India

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Abstracts: Background: Literature reviews world over have shown a high prevalence of Musculoskeletal disorders (MSD) among dental practitioners. Objective of the present study was to determine the prevalence and distribution of Musculoskeletal Disorders (MSD) among dental practitioners in Kanpur, India. Methodology: A questionnaire based cross sectional descriptive study was conducted among 100 dental practitioners at their respective clinics. Process for responding to items in the questionnaire was explained and the completed questionnaire was collected according to the convenience of practitioners over a maximum period of one week. Chi square test was used for statistical analysis. Level of significance was set at $p \leq 0.05$. Results: Majority of the surveyed dental practitioners (86%) were found to be suffering from MSD. The effects of MSD mainly observed were pain (45.3%) and stiffness (40.7%). Most common areas affected by MSD in order of magnitude were neck and upper back (52.3%), lower back (30.2%), hands and fingers (11.6%) and forearm (5.8%). One-third of the dental practitioners were under treatment for the same. Conclusion: High prevalence of MSD exists among our dental practitioners affecting their daily practice. A proper formal educational training in ergonomics is necessary to minimize the work-related musculoskeletal conditions. [Thakur P NJIRM 2015; 6(3):67-73]

Key Words: Dental practitioners, musculoskeletal disorders, prevalence.

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Introduction: A continuous social interaction between health care providers and their patients, healthy dental practitioners are particularly important for a successful dental practice and the well-being of patients. The above interaction of a dentist is influenced by the unique work setting and by personal characteristics.

India has a population of 1.21 billion people¹ and 1,20,897 registered practicing dentists² providing oral health care for the people. The dentist population ratio of India is 1:12,437.46 when compared to the WHO recommendation of 1:7500². In contrast to this background of large population, rising oral health care needs, and inadequate dental manpower, the health and efficiency of the dental care practitioner play a key role in providing the optimal oral health care. Dental professionals are commonly exposed to a variety of occupational hazards such as chemical, biological and legal as well as ergonomic, which cause musculoskeletal disorders (MSD)³. The term 'Musculoskeletal Disorders (MSD)' refers to a condition that involves the nerves, tendons, muscles and supporting structures of the body⁴. When a specific job plays the main causative

factor, the term becomes work-related musculoskeletal disorders (WMSDs).

Dental personnel have an increased risk of developing such disorders. The common sites of musculoskeletal complaints among the dental personnel were neck, shoulder and lower back region with diverse prevalence reported in different studies⁵. High risk of neck and back problems are due to the limited work area and impaired vision associated with the oral cavity. These working restrictions frequently cause a clinician to assume stressful body positions to achieve good access and visibility inside the oral cavity. Furthermore, dental procedures are usually long and require much more concentration during work⁶.

The dental operators sit or stand for prolonged periods and maintain the head, neck and shoulders in fixed positions for long intervals. In dentistry, improper working habits, inconvenient posture as well as repetitive tasks, such as: root canal instrumentation, cavities preparation and filling, scaling or root planning, contribute greatly to both, musculoskeletal disorders (MSDs) and psychological stress, and finally cause fatigue. This

condition can result in the decrease of productivity and quality of work. Moreover, the monotony of work, work in noise and artificial light are disadvantageous for dental personnel^{6,7}.

Basic operating posture is considered an important occupational health issue for dental surgeons. It is generally agreed that the physical posture of the operator should be such that all the muscles are in a relaxed, well-balanced, and neutral position. Postures outside of this neutral position are likely to cause musculoskeletal discomfort. A thorough understanding of the underlying physiological mechanism leading to these problems is necessary to develop and implement a comprehensive approach to minimize the risk of work-related injury⁸.

Literature reviews across the world have shown a high prevalence of MSD among dentists and estimates have shown that MSD contributes to about 40% of all costs towards the treatment of work related injuries⁹⁻¹². It is considered as one of the major occupational health problems in India¹³ and there is scarcity of data regarding the prevalence of MSDs among Indian dentists¹⁴. Hence, this study was undertaken with the objective to determine the prevalence and distribution of Musculoskeletal Disorders (MSD) among dental practitioners in Kanpur, Uttar Pradesh, India.

Material and Methods:

Study design and Sample selection: A cross-sectional descriptive study was conducted in Kanpur, Uttar Pradesh, India to assess the prevalence of MSD among dental practitioners in the city. A list of the dental practitioners (N=273) with contact numbers was obtained from the Indian Dental Association, Kanpur Branch. Dentists with work experience of less than 1 year, previous history of trauma that impaired musculoskeletal system and any previous history of neuromuscular disorders were excluded from the study. Prior appointment was taken through telephone and a self-administered questionnaire was handed over to 130 dental practitioners who fulfilled the eligibility criteria, at their respective clinics. The method for answering the questionnaire was explained and the completed questionnaire was collected according to the convenience of the

practitioners over a maximum period of one week. Out of this 100 returned the filled questionnaire form and the response rate was 76.9%. Those who did not respond were contacted again after a period of 15 days but the response was same.

Ethical approval and informed consent: The study protocol was reviewed and approved by the Institutional Review Board of Rama Dental College Hospital and Research Center, Kanpur. The purpose of the study was explained to the participants and informed consent was obtained.

Pre-testing of questionnaire: Questionnaire was screened by a panel of eight academicians and further administered to a convenience sample of 15 dentists twice on successive days who were interviewed to gain feedback on the overall acceptability of the questionnaire in terms of length, language clarity, time, and feasibility of dentists completing and returning it. Based on the opinions expressed a mean Content Validity Ratio (CVR) of 0.83 among academicians and Cronbach's coefficient of 0.69 in dentists was found. Face validity was also assessed and it was observed that 90% of the participants found the questionnaire to be easy.

Methodology: The structured questionnaire written in English validated through a pilot survey included 25 close ended questions. The questionnaire was divided into 3 sections. The first section included demographic questions regarding gender, age, work duration and acquired specialization. Section two dealt with the work conditions (working posture, work with or without an assistant) and the organization of dentist's work (number of breaks and their purpose). The third section concerned Musculoskeletal Disorders (MSDs) and also prophylactic physical activities (type, effectiveness). Responding involved choosing the most appropriate response from each alternative though some questions allowed for multiple responses. Confidentiality and anonymity of the respondents were assured.

Statistical analysis: The recorded data was analyzed using the Statistical Package for Social Sciences (SPSS) version 17.0 software. Chi square test was used for statistical analysis. Level of significance was set at $p \leq 0.05$.

Results: The study population consist of predominantly males (94%) compared with females (6%) with age ranging from 27-61 years with mean age 39.85 ± 8.243 years. Most of the dentists (64%) in the study have work experience of more than 10 years. The mean of the work experience is 8.88 ± 5.203 years. General dental practitioners with the basic degree of Bachelor of Dental Surgery (BDS) accounted to 93% and remaining (7%) were specialists having Master of Dental Surgery (MDS) qualifications. Majority of the subjects were right handed (89%). Half (52%) of the dental practitioners were working for 5-10 hours per day. Most of the practitioners (83%) were attending to ≤ 10 patients per day (Table 1).

Table 1: Distribution of the study population according to sociodemographic variables.

Sociodemographic variables	Percentage (%)
Sex	
Males	94
Females	06
Age (in years)	
25-35	36
36-45	40
46-55	21
56-65	03
Qualification	
General practitioners	93
Specialists	07
Duration of practice (in years)	
≤ 10	36
≥ 10	64
Hand dominance	
Right handed	89
Left handed	11
Number of patients seen per day	
≤ 10	83
≥ 10	17
Working hours	
≤ 5	36
5-10	52
≥ 10	12

Comfortable stool was used by all the surveyed dental practitioners (100%). Only 30% of the dentists practice four-handed dentistry regularly while 41% practice it sometimes. Majority of them (91%) found their instruments in reach while working. Most of the dental practitioners (63%) kept their arms above shoulder height while

working. One-third (34%) of them used forceful movements while working, only when required. The frequency of using vibrating instruments was less than half of the working time in 51% of the dental practitioners (Table 2).

Table 2: Distribution of the study population according to work related physical load.

Items	Percentage (%)
Do you use a comfortable stool?	
Yes	100
No	00
Do you adjust the height of the dental stool?	
Yes	67
Sometimes	33
Do you practice four handed dentistry?	
Yes	30
No	29
Sometimes	41
Do you find instruments in reach while working?	
Yes	91
Sometimes	09
Do you think that your arms remain above shoulder height while working?	
Yes	63
No	14
Sometimes	23
Do you use forceful movements to perform clinical work?	
Yes	33
No	33
Only when required	34
What is the frequency of using vibrating instruments?	
< Half	51
Half	42
> Half	07

Majority of the surveyed dental practitioners (86%) were found to be suffering from MSD. The effects of MSD mainly observed were pain (45.3%) and stiffness (40.7%). The areas of body affected in most of the dentists were neck and upper back (52.3%) and lower back (30.2%). One-third (31%) of the dental practitioners were under treatment for the same. Forty-four percent of the dental practitioners said it affected their work output. A majority of the dental practitioners (62%) had not attended any workshop on MSD and the same percentage of the subjects (62%) didn't take any remedies for preventing MSD. Only 32% of the dental practitioners performed stretching exercises

during the clinical procedures in between the patients while a significant number (40%) didn't perform it at all. A less percentage of the surveyed dentists (38%) took micro-break in between the patients' treatment procedures (Table 3).

Table 3: Prevalence of Musculoskeletal Disorders in the study population.

Variables	Percentage (%)
Prevalence	
Yes	86
No	14
Are you suffering from any of the musculoskeletal disorders listed below?	
Pain	45.3
Stiffness	40.7
Fatigue	3.5
Discomfort	10.5
Which is the commonly affected area?	
Neck and upper back	52.3
Lower back	30.2
Hand and fingers	11.6
Forearm	5.8
Are you under any treatment for the same?	
Yes	31
No	69
Do you think that it affects the output of patients treated?	
Yes	44
No	56
Have you ever attended a workshop on preventing musculoskeletal disorder problems?	
Yes	38
No	62
Do you have any idea on preventive remedies/treatment options available for musculoskeletal disorder problems?	
Yes	38
No	62
During clinical practice do you perform stretching exercises?	
Yes	32
No	40
Sometimes	28
Do you take micro break in between the patients' treatment?	
Yes	38
No	34
Sometimes	28

A statistically significant association was observed between prevalence of MSD and other socio demographic variables such as gender ($p=0.034$), age ($p=0.001$), working hours per day ($p=0.034$), duration of practice/experience ($p=0.001$) and practice of four handed dentistry ($p=0.013$). A statistically significant association was also observed between age and discomfort in neck ($p=0.013$), discomfort in lower back and variables like age ($p=0.001$), patients treated per day ($p=0.001$), duration of practice/experience ($p=0.001$) and practice of four handed dentistry ($p=0.038$) (Table 4).

Table 4: Association between socio demographic and other variables.

Variables	Prevalence of MSD	Effect in output	Area of discomfort			
			Neck	Lower back	Hand	Fore-arm
Gender	0.034*	0.033*	0.688	1.000	1.000	1.000
Age	0.001*	0.011*	0.013*	0.001*	0.748	0.079
Type of job	0.253	0.017*	0.698	0.673	1.000	1.000
Working hours per day	0.034*	0.001*	0.343	0.066	0.094	0.001*
Patients treated per day	0.119	0.795	0.188	0.001*	0.204	0.586
Duration of practice/ Experience	0.001*	0.004*	0.005*	0.001*	0.560	0.045*
Practice of four handed dentistry	0.013*	0.074	0.138	0.038*	0.001*	0.110

$P < 0.05$ is considered statistically significant.

Discussion: Musculoskeletal disorders are a diverse group of disorders with regard to pathophysiology. According to World Health Organization (WHO), the burden of MSD can be assessed in terms of problems associated with them, that is the pain and impaired functioning (disability) related to the musculoskeletal system or in relation to the cause such as joint disease or trauma^{15,16}. The instrument used in this study is a self-administered questionnaire with closed-ended questions.

The present study has revealed a high prevalence (94%) of MSD among dental practitioners in the city. This prevalence is much higher than that reported by practitioners in Saudi Arabia (59.2%)¹⁷, Lithuania (86.5%)¹⁵ and Australia (87.2%)¹⁸ and

relatively similar to that reported from Turkey (94%)¹⁹. Compared to other health care professionals, the prevalence of MSD in the past 12 months among our sample was higher than reports among medical physicians (41.7%) in Iran²⁰ and that of physiotherapists in Nigeria (91.3%)²¹. The prevalence of MSD among dental practitioners in the present study was much higher than the general Indian population (25.9%, N=2086) as evident from a recent community based cross sectional study by Bihari et al., in the national capital region of India²².

High prevalence of MSD among dentists has been shown in the published literature^{15,23,24}. This has been attributed to prolonged static postures, repetitive movements, use of force and vibrations, which are considered to be risk factors for MSD^{15,25}. In severe cases MSD results in frequent absences from work and finally to early retirement⁸. Dentists are predisposed to pain or injury in different regions of the body depending on the type of work and the position adopted²⁶. In the present study the commonly affected areas were neck and upper back (52.3%) followed by lower back (30.2%). This pattern of distribution was similar to studies from Queensland¹⁸ and New Zealand²³. These results indicate that most of the dental practitioners adopt positions which frequently result in MSD of the neck and back regions. Literature has shown that predisposing factors for MSD are multifactorial and may be attributed to posture, repetitious movements, physical loads, psychological stress, and other ergonomic factors²⁵⁻²⁷.

Studies assessing the prevalence of MSD among dental practitioners in Lithuania²⁸ and New Zealand²³ have shown higher prevalence of MSD among female practitioners. This was attributed to the fact that women were more concerned about their health compared to men and tended to report health problems more often. Prevalence of MSD among the general population of India showed females to have higher prevalence compared to the males²². In contrast the current study revealed no difference in prevalence of MSD between male and female practitioners. This could be due to the small sample size and also an imbalance in the ratio of male to female practitioners.

Studies among dental practitioners in Lithuania and Poland^{3,16} have shown MSD to increase with age. The results of the present study similarly showed that all practitioners in the oldest age group had MSD however this prevalence was not significantly different from practitioners below 45 years of age. In contrast other studies among dental practitioners of Saudi Arabia and New South Wales showed MSD decreases with age and duration of practice^{17,29}. Their findings were attributed to older practitioners taking up less number of patients as a result of age or with the years of practice having developed coping measures (adjusting position, better ergonomically oriented dental chairs, exercise, medication and rest) for MSD.

Literature has shown that predisposing factors for MSD are multifactorial^{11,26,27} and may be attributed to posture, repetitious movements, physical loads, psychological stress, and other ergonomic factors. Due to the cross sectional design of the study the causal variables could not be identified which can be considered as a limitation of the present study. The subjectivity of the responses may also be considered as a limitation. Practitioners with recent episodes of MSD will remember the events much better and hence can affect the response to the questionnaire. The major limitation of this study however is the sample size which limits the generalizability of the findings. Larger sample size would further improve the power of study.

The overall high prevalence of MSD might be due to lack of an ergonomically oriented work practice among the Indian dental practitioners; however additional studies need to be conducted in order to make logical conclusions.

Conclusion: A high prevalence of MSD exists among the dental practitioners which affect the daily practice of more than one third of them. Further studies are needed to identify the special risk factors for MSD so as to introduce effective remedial measures.

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