

# Prevalence of musculoskeletal disorders among dentists in the Ha'il Region of Saudi Arabia

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**BACKGROUND AND OBJECTIVES:** Dentists suffer a high prevalence of musculoskeletal disorders (MSDs) but studies are quite limited. The present study was carried out to investigate the prevalence of MSDs among dentists in the Ha'il Region, Saudi Arabia.

**DESIGN AND SETTINGS:** A cross-sectional, questionnaire study was conducted among 80 licensed dentists affiliated with the Ministry of Health (MoH), Ha'il Region, Saudi Arabia from January 2014-January 2015.

**PATIENTS AND METHODS:** A self-administered questionnaire, based on the Nordic Musculoskeletal Questionnaire (NMQ) was sent to participants after translation to Arabic. The questionnaire was delivered by mail with a prepaid return envelope.

**RESULTS:** Sixty-eight questionnaires (85%) were returned. The prevalence of MSDs among respondents was 77.9% (n=53) with the most commonly affected areas the lower back (73.5%) (39/53) followed by the neck (66%) (35/53) and the shoulders (43.3%) (23/53). Twenty-four (45.2%) of 53 respondents had experienced MSDs in the neck and lower back at the same time throughout the past twelve months. Nearly 85% (45/53) of respondents were found to have MSDs affecting two or more sites.

**CONCLUSION:** Prevalence of MSDs was high among dentists in the Ha'il region. Lower back, neck and shoulders were the most commonly affected body sites.

Occupational hazards are common in various populations. Musculoskeletal disorders (MSDs) are a significant occupational health hazard that affect members of various occupations.<sup>1</sup> MSDs are defined as a group of disorders that affect various regions of the musculoskeletal system. These areas include the nerves, tendons, muscles, joints and supporting structures such as intervertebral discs. Patients with MSDs may exhibit any of the following symptoms/ complaints: pain, paresthesia, stiffness, swelling, redness and/or weakness.<sup>2,3</sup> MSDs may be caused by an interplay of specific risk factors acting during work-related activities, such as: repetitive motions, awkward or static postures, forceful movements, and exposure to vibration and/or mechanical stress. When these factors exist simultaneously, the risk of developing MSDs

increases significantly. Although some musculoskeletal injuries occur at one specific moment, many more result from repeated strength demands coupled with lack of significant rest periods. Upon exceeding the tissue tolerance of an individual, these injuries further impair the body's ability to heal itself from the long-term adverse effects of work-related activities.<sup>4,5</sup> Dentists are at risk of developing MSDs. The use of vibratory tools, excessive repetitive movements, maintaining a static position while performing extremely precise procedures in a small workspace, and/or maintaining an inadequate posture for long periods of time are some of the postulated reasons for the possible risk of developing MSDs. Other culprits might include temperature changes, biological factors, chemical irritants and psychological stress that comes at a cost to the neck, shoulders and

back of the dentist.<sup>6-8</sup> Decreased work satisfaction, lack of patient appreciation, anxiety, stress and worry can also influence the experience of pain and discomfort related to MSDs.<sup>9</sup> It has been noted that dentists have a higher prevalence of MSDs compared with office workers.<sup>10</sup> The literature on MSDs among dentists indicates that these complaints have contributed considerably to morbidity, as well as reducing productivity and quality of work and possibly leading to premature retirement.<sup>11,12</sup> Further to the point, the symptoms of MSDs increase with the number of years of practice.<sup>7,8</sup> There is evidence of MSD among dentists in Saudi Arabia, but data is limited.<sup>13</sup> This study was carried out to investigate the prevalence of MSDs among dentists in Ha'il, Saudi Arabia.

## PATIENTS AND METHODS

In this cross-sectional study, participants included a convenience sample of 80 licensed dentists affiliated with the Ministry of Health (MoH), Ha'il Region, Saudi Arabia. Permission for the study was given after review by the General Administration of Dentistry at the Ministry of Health in Ha'il, Saudi Arabia. All participating dentists signed an informed statement of consent. At least 1 year of work experience in the current position was the only criterion for entry into the study.

We used a self-administered questionnaire, based on the Nordic Musculoskeletal Questionnaire (NMQ) in English with translation into the Arabic language. It was delivered by mail with a prepaid return envelope. The applicability of the NMQ as an accepted research tool for assessment and measurement of musculoskeletal complaints in various population samples is well documented.<sup>14-16</sup> The questionnaire was pilot-tested among eight dentists in both languages, for clarity and applicability. The questionnaire contained general items such as age, gender and work duration. It also contained items on musculoskeletal complaints. The respondents were asked whether they had any musculoskeletal symptom that affected their daily activities within the past year and in which body site they occurred, including regions of the neck, shoulders, upper back, elbow, lower back, wrist/hands, hip/thighs, knees, and ankles/feet. The questionnaire also included a diagram of the human body viewed from the back, divided into anatomical areas, which helped the subjects in identifying the areas of the body.

The Statistical Package for Social Sciences (SPSS) version 20 was used for statistical analysis of data. Descriptive analysis of the data was carried out relative to the dependent variables. The prevalence of musculoskeletal complaints affecting each anatomical

region was determined. Descriptive data are reported as percentages. For comparison of MSD prevalence among male and female dentists, the chi-square test was used.

## RESULTS

Of 80 participants, 68 dentists returned the filled questionnaire for a response rate of 85%. The majority were male dentists (63.2%) (n=43) with a 1.7:1 male to female ratio. Forty of 68 (58.8%) were younger than 40 years of age and 30.8% (n=21) were 35 to 39 years of age [median (SD), 38.50 (7.4) years]. The duration of dental practice for the dentists in this study ranged from 2 to 31 years [mean (SD), 12.4 (7.2) years].

The prevalence of MSDs among 68 dentists was 77.9% (n=53). Eighty percent of female respondents (20/25) had experienced MSDs during the past year, while 33/43 (76.7%) male respondents had experienced MSDs during the past year. No significant difference was found between male and female respondents in the prevalence of MSDs ( $P=0.754$ ) (Table 1).

The most commonly affected area was the lower back (73.5%) (n=39) followed by the neck (66%) (n=35) and then shoulders (43.3%) (n=23). The least prevalent MSD symptoms were reported in ankles/feet and elbows (9.4%) (n=5) and knees (11.3%) (n=6). Twenty-four (45.2%) of 53 respondents had reported experiencing infrequent episodes of MSD symptoms in the neck and lower back and 37.7% (n=20) in the neck and shoulders at the same time during the last 12 months, while during the same period 24.5% (n=13) of respondents had complained of infrequent MSD symptoms in the neck, shoulders and lower back at the same time. Figure 1 presents the percentage values for prevalence of the MSDs by various musculoskeletal areas. Nearly 85% (n=45) of respondents had MSDs affecting two or more body sites during the past 12 months, while 15% (n=8) of respondents had MSD complaints involving exclusively one body site. Table 2 shows the prevalence of MSDs by various body sites among dentists in the Ha'il Region and in other countries.

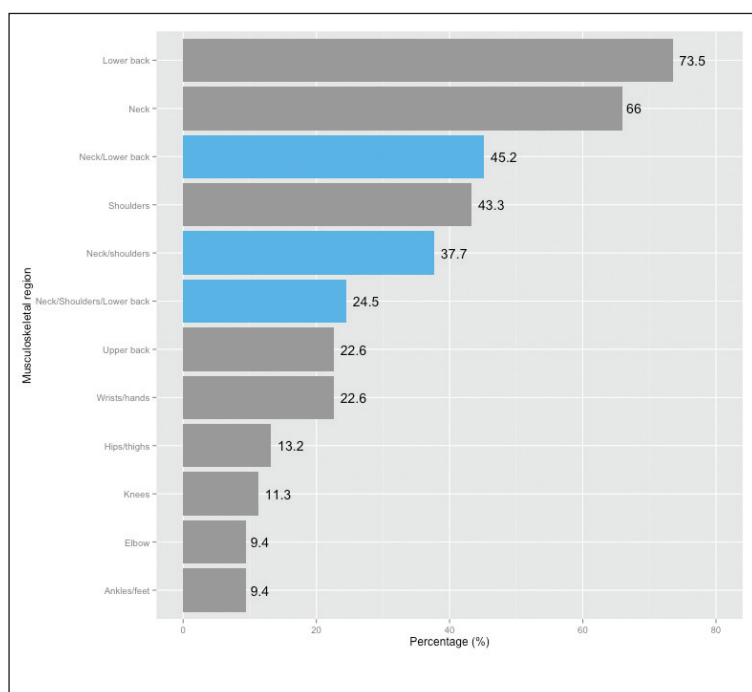
## DISCUSSION

Work-related MSDs are common among dentists.<sup>17</sup> Alexandre et al<sup>10</sup> and Rambabu and Suneetha<sup>18</sup> noted that these professionals exhibit an elevated risk of acquiring MSDs in comparison with other professions, possibly because of prolonged maintenance of static postures and use of precise hand and wrist movements. In Saudi Arabia only a few studies have been conducted to investigate the occurrence and prevalence of MSDs among medical professionals, let alone dentists. In a

**Table 1.** Prevalence of musculoskeletal disorders among dentists in the Ha'il Region of Saudi Arabia.

	Dentists with musculoskeletal disorders		
	Total n (%)	Yes n (%)	No n (%)
Total respondents	68 (100)	53 (77.9)	15 (22)
Male dentists	43 (63.2)	33 (48.5)	10 (14.7)
Female dentists	25 (36.8)	20 (29.4)	5 (7.3)

P=0.754 for male vs female prevalence (chi-square test) MSD: musculoskeletal disorders.



**Figure 1.** Prevalence of musculoskeletal disorders in different regions of the body (n=53) (blue: concomitant musculoskeletal regions).

cross-sectional survey of 200 nurses at a tertiary care centre in Saudi Arabia, approximately 85% of subjects experienced MSD-associated symptoms that commonly affected the regions of lower back (65.7%), ankle/foot (41.5%) and shoulders (29.0%).<sup>19</sup> Al Wazzan et al<sup>13</sup> in a study assessing work-related back and neck problems among dentists and dental auxiliaries reported complaints of neck pain in 54.4% of the subjects and back pain in 73.5%. Dentists had relatively more neck (63.7%) and back (79.1%) pain as compared with neck (46.9%) and back (69.0%) pain among auxiliary staff (dental assistants, dental technician and dental hygienists). In another investigation<sup>9</sup> on prevalence and distribution of musculoskeletal symptoms among dentists in Saudi Arabia, 82.9% dentists (63 males and 77 fe-

males) had one or more symptoms in the musculoskeletal system. MSD-associated pain severely affected the neck, shoulders and lower back regions (59.3%).

The analysis of the data from the present study revealed a high prevalence of MSDs (77.9%, n=53/68) among dentists in the Ha'il Region. Previous studies have documented various overall rates of MSDs over a 12-month period among dentists. The prevalence data from the present study was comparable to that reported from Sweden (78%)<sup>20</sup> and Thailand (78%),<sup>21</sup> but higher than that observed among Australian (64%)<sup>22</sup> and Greek (62%)<sup>23</sup> dentists. On the contrary, MSD rates among dentists in the Ha'il Region were lower than that reported by their counterparts in Poland (92%),<sup>8</sup> Australia (87%),<sup>24</sup> India and Saudi Arabia (83%).<sup>1,9</sup> The lower rate in this study compared to previous reports<sup>1,8,9,24</sup> may be due to several factors: less self-reporting, less workload, better ergonomic dental chairs or less complex procedures. The study unfortunately did not study these factors to reach a definite explanation for the lower rate of MSDs seen in this study compared to the previous studies. Among different anatomical regions, studies have noted that the lower back, neck, and shoulders exhibit a higher prevalence of MSD-associated pain among dentists.<sup>8,12,25</sup>

In the present study, the most frequently affected body sites were the lower back (73.5%, n=39), neck (66%, n=35), and then shoulders (43.3%, n=23). These areas may correspond to the overloading of the spine at work. It means that dentists sit with their head bent excessively and their body in awkward positions as well as standing with their lumbar spine twisted in unnatural postures. The marked prevalence of shoulder pain among dentists can be explained by the fact that while working, the shoulders are often overloaded during the extended periods of arm elevation and leaning forward in sitting or standing positions.<sup>26</sup> The prolonged static load as a result of sustained muscle activity in the sternocleidomastoid or trapezius muscles may be a primary etiological factor for neck pain among dentists.<sup>17</sup>

**Table 2.** Prevalence of musculoskeletal disorders in dentists by body site and country.

Body site	MSD prevalence (%)	Country	Reference
Overall	78	Saudi Arabia (current study)	
	62	Greece	23
	64	Australia	22
	78	Sweden	20
	78	Thailand	21
	83	India & Saudi Arabia	1 & 9
	87	Australia	24
	92	Poland	8
Back	74	Saudi Arabia (current study)	
	54	Australia	24
	58	Brazil	7
	59	Denmark	15
	66	Taiwan	25
	79	Saudi Arabia	13
Neck	66	Saudi Arabia (current study)	
	64	Saudi Arabia	13
	65	Denmark	15
	72	Taiwan	25
Shoulders	43	Saudi Arabia (current study)	
	40	Brazil	7
	75	Taiwan	25
Lower extremities (ankles/feet, knees, thighs)	9-13	Saudi Arabia (current study)	
	12-19	Australia	24
	13-15	Taiwan	25
Hands and wrists	23	Saudi Arabia (current study)	
	34	Australia	24
	48	Poland	8

The prevalence of lower back pain (73.5%) in the current study was similar to that reported by dentists in Saudi Arabia (79.1%),<sup>13</sup> but higher than a survey of Taiwanese (66%),<sup>25</sup> Danish (59%),<sup>15</sup> Brazilian (58.4%)<sup>7</sup> and Australian (53.7%)<sup>24</sup> dentists. The 12-month period prevalence of neck-related pain among Ha'il dentists (66%) was similar to that reported by dentists in Denmark (65%)<sup>15</sup> and Saudi Arabia (63.7%),<sup>13</sup> but lower than that reported by dentists in Taiwan (72%).<sup>25</sup> The 12-month period prevalence of shoulder pain (43.3%) was found to be less prevalent than lower back (73.5%) and neck pain (66%) among Ha'il dentists; however the

rate was similar to the 12-month prevalence of shoulder pain among dentists in Brazil (40.4%).<sup>7</sup> To confirm the marked prevalence of low back pain among dentists, Alexandre et al<sup>10</sup> compared the prevalence of musculoskeletal complaints among dentists, doctors, lawyers and individuals of the population in general. Back pain was more common among dentists (22.1%), than among physicians (14%) and lawyers (12.3%).

The bodily areas with a lower prevalence of MSDs in the present study were the elbows (9.4%), ankles/feet (9.4%), knees (11.3%) and hips/thighs (13.2%). This finding is similar to an investigation in Taiwanese

dentists,<sup>25</sup> in which the three parts of the body with the lowest prevalence (13-15%) of MSD complaints among dentists were hips/thighs/buttocks, knees, and ankles/feet. Surprisingly, wrist and hand pain was reported as a significant symptom by 47.5% of Polish dentists<sup>8</sup> and 33.7% of dentists in Queensland, Australia;<sup>24</sup> however, only 22.6% of dentists in the current study reported pain in the wrists/hands. Our finding is substantiated by a systematic review<sup>14</sup> of musculoskeletal disorders among dentists and dental hygienists, which indicated that dentists are less likely to experience wrists/hands pain than dental hygienists. This is an interesting finding as dental hygienists are more likely to report MSDs in the wrist/hand region. This is thought to be due to repetitive scaling tasks performed daily as dental hygienists.<sup>27</sup>

According to the systematic review<sup>14</sup> of MSDs among dental professionals, in overall terms, the prevalence of lower extremity musculoskeletal pain is often less than 20%, which is considerably lower than the prevalence of upper extremity pain. Accordingly, the prevalence of MSDs related to areas of the lower extremity such as hips/thighs, knees and ankle/feet in this study was found to be in the range of 9.4% to 13.2%. This prevalence among dentists seems to be even lower when compared with other medical personnel such as surgeons and nurses.<sup>18,19</sup> The period-prevalence of ankle and foot MSDs among nurses from Saudi Arabia was 41.5%. Because nurses spend most of their working time on their feet, they may develop numerous conditions that result from wearing inappropriate footwear that can cause chronic foot and ankle pain.<sup>19</sup> Likewise, 95% of surgeons experienced musculoskeletal pain in the lower extremities more than dentists or physicians. This may be because of prolonged standing and bending postures during surgeries.<sup>18</sup>

The co-existence of MSDs in the neck, shoulders and lower back regions (**Figure 1**) was evident in the current study, which indicates that dentists are suffering from MSDs in more than one body region. Furthermore, this co-existence can be further debilitating for dentists by virtue of its greater interference with other aspects of their daily life, such as housework

and sports. Lastly, 85% of dentists in this study had at least two or more than two MSD complaints, which is in contrast to a study<sup>19</sup> in which approximately 85% of the nurses reported experiencing at least one musculoskeletal symptom. The high percentage of dentists with problems in more than one body site might be caused by complex body postures during dental treatment, unorganized working conditions in the majority of clinics as well as excessive working hours without intermittent rest periods.

The results of this study are limited by the small sample size and the use of one geographic area to recruit the participants. A larger sample size would achieve more comprehensive results. Dentists working in the outskirts and peripheries of the Ha'il Region can also be included in future research investigations on MSDs. MSDs represent a significant occupational health hazard for dentists that can have a potential negative impact in terms of reduced working efficiency and productivity. Therefore, this high prevalence of MSDs among dentists should set off alarm bells, as the associated long-term risks of MSDs are often ignored by dentists. On the research front, it is necessary to identify the causes of the MSDs and subsequently focus on appropriate preventive interventions that can help to reduce the prevalence of these problems. It is also suggested that strategies on the prevention and reduction of MSDs among dentists be included in the dental curriculum during undergraduate dental education.

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