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Original Article

Musculoskeletal disorders among dentists in Nepal

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Abstract

Background: Musculoskeletal disorders (MSD) are one of the most common occupational hazards associated with wide range of occupations. Dental personnel had an increased risk of developing such disorders caused by repetitive, awkward or stressful motions. Taking this issue into consideration we felt the necessity to investigate the prevalence and distribution of musculoskeletal symptoms among dentist in Nepal.

Methods: A self reported questionnaire was distributed to a random sample of 150 dentists from different parts of Nepal. The questionnaire was about musculoskeletal symptoms in different parts of the body.

Results: A total of 103 questionnaires were completed and returned. Of the respondents, 46(44.7%) were males and 57(55.3%) were females. The mean age of respondents was 29.8 with SD 6.03. Majority were general dentist's practitioner (63.1%) with the remainder being specialists (36.3%). Practicing in private (55.3%) sector was more compared to government (44.7%) sector. Ninety nine percent of the dental surgeons were right handed while 1% was found to be both handed. Female dentists were significantly younger (p=0.009) compared to males. Prevalence of MSD during the past 12 months were reported at the neck (52.4 %), lower back (52.4%), shoulder (49.5%),upper back (41.7%), and wrist/ hand (36.9%).MSD during past 1 week were reported at the neck (15.5%),lower back (25.2%), shoulder (28.2%), upper back (21.4%) and wrist/hand (12.6%). MSD which interfered with daily activities during the previous 12 months were reported at the neck (7.8%), lower back (4.9%), shoulder (7.8%), upper back (7.8%) and wrist/hand (4.9%).

Conclusion: The results suggested that the prevalence of musculoskeletal symptoms among dentists in Nepal is high. MSD remains a major occupational health problem for dentists of Nepal with the commonest problem of neck and lower back pain. Therefore, it is of vital importance to promote the occupational health and prevention programs regarding ergonomic postures which must be acquired by the dentists during their clinical practices.

Key words: Musculoskeletal disorders, Occupational hazards in dentists, Work related disorders

Introduction

Musculoskeletal disorders have become increasingly common worldwide during the past decades. Work-related musculoskeletal disorders are of serious concern to many organizations, including industry, insurance, and health care[1]. Musculoskeletal diseases, including pain, weakness and parasesthesia, are reported to be associated with wide range of occupations[2,3]. These problems are caused by repetitive, awkward, or stressful motions[4]. Among the health care professional, dentists are at high risk for developing profession-related disorders such as musculoskeletal disorders(MSD)[5]. In dentists, common MSD are overstrained and awkward back postures for back pain, repetitiveness for neck and shoulder disorders, and psychosocial stressors for back, neck and shoulder complaints[6].

Dentistry, particularly the practice of general dentistry is characterized by high visual demands which result in the adoption of fixed postures[7]. They spend their work days in an awkward, static position performing extremely precise procedures in the patient's mouth. This produces muscular pain and soreness, which are usually harmless and slow to appear, consequently, the symptoms are usually ignored until they become chronic and permanent lesions are present[8]. Dentistry, as a form of work, is not exempt of risks. Generically, the possible risk factors can be classified as: biomechanical, ergonomic and work factors. The physical load among

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dentists seems to put them at risk for the occurrence of musculoskeletal disorders. Muscular imbalance, neuromuscular inhibition, and pain and dysfunction may frequently be observed among dentists. Repeated unnatural, deviated or inadequate working postures, forceful hand movements, inadequate equipment or workplace designs and inappropriate work patterns are likely to be the particular risk factors. However, MSDs are not an avoidable part of the oral health care providers' professional lives[9-11].

Since, dentistry is a demanding profession regarding concentration and precision, there is no room for error, a steady hand and a steady, awkward posture must be assumed and maintained. However, maintaining the steady hand and posture comes at a cost to the back, neck and shoulder area of the dentist. Occasional pains from irregular stances or positions are to be expected while they are performing static work. However, when the pain becomes a regular occurrence, cumulative damage could arise leading to debilitating injuries. The possible pathophysiological mechanism of occupational stress on the neck and shoulders has been reviewed by Hagberg[12]. Several studies have indicated that back, neck and shoulder pain are a major problem among dentists. Six studies, in particular, polled respondents over a period of 1 to 5 years and found that over half of the participating dentists experienced musculoskeletal pain: Shugars, *et al*.(1987) reported 60%; Runderantz, *et al*. (1990) cited 72%; Auguston and Morken, (1996) reported 81%; Finsen, *et al*. (1997) reported 65%; and Chowanadisai, *et al*. (2000) reported 78%.

MSD was shown to interfere with daily activities in some cases, while a considerable proportion of dentists had also sought medical attention for their symptoms[13,14]. The dentists in the Public Dental Service were found to have a high prevalence of pain and discomfort in the locomotor system. The epidemiologic data regarding MSDs have been obtained from many countries and societies[15-19].

Despites these facts, there have not many investigations done so far to find the prevalence of musculoskeletal disorders among dentists in Nepal. Therefore, the first aim of our study was to find out the prevalence of musculoskeletal disorders among dentists from different parts of Nepal. Secondly, to analyze the relationship of gender, work duration, and musculoskeletal complaints.

Materials and methods

A self administered questionnaire was distributed to dental practitioners from different parts of Nepal. The questionnaire was distributed by the researchers between November 2010 and February 2011. The questionnaire used in this study was adopted and modified from previous studies[19]. Prior to the study the questionnaire was pretested for comprehensibility and relevance among six dentists. A consent form was sent to each participant.

The questionnaire involved information including information on the location of symptoms in the past 12 months, past 1 week, and whether it interfered with daily activities in the previous 12 months. The questionnaire also included information whether the dentist had any congenital or any other disorders before she/he became dentists. Additional information was recorded on age, gender, height, right handedness or left handedness, number of years of practice, field of dental practice, number of hours worked per week and the type of institution.

Data were anonymously coded and entered into a spreadsheet programme before being analyzed using the Statistical Package for the Social Sciences (SPSS 17). Appropriate statistical methods such as frequency, descriptive measures, independent t test, chi square test and Mann Whiteney test were performed in proper context. The p value of less than 0.05 is considered as statistically significant.

Results

150 questionnaires were distributed out of which only 103 responded and was analyzed. Among the respondents, the distribution of age groups by gender is given in Table 1. Summary background data on age (years), number of years in clinical practice and working hours per week have been stratified and shown in Table 2.

Table 1: Distribution of age groups by gender for dentists involved in the study

Age	Male	Female
20-29	22	39
	36.1%	63.9%
30-39	20	18
	52.6%	47.4%
40-49	1	0
	100.0%	.0%
>=50	3	0
	100.0%	.0%
Total	46	57
	44.7%	55.3%

Table 2: Background characteristics of respondents

	Gender	N	Mean	Std. Deviation
Age (Years)	Male	46	31.7609	8.13821
	Female	57	28.3333	2.79242
Experience (Years)	Male	46	6.5913	8.21778
	Female	57	4.0772	3.74576
Working Hrs/wk	Male	46	48.7826	9.38536
	Female	57	46.9298	7.86915

Among the 103 dentists interviewed 46(44.7%) were males and 57(55.3%) were females with the mean age 29.8 and SD 6.03. Majority were general dentist's practitioner (63.1%) with the remainder being specialists (36.3%). Dentists practicing in private (55.3%) sector was more compared to government (44.7%) sector. Among the dentists, 99 % of the dental surgeons were right handed while 1% was found to be both handed. Female dentists were significantly younger (p=0.009) compared to males.

Prevalence of MSD

Most of the dentists (87.4%) reported having at least one MSD symptoms in the past 12 months (Fig 1). The prevalence of MSD by body site is given in Fig 2. The most prevalent MSD during the past 12 months were reported at the neck (52.4 %) and lower back (52.4%) followed by shoulder (49.5%),upper back (41.7%) and wrist/ hand (36.9%).Neck pain was reported more by the male dentists compared to the female counterparts (p=0.72).Whereas upper back pain was significantly more likely to be reported by female dentists.(p=0.09) compared to males, and lower back pain was reported significantly more by the males compared to females (p=0.45) similarly shoulder pain was likely to be reported more by males compared to female(p=0.62) and wrist/ hand pain was significantly more likely to be reported by female dentists(p=0.69).

MSD reported by the dentists that interfered with a dentist's daily activities is given in Fig.3. Percentage of dentist that reported with MSD symptoms interfered with daily activities in past 12 months was of neck (7.8%), lower back (4.9%), shoulder (7.8%), upper back (7.8%) and wrist/hand (4.9%). The prevalence of MSD in past 1 week was reported at the neck (15.5%), lower back (25.2%), shoulder (28.2%), upper back (21.4%) and wrist/hand (12.6%).

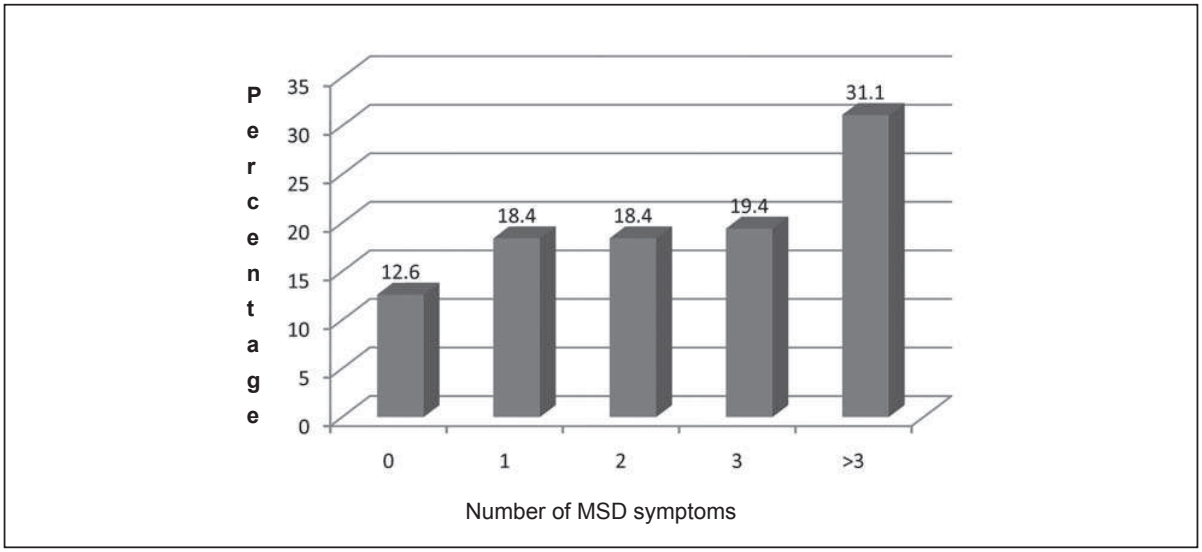

Fig 1: Number of Musculoskeletal symptoms experienced by the dentists in the past12 months.

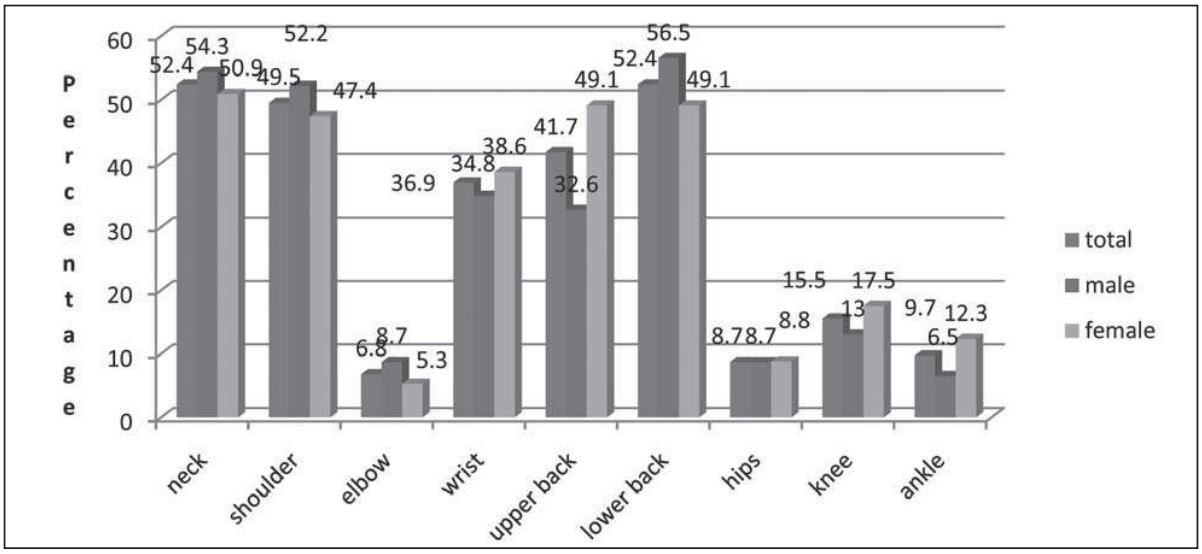

Fig 2: Prevalence of Musculoskeletal symptoms experienced by dentists that interfered with daily activities in the previous 12 months by body site and gender.

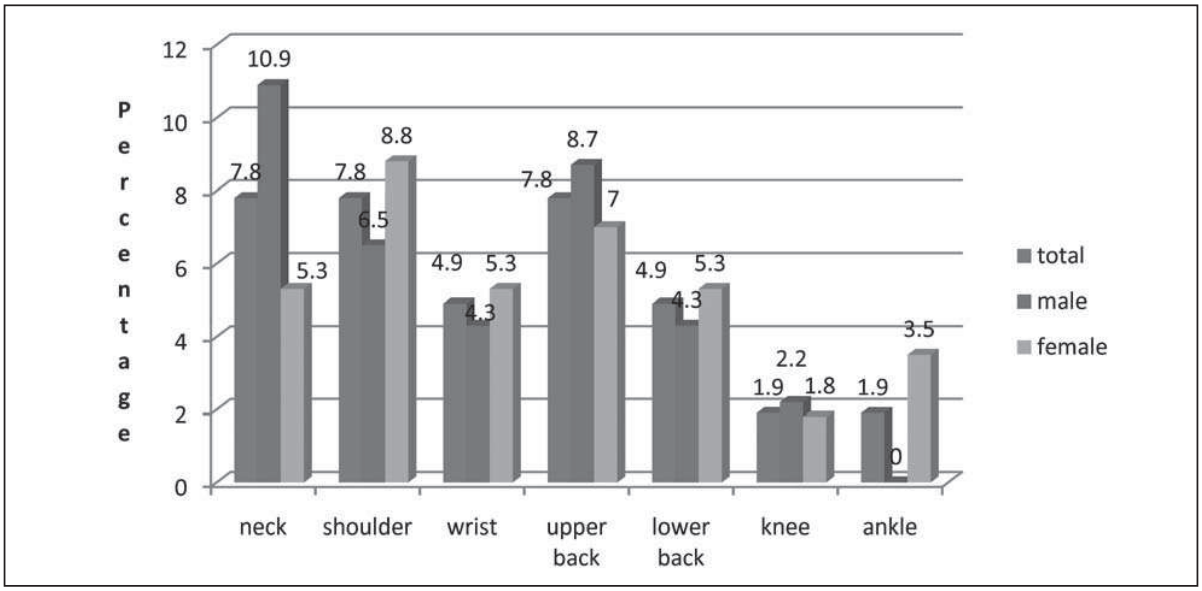

Fig 3: Prevalence of Musculoskeletal symptoms in different parts of the body during the previous 12 months among male and female dentists by body site and gender.

Discussion

This study examined the prevalence and distribution of self-reported MSD among a cross-section of dentists in Nepal. The dentists were asked to note the occurrence of pain and discomfort over the past twelve months and the previous seven days. The questionnaire gives answers only with respect to the occurrence of symptoms and not to the frequency and intensity of pain and discomfort. Furthermore, an advance telephonic information was given to the participants which study's have also shown to be effective for dental surveys[20].

The 12-month period prevalence of lower back pain among dentists in Nepal (52.4 percent), was similar with that reported in many other countries, such as Denmark(50 percent),[21] Israel(55 percent),[22] and the United States[23]. It was also similar to an Australian study from New South Wales, NSW(64 percent)[24]. The 12-month period prevalence of neck-related pain among dentists in Nepal (52.4 per cent) was lower to that reported by dentists in many other countries, such as Denmark (65 per cent)[21] and Saudi Arabia (65 per cent),[25] but higher than a survey of Israeli dentists (38.3

per cent)[22]. Our current study also examined MSD at seven other body sites, revealing that the 12-month period prevalence of shoulder pain (49.5 per cent) was as prevalent among the dentists in Nepal. This finding is similar to an investigation of Queensland dentists (53.3 percent)[13] but higher in the study of Danish dentists (65 percent)[21]. In this regard, a previous study from Sweden found that dentists were exposed to a high load on the trapezius muscles bilaterally, as well as prolonged forward bending of the head[26]. Prolonged static postures are thought to be associated with various MSD[22].

In addition, wrist/hand MSD among dentists in Nepal was reported (36.9 per cent) which is similar to the report of Queensland dentists (one-third of the dentist) but lower to the result of the dental workers (75.6 percent) in the United States military study[23]. In our study we found that the occurrence of low back pain(52.4 percent) and neck pain (52.4 percent) in the last twelve months was high, the occurrence of pain in this region in the past 7 days was only (25.5 percent) back pain and (15.5 percent) neck pain. It would be expected that the proportion of musculoskeletal symptoms in the nine anatomical regions will diverge more or less identically in the past 12 months and in the past 7 days, but it did not. The frequency of low back symptoms in the last 7 days was even lower than point prevalence of 15 percent (as it appears in literature) among population who states that they are having low back symptoms[27].

In our study we found that neck pain (52.4 percent) and shoulder (49.5 percent) pain was also a common complain for the dentists. Hagberg M[12] reported that the high frequency of symptoms from the neck, shoulders, and upper extremities of the dentists was probably related to their difficult work positions with cervical flexion and rotation, abducted arms, and repetitive precision-demanding handgrips. A work posture involving elevated arms may accelerate degeneration of shoulder tendons through impairment of circulation due to static tension and humeral compression against the coracoacromial arch. Furthermore, work tasks with repetitive arm movements may evoke shoulder tendinitis, probably due to friction. The three possible routes to neck-shoulder muscular pain are mechanical failure, local ischemia and energy metabolism disturbance.

Physiological changes that accompany the MSD disorders can be related to practices used by dentists-primarily being seated for prolonged periods. There is a relationship shown between prolonged, static (motionless) muscle contractions and muscle ischemia or necrosis. Weak postural muscles of the trunk and shoulder may lead to poor posture. As muscles adapt by lengthening or shortening to accommodate these postures, a muscle imbalance may result, leading to structural damage and pain. A significant number of today's dentists experience musculoskeletal pain and are at risk of developing serious MSDs. The appearance of musculoskeletal symptoms among dentists, suggests that ergonomics should be covered in the educational system to reduce risks to dental practitioners[28].

Valachi et al[29] showed that there are deficiencies in dentist's position, posture, flexibility, strength and ergonomics. The following widespread postures among dentists are considered risk factors: Forward bent sitting posture, accompanied with bending and twisting, and the relative static work[30,31]. Damkot et al.[32] found that not only sitting and twisting postures effect back pain but the amount of sitting and twisting in seat has a great impact on musculoskeletal pain. Navah et al conducted a study to determine the effect of work posture on musculoskeletal complaints. They concluded that those working only in the sitting position had a more severe low back pain than those who alternated between the sitting and standing positions.[22] In dentistry, factors such as physical conditions of the environment, adequate equipment design with proper anthropometric requirements and avoidance of unhealthy postures can be evaluated from the ergonomic point of view[33]. Physical tasks influence musculoskeletal disorders more than active leisure and psychosocial work factors[34, 35].

A thorough understanding of the underlying physiological mechanisms leading to these problems is necessary to develop and implement a comprehensive approach to minimize the risks of a work-related injury. The dental teams need functionally designed dental equipment and proper training in ergonomic methods[36-38]. Therefore it is useful to take again a closer look at the preventive measures that can contribute to less physical and psychological strain in the daily practice[39].

The use of ergonomic design and appropriate selection of hand tools can reduce exposure to cumulative trauma. Tissues of each individual have a threshold of resistance, and if that threshold is crossed too many times by a defective or ill fitting tool, pathologic changes can occur. The proper tool design, rotating work schedules, work pacing, scheduling, and exercise programs can, in combination, improve productivity and promote human wellness[6,15,40-42]. Although there have been considerable advances in dental equipment, there has been insufficient attention paid to ergonomic considerations and a systematic approach to dental ergonomics have not yet emerged.[43] Dentists can recognize and identify their own postures, practicing positions, and the equipment usage patterns that are associated with increased risks of experiencing musculoskeletal pain and discomfort. Such recognition is the first critical step to avoiding or neutralizing ergonomic habits and work

environment layouts that might otherwise unnecessarily shorten professional clinical careers.[44]One of the major limitations of this type of study is that what people report may differ from their actual situation. Non-respondents may also introduce some bias, as they experience more MSD. However, the reported prevalence of MSD symptoms was quite high.

Studies have noted an association between musculoskeletal problems and age[27]. Indeed such correlation was found in our study but the correlation coefficient was low, and no significant correlation was found between low back pain or neck pain and age. It seems that low correlation on one hand and no correlation on the other was partially due to interfering variables like practice of dentistry, different working positions and ergonomic workloads, all factors which contributed to musculoskeletal symptoms and were indeterminate to the age effect.

The finding that younger and less experienced dentists were more likely to report MSD of the neck, upper back and shoulders is consistent with some previous studies[45,46]. In this regard, an investigation of Thai dentists revealed that less experienced dentists were more likely to suffer from musculoskeletal pain than their more experienced counterparts.[45]Possible explanations were that experienced dentists are probably better at adjusting their working position and techniques in order to avoid musculoskeletal problems compared to their less experienced counterparts, or they simply developed coping strategies to deal with the pain. Previous research from the NSW survey has suggested that modification of work practices in dentistry, including taking rest breaks, does not seem to influence the prevalence of reported symptoms associated with MSD.[24] Given the continuing high prevalence of MSD reported among dentists in Nepal, further research may have to concentrate on specific risk factors related to the MSD, such as repetitious movements, physical loads, psychological stress, and other ergonomic factors. In addition, a health economic analysis of the impact of MSD on dentistry may be useful to consider.

Conclusions

The results suggested that the prevalence of musculoskeletal symptoms among dentists in Nepal is high. MSD remains a major occupational health problem for dentists of Nepal with the commonest problem of neck and lower back pain. Younger dentists had more symptoms than the older dentists. The female dentists had a significantly higher frequency of wrist/hand pain than their male counterparts. In some cases, MSD was shown to interfere with daily activities. Adopting adequate postures in clinical practice and having a favorable work environment could reduce the muscular skeletal system problem. Therefore, it is of vital importance to promote the occupational health and prevention programs regarding ergonomic postures which must be acquired by the dentists during their clinical practices. Further research is now needed to more carefully investigate the impact of MSD on dentists, especially with respect to identifying the specific risk factors and effective measures for reducing MSD.

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