

PREVALENCE OF MUSCULOSKELETAL DISORDERS AND ITS ASSOCIATION WITH BODY MASS INDEX, AMONG DENTISTS IN KANPUR CITY (UTTAR PRADESH)

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ABSTRACT:

Objective: To identify the prevalence for different anatomic locations of work-related musculoskeletal complaints among dentists in Kanpur city (Uttar Pradesh), its association with body mass index, and the prophylactic measures taken by dentists for the same.

Materials and methods: A cross-sectional study was conducted using a self-administered questionnaire covering demographic details and questions regarding the location and nature of musculoskeletal disorder focused on whether the participant had experienced any trouble in the region in the previous 12-month period and if he undertook any precautionary measures for the same. Self-reported body weight in kilograms and body height in centimeters were used to determine Body mass index(BMI).

Chi square test was used to carry out the association.

Results: A total of 73 dentists completed the questionnaire, yielding a response rate of approximately 88.7% out of which 80% of dentists reported having at least one musculoskeletal disorder symptom in the past 12 months. Chi-square test values showed negligible association between Body Mass Index and overall Musculoskeletal disorder, although there was a weak association seen between Body Mass Index and neck ($\chi^2 = 0.434$), lower back ($\chi^2 = 0.1750$) and hands/wrist ($\chi^2 = 0.413$) related musculoskeletal symptoms.

Conclusion: musculoskeletal disorders are emerging as a major ergonomical problem in dentistry. This study gives an insight about the problems, awareness and precautions taken by dentists.

Keywords: musculoskeletal disorders, dental ergonomics, body mass index, prevalence



INTRODUCTION:

Modern dentistry, the least hazardous of all occupations, faces a few occupational health problems. These include percutaneous exposure incidents (PEI); exposure to infectious diseases (including bioaerosols), radiation, dental materials, and noise; musculoskeletal disorders; dermatitis and respiratory disorders; eye injuries; and psychological problems.^[1] Musculoskeletal disorders (MSD) are defined as musculoskeletal

complaints, musculoskeletal symptoms or musculoskeletal pain that reflects a number of conditions, such as neck pain, back pain, shoulder pain, pain of limbs, carpal tunnel syndrome, myofascial dysfunction syndrome, atypical facial pain, etc.^[2] On one end of the spectrum, MSD can be mild and infrequent; at the other end, MSDs can be severe, chronic and debilitating.^[3] The musculoskeletal health of dental professionals has been

the subject of numerous studies worldwide, because of narrow work area and impaired vision associated with the oral cavity and inflexible work posture.^[4]

Research suggests that MSDs are a major contributor to sick leave, reduced productivity and early retirement in dentistry.^[1,5] It is considered that these biomechanical risk factors combined with psychosocial stress contribute to the development and progression of MSD.^[6,7] Despite this knowledge, MSD prevalence rates continue to be high amongst dental professionals, especially among dentists and dental hygienists.

Dentists and dental professionals' prevalence for self-reported musculoskeletal symptoms have been reported earlier by many authors.^[8-39] and a recent review found dental professionals to have a one-year period prevalence of musculoskeletal symptoms ranging from 24% to 100%.^[39]

National differences were found to exist in work-related attitudes which in turn influence work performance and work related musculoskeletal disorder (WRMSD) prevalence. To the best of our knowledge, a prevalence study in this relation has not been conducted in the state of Uttar Pradesh. For this purpose, a pilot study was conducted in Kanpur city with the following objectives in mind.

- Identify the prevalence for different anatomic locations of work-related musculoskeletal complaints among

dentists in Kanpur city (Uttar Pradesh)

- Examine the association between body mass index and musculoskeletal complaints among dentists with symptoms
- Identify prophylactic measures by dentists with work-related musculoskeletal complaints

MATERIALS AND METHODS:

Study design

Cross-sectional study using a self-administered questionnaire survey.

Questionnaire description

Each of the participants completed an anonymous, modified version of the Standardized Nordic Questionnaire. The questionnaire consisted of twelve questions covering demographic items such as gender, age, weight, height and work experience. Questions regarding the location and nature of musculoskeletal disorder focused on whether the participant had experienced any trouble in the region in the previous 12-month period and if he undertook any precautionary measures for the same.

Dentists who wished to participate were given time to complete and return their questionnaires. Informed consent was implied by the voluntary completion and return of the questionnaire.

Data Analysis

Self-reported body weight in kilograms (kg) and body height in centimeters (cm) were used to determine BMI. BMI was computed as weight (kg)/height (m)². Subsequently, BMI was classified into three categories (normal weight (BMI 18.5-24.9 kg/m²), overweight (BMI 25.0-29.9 kg/m²), and obese (BMI ≥ 30 kg/m²), which is in accordance with the international classification system of the WHO. Chi square test was used to carry out the association.

RESULTS:

Demographic Details:

- A total of 73 dentists (40 males and 33 females) completed the questionnaire, yielding a response rate of approximately 88.7%. The age group under the study ranged from 24-60 years.
- Mean age was 34.2 years (SD = 6.09 years).
- Most dentists (80%) reported having at least one MSD symptom in the past 12 months (table 1).
- The types of symptoms present were pain (60.3%), fatigue (49.2%), discomfort (44.4%), clicks/sounds (11.1%) and other neurogenic symptoms (6.3%).
- Neck pain had the highest prevalence rate, with 57.8% of respondents reporting trouble in this region during the past year.

The 12-month prevalence for lower back pain (LBP) was also high. Pain in this region was reported by 43.8% of the respondents. Right wrist/hand had the third highest prevalence of all the body regions investigated, with 20.3% of participants indicating they had experienced pain in this region in the past year.

According to the study results, the number of dentists reporting pain increased with age and the number of years of profession. Among the participants, 19.13% of respondents just beginning their professional careers (<5 years of experience), 91% with 5-10 years of experience, 70.87% with 10-20 years of experience and 86.52% of those with more than 20 years of experience suffered from MSD.

Characteristics and prevalence of symptoms

Table 1 presents the characteristics of the cross-sectional sample. After excluding 4 dentists with missing data on BMI, in total 73 dentists were included in the analysis. Of the dentists with normal weight, 75% reported musculoskeletal symptoms within the past 12 months. Musculoskeletal symptoms were reported by 78.5% and 87.5% of the overweight and obese dentists, respectively.

Statistical correlations

Table 2 shows association between BMI (normal, overweight and obese) and musculoskeletal disorder. Statistical test

shows no association between body mass index and musculoskeletal disorder. Chi-square test values showed negligible association between BMI and overall MSD, although there was a weak association seen between BMI and neck ($\chi^2 = 0.434$), lower back ($\chi^2 = 0.1750$) and hands/wrist ($\chi^2 = 0.413$) related musculoskeletal symptoms.

DISCUSSION:

Health care work is recognized as a high-risk job for MSD; however most of the studies have been carried out in specific groups of healthcare professionals such as dentists and dental hygienists, nurses, radiologists, ophthalmologists, and physiotherapists. The dental profession however has one of the highest prevalence for MSD.

So far, various risk factors for the development of MSD among dentists have been studied.^[40,41] which include biological, psychological and social risk factors.

Biological/physical risk factors include poor work postures commonly adopted by clinicians like trunk lateral bending and rotation, static awkward postures involving isometric contractions of trapezius, and forceful hand movements.^[42]

Prevalence of musculoskeletal pain was positively associated with work hours. Indeed, prolonged static contractions leads to accumulation of lactic acid, reduction of oxygen levels, fatigue, and pain. Also, lack of regular physical

exercise has been found to be highly associated with lower back pain.^[43]

A higher risk of occupational injury and symptoms has been reported in women^[44] compared to their male counterparts which may be associated with the lower muscle volume and strength of women and female hormones. While Tezel et al.^[44] found no significant differences in MSK symptoms because of gender.

In our study no significant relationship was found between weight, BMI, and prevalence of pain, and this is consistent with the findings of Lindfors et al.^[45] and Chamani et al.^[46] but inconsistent with the findings of Motamayel et al.^[47]

Psychological-cognitive affective (mental): Warren.^[48] found strong association between psychosocial stress and musculoskeletal disorder causation among dental practitioners and dental hygienist students. Ylipaa et al.^[49] found work-family overload and work relations were associated with more MSK disorders among dental hygienists.

Among social-environmental or ergonomic risk factors, Samotoi et al.^[50] reported that less number of dental therapists working with dental assistants had shoulder symptoms. Anton et al.^[51] found that number of patients treated per day was a significant risk factor for greater prevalence of CTS symptoms among dental hygienists.

There is much inconsistency regarding the effect of the years of work on the

incidence and prevalence of musculoskeletal disorders. Some studies have reported that such disorders increase with the years of work.^[52], while others have reported higher prevalence in the unskilled.^[53]

The present study shows that the more years of age and practice and more patient per day may lead to more MSD (77.4% [<5 years experience], 85% [6-10 years experience], 71.4% [more than 10 years experience]). Possible explanation is that the experienced dentists are better at adjusting their work postures and techniques to avoid musculoskeletal problems or they probably develop coping strategies to help deal with the pain.^[1]

The musculoskeletal disorder is more prevalent among female dentists than male with 81.4% of female affected compared to 77.7% male. Female dentists face unique musculoskeletal demands and inherent gender differences that may place them at higher risk for occupational pain and injury than their male counterparts. By familiarizing themselves with unique muscle imbalances, specific pain syndromes, and positioning challenges to which they are predisposed, female dentists may take pre-emptive action and initiate ergonomic intervention in the operatory and specific exercise at home to reduce the risk of developing musculoskeletal disorders.

Al Wazzan et al,^[54] in their study, reported that only 37% of those suffering

back and neck pain sought medical treatment and concluded that these symptoms among dental personnel are not severe enough to ask for medications.

BMI and musculoskeletal disorder in our profession, was found to have negligible relation, as per our study. But excessive BMI, in other ways can lead to fatigue and postural disharmony which can lead to musculoskeletal disorders.

Although the present study does not clearly focus on the difference of symptoms and inclination toward the benefits of exercise between males and females, further investigation is needed in this regard.

Limitations: In the analysis the association was controlled for several potential confounding factors, however some potential psychosocial confounders, for instance stress, anxiety or depression disorders, were not measured, and consequently could not be controlled for. The use of self-reported measures could be considered a limitation as they are susceptible to possible bias.

Misclassification in categories of BMI, because of underreporting of body weight, could hypothetically lead to underestimation of the association with MSD. Furthermore, BMI as a measure does not discriminate adipose from non-adipose body mass, nor does it indicate the distribution of body fat. Stronger associations with abdominal obesity than

general obesity and LBP were found in population-based studies.^[55]

Additional measurements of fat distribution would provide insight in possible factors of the mechanism of the effect (posture, loading etc.).

Treatments taken for relief of musculoskeletal pain

Two studies evaluated the reports of treatments taken by DP with MSK pain. Dajpratham et al.^[56] found Thai traditional massage (51.9%), medication (28.5%), physical therapy (15.8%), acupuncture (7.6%), and alternative medicine (4.4%) was taken for pain relief by their subjects. Augustson and Morken^[57] found incorporating ergonomic equipment into dental practice alleviated shoulder discomfort. Al Wazzan et al,^[54] in their study, reported that only 37% of those suffering back and neck pain sought medical treatment and concluded that these symptoms among dental personnel are not severe enough to ask for medications. In the present study, 11.1% of the dental personnel visited a medical practitioner, while 23.6% reported having taken medication for symptom relief.

Previous research review by the NSW survey has suggested that modification of work practices in dentistry including taking rest breaks does not affect the prevalence of symptoms associated with MSD.^[58]

CONCLUSION:

It is understood that work duration and working postures are root cause of back and neck pain among the dentists. This study also highlights the fact that the incidence among dentistry is higher than general population. We opine that the practice of dentistry is not per se an ignition for development of neck and low back pain, rather accelerates the process and increases the severity of symptoms due to the working posture.

While the occasional backache or neck ache is not a cause for alarm, if regular pain or discomfort is ignored, the cumulative physiological damage can lead to an injury or a career ending disability.

Although, there was no significant connection seen between BMI and musculoskeletal disorder, which means that the BMI parameters have no direct effect on musculoskeletal problems that a dentist faces; but it is of great significance to exercise and follow balanced dietary practices to keep the BMI in check. Following proper body posture protocols while working on dental chair and regular medical checkups can be other ways to stay away from work related musculoskeletal disorders.

Our study gives an insight into the level of awareness among Indian dentists about the importance of regular physical activity. The physical inactivity among dentists seems to put them at risk for the occurrence of musculoskeletal disorders. Musculoskeletal disorders are major

reason leading for loss of work efficiency as well as early ill health retirement among dentists and the prevalence and severity of these disorders decrease by performing regular specific exercises as shown by the present study. There is an increasing trend of dentists being treated by physiotherapists for their

musculoskeletal problems. The physical therapy advice included posture correction, ergonomic advice, and stretching exercises. The role of physical activity among the dentists needs to be investigated further on larger group to evaluate specifically the type of activity that reduces their symptoms in future.

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TABLES:

TABLE 1: Characteristics and prevalence of symptoms

	total	Normal weight	Overweight	Obese
	73	32	28	8
Symptoms overall %	79.4%	75%	78.5%	87.5%
Neck	33/58	12/24	14/28	5/8
shoulders	15/58	7/24	6/28	4/8
upper back	7/58	2/24	4/28	0/8
Lower back	27/58	10/24	12/28	4/8
Wrist/hands	14/58	7/24	6/28	2/8
Lower extremities	11/58	2/24	4/28	3/8

TABLE 2: Association between Body Mass Index (normal, overweight and obese) and musculoskeletal disorder

Musculoskeletal disorder	Normal weight	Overweight	Obese	Total	Chi-square	p-value
Symptoms overall	32	28	8	68	21.1582	<0.001
%	43.84	38.36	10.96	93.15		
Neck	12	14	5	31	0.4342	0.8051
%	50.00	50.00	62.50	53.45		
Shoulders	7	6	4	17	2.5150	0.2844
%	29.17	21.43	50.00	29.31		
Upper back	2	4	0	6	1.5342	0.4640
%	8.33	14.29	0.00	10.34		
Lower back	10	12	4	26	0.1750	0.9161
%	41.67	42.86	50.00	44.83		
Wrist/hands	7	6	2	15	0.4135	0.8140
%	29.17	21.43	25.00	25.86		
Lower extremities	2	4	3	9	4.0242	0.1340
%	8.33	14.29	37.50	15.52		

FIGURES:

