Work-related musculoskeletal disorders among dental professionals in Saudi Arabia

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Abstract. [Purpose] Musculoskeletal disorders are common causes of work-related disability in different professions involving the frequent practice of lifting, stooping, twisting, prolonged sitting, or standing. The dental profession is one such profession. Our aim was to determine the prevalence of work-related musculoskeletal disorders among dental professionals in Saudi Arabia, the factors associated with them, and their consequences and to propose preventive measures for them. [Subjects and Methods] A self-administered online questionnaire was sent to 225 members of the Saudi Dental Association. It included questions on demographic and professional characteristics, general medical history, and history of work-related musculoskeletal disorders before and after joining the dental profession. [Results] The questionnaire was completed by 65% of the respondents. Among them 85% reported that they had developed some pain due to work after joining the dental profession, and 42% reported that they were suffering pain at the time of the survey. Besides lower back, shoulder, and neck regions, the hands, upper back, and other regions like the elbows, buttocks, thighs, leg, and feet were areas in which they pain. [Conclusion] The prevalence of work-related musculoskeletal disorders among dental professionals in Saudi Arabia is high, affecting their daily activities, sometimes even forcing them to change their work setting. Age, gender, specialty of work, work setting, number of contact hours with patients, etc., were all found to be related to their work-related pain. We need to emphasize the role of ergonomics, counseling, proper techniques of patient handling, etc., during the training of dental professionals so that they can work efficiently.

Key words: Work-related musculoskeletal disorders, Dentists, Saudi Arabia

INTRODUCTION

Musculoskeletal disorders are a common cause of work-related disability in different professions1). The physical aspect of work associated with such professions has been identified as a risk factor for developing work-related musculoskeletal disorders (WRMDs). In dentistry, overstrained and awkward postures, repetitiveness of different joint movements, use of high frequency vibration tools, and psychological stress have been identified as risk factors2, 3).

In the last decade, various studies have been published around the world citing the high prevalence of WRMDs among dental professionals4–5). The most affected regions reported are the back and neck5). The need for prevention of these disorders has been identified, including identification and modification of risk factors associated with this profession6).

The data on the prevalence of WRMDs for different professions can provide the basis for formulation of necessary strategies to prevent them in the future. However, to our knowledge, no data on the incidence or prevalence of WRMD among dental professionals has been reported previously in Saudi Arabia.

The objectives of this study were to report the prevalence of WRMDs among dental professionals working in Saudi Arabia; identify factors, such as age, gender, subspecialties of dentistry, and the work environment, that might be associated with them; determine how WRMDs affect their work and activities of daily living; and propose some preventive measures.

SUBJECTS AND METHODS

The questionnaire used to collect data for this study was based on similar studies published previously2, 3, 5, 6) and was adapted to the Saudi work culture for use among dental professionals working in Saudi Arabia. The study fully complied with the ethical standards for human research of King Saud University.

The questionnaire included 43 questions pertaining to three domains, demographic and professional characteristics, general medical history, and history of WRMD before and after joining the dental profession. These domains included questions pertaining to work setting characteristics and the
effect of WMRD on dentists’ daily work and non-work activities. WMRD was defined as any unpleasant sensation in the musculoskeletal system of the body developed after joining the dentistry profession.

The questionnaire was uploaded online, and the web link for the survey along with an explanation of the purpose of the study were sent to 225 members of the Saudi Dental Association (SDA) working in Saudi Arabia, inviting them to participate in the study. Respondents were assured of confidentiality of their information. Two weeks after uploading the questionnaire online, a reminder email was also sent.

Dental professionals who were members of the SDA and involved in direct patient contact for at least 10 hours per week were eligible to participate. The participants had to complete the questionnaire online. Incomplete questionnaires were rejected.

**RESULTS**

Out of 225, 146 (65%) members of the SDA completed the online questionnaire. Among them, 69 (47%) were females, and 77 (52%) were males. The majority of the respondents, 102 (70%), were under the age of 40 years (Table 1). Overall, 94 (64%) of the respondents were Saudi in origin. However, no difference in prevalence of WRMDs based on nationality was observed. Out of the 146 respondents, 119 (81%) respondents indicated that they were satisfied with their job. Of the 146 respondents, 134 (92%) were dentists, 6 (4%) were dental assistants, 5 (3%) were dental hygienists, and 1 (1%) was a dental technician. Among the respondents 68 (47%) had only a Bachelor’s degree, while 35 (24%) and 30 (20%) also had a Master’s degree and PhD degrees, respectively. The remaining 13 (9%) had a diploma certificate. Ninety-four (64%) had work experience (WE) of more than 5 years. Most of the respondents, 138 (94%), reported that they worked as a full time professionals with patient contact of more than 15 hours per week (Table 1).

The majority of the respondents, 46 (31%) had endodontics as their area of specialty. Thirty-seven (94%) respondents were employed in the government sector, while 9 (6%) were employed in the private sector. The main employers were hospitals, with 49 (34%) respondents employed in the...
of WRMDs was high, with at least 85% of the respondents reporting development of some musculoskeletal pain after joining their professions. Among those with patient contact of more than 30 hours per week, 27 (59%) reported severe pain in one or more region. Compared with those with less patient contact, the location of pain in respondents with patient contact of more than 30 hours per week was widely distributed, forcing at least 20 (34%) of them to go on sick leave.

The location of the pain among the respondents seemed to be related to the type of chairs they used in their clinical facilities. Respondents who used a revolving chair had a higher prevalence of WRMDs, with 32 (54%) of them complaining of pain in the neck region and 36 (61%) complaining of pain in the shoulder region. Respondents using chairs with arm rests had less pain complaints than those reporting using chairs without arm rests, with 38 (51%) complaining of pain in the lower back and 34 (58%) each complaining of pain in the neck and shoulder region (Table 5).

**DISCUSSION**

The prevalence of WRMDs among dental professionals in Saudi Arabia was found to be high, with at least 85% of the respondents reporting development of some musculoskeletal pain after joining the dental profession. Out of these respondents, 52% reported that they were suffering from pain at the time of the survey. Our data suggests that age, gender, duration of contact with patients per week, the chairs used in the clinics, and area of dental specialty are all related to this high prevalence. This is first study of its kind to be

### Table 3. Distribution of WRMDs among respondents after joining dental profession (most of the respondents had complaints in multiple locations)

| Location          | Females | Males | Total |
|-------------------|---------|-------|-------|
| Neck              | 33 (56) | 26 (44) | 59 (48) |
| Shoulder          | 34 (58) | 25 (42) | 59 (48) |
| Elbow             | 02 (67) | 01 (33) | 03 (2) |
| Hand              | 20 (59) | 14 (41) | 34 (27) |
| Upper back        | 15 (52) | 14 (48) | 29 (23) |
| Lower back        | 32 (43) | 42 (57) | 74 (60) |
| Low back and buttocks | 04 (44) | 05 (56) | 09 (07) |
| Thighs and knee   | 04 (66) | 05 (34) | 06 (05) |
| Lower leg         | 06 (75) | 02 (25) | 08 (06) |
| Foot              | 12 (70) | 05 (30) | 17 (14) |
| Others            | 02 (50) | 02 (50) | 04 (03) |

Values in the tables are numbers followed by percentages in parentheses.
done in Saudi Arabia.

Our findings are the same as those of previous similar studies done around the world, such as in Greece, Sweden, and Canada, reporting dentistry to be a high risk profession for development of WRMDs. In most of these studies, back pain was the most reported WRMD among dentists, with its prevalence ranging from 37% and 55%. In our study, along with pain in the lower back region (reported by 60% of the respondents), pain in the neck and shoulder regions (48% each), hands (27%), upper back region (23%), and in other regions like the elbows, buttocks, thighs, leg, foot, etc. (26%), also showed a high prevalence.

The respondents in our study were relatively younger, with 70% of them under 40 years of age. Among these respondents, at least 36% had work experience of less than 5 years (Table 1). The high prevalence of work-related pain in these young professionals is either due to overload in the work setting, faulty ergonomics, or incorrect techniques used during treatment of patients. Such professionals are at the beginning of their career. As WRMDs are known to increase with age, if dental professionals suffer pain at this point in their lives, the problem could grow, making it difficult for them to practice in the future. Strategies need to be developed that can help them to continue clinical practice without such problems.

Our study is in line with the previous studies showing WRMDs to be gender related. The prevalence of WRMDs after joining the dental profession was found to be high in female professionals compared with their male counterparts. This is accounted for by their higher body weight, smaller height, and differences in muscle strength and composition. Smaller body builds among females acts as a disadvantage when lifting or transferring equipment and when applying body force during treatment, putting an extra load on their bodies especially the spine.

Furthermore, in our study, specialists from pediatrics seemed to be at the most risk of developing WRMDs with 91% of them reporting some work-related pain. However, the distribution of pain is different in specialists from different areas of dentistry. In orthodontists, 27% each specialists

Table 4. WRMD characteristic after joining dental profession

| Current pain | Females | Males | Total |
|--------------|---------|-------|-------|
| Yes          | 30 (42) | 42 (58) | 72 (58) |
| No           | 31 (60) | 21 (40) | 52 (42) |
| Onset of pain|         |        |       |
| Sudden       | 16 (10) | 21 (29) | 37 (30) |
| Gradual      | 45 (20) | 42 (18) | 87 (70) |
| Average duration of pain |        |        |       |
| <2 weeks     | 35 (44) | 45 (56) | 80 (64) |
| 2–4 weeks    | 16 (64) | 09 (36) | 25 (20) |
| >4 weeks     | 10 (53) | 10 (47) | 19 (16) |
| Effect of pain on daily activities |        |        |       |
| No           | 31 (42) | 42 (58) | 73 (59) |
| Yes          | 30 (59) | 21 (41) | 51 (41) |
| Activities limited due to pain |        |        |       |
| Bending      | 15 (47) | 17 (53) | 32 (26) |
| Twisting     | 22 (51) | 21 (49) | 43 (35) |
| Stooping     | 00 (00) | 03 (100) | 03 (02) |
| Patient handling/ Treatment | 18 (55) | 15 (45) | 33 (27) |
| Prolonged sitting | 17 (41) | 24 (59) | 41 (33) |
| Prolonged standing | 14 (87) | 03 (100) | 17 (03) |
| Others       | 06 (50) | 06 (50) | 12 (10) |
| Effect of pain on work activities |        |        |       |
| No           | 26 (54) | 22 (46) | 48 (39) |
| Yes          | 35 (58) | 41 (42) | 76 (61) |
| Outcome of WRMDs |        |        |       |
| Sick leave   | 29 (59) | 20 (41) | 49 (39) |
| Compensation | 05 (55) | 04 (45) | 09 (07) |
| Reduced non work activities | 14 (52) | 13 (48) | 27 (22) |
| Reduced working hours | 15 (52) | 14 (48) | 29 (23) |
| Change of work setting | 16 (34) | 31 (66) | 47 (38) |
| Others       | 08 (53) | 07 (47) | 15 (12) |

Values in the tables are numbers followed by percentages in parentheses.

Table 5. Chairs used in clinic and location of pain

| Location of pain       | Total | Fixed chair | Revolving chair | Chair with armrests | Chair without armrests |
|------------------------|-------|-------------|----------------|---------------------|------------------------|
| Neck                   | 59 (48) | 02 (03) | 32 (54) | 07 (12) | 34 (58) |
| Shoulder               | 59 (48) | 01 (02) | 36 (61) | 03 (05) | 34 (58) |
| Elbow                  | 03 (02) | 00 (00) | 01 (33) | 00 (00) | 03 (66) |
| Hand                   | 34 (27) | 02 (06) | 20 (58) | 04 (12) | 17 (50) |
| Upper back             | 29 (23) | 00 (00) | 19 (66) | 03 (10) | 11 (38) |
| Lower back             | 74 (60) | 01 (01) | 43 (58) | 13 (18) | 38 (51) |
| Lower back and buttocks| 09 (07) | 00 (00) | 04 (44) | 02 (22) | 04 (44) |
| Thighs                 | 06 (05) | 00 (00) | 03 (50) | 02 (33) | 03 (50) |
| Lower leg              | 08 (06) | 00 (00) | 02 (25) | 03 (37) | 03 (37) |
| Foot                   | 17 (14) | 00 (00) | 08 (47) | 03 (18) | 07 (41) |

Values in the tables are numbers followed by percentages in parentheses.
reported pain either in the neck or lower back region. In endodontists, the elbow region (20%) was reported to be a major area of pain. In prosthodontists and periodontists, pain in the hand (20% each) was the most reported WRMD. In respondents with pediatric specialists, knee pain (22%) was the major reported WRMD. Such differences in the prevalence of various WRMDs among dentists from different specialties have been observed in previous studies\(^6, 19\) and can be accounted for by the difference in nature of the duties they perform and whether they have direct patient contact or not. Work posture during the scaling procedure has been reported as a risk factor for development of WRMDs\(^{20}\).

Work-related disorders seem to have a major effect on their daily activities other than work, especially in those with patient contact of more than 30 hours in a week. Respondents reported significant decrease in activities like shopping, cooking, and other home duties. At least 40% of them reported that they had to go on sick leave, 23% had to reduce their working hours, and 39% had to seek some treatment for their pain. Other studies have also reported sickness absence, reporting that they had to go on sick leave, 23% had to reduce their daily activities other than work, especially in those with high job demand, and “low” after their work time and reported that this affected their care of patients. They should be encouraged to discuss their workloads, self-efficacy and personal health\(^{14}\).

In previous studies a significant relation has been found between self-reported risk factors and the occurrence of WRMDs in different parts of the body\(^6\). Similarly, in our study, risk factors reported include frequent strenuous back position during work, repetitive shoulder/hand movements, use of vibrating tools, use of revolving chairs hairs and other armrests, high job demand, and others like high exertion and low job control. Height adjustable chairs with armrests/supports have been ergonomically proven to be an efficient intervention for reducing musculoskeletal pain\(^{22, 23}\). Both physical load and psychological factors play an important role in maintaining general health.

Beyond a limit, patient handling/treatment has also been known to cause WRMDs among other health professionals like physical therapists\(^{15, 21}\), nurses\(^{24-26}\), and other care givers\(^{17}\). Preventive measures should always be considered while handling the patients by incorporating special equipment, suspension frames, automatic chairs, and height adjustable beds. The role of ergonomics, proper techniques of carrying and lifting, healthy work environment, team work, prevention of injury, counseling, etc., needs to be emphasized during training of health professionals so that they can use their body force efficiently and effectively without putting an extra load on any specific part of the body. Ergonomics may be introduced as a separate course during their studies.

The prevalence of work-related musculoskeletal disorders among dental professionals in Saudi Arabia is high, affecting their daily activities, sometimes even forcing them to change their work setting. Age, gender, specialty of work, work setting, number of contact hours with patients, etc. were all found to be related to their work-related pain. We need to emphasize the role of ergonomics, counseling, proper techniques of patient handling, etc., during the training of dental professionals so that they can work efficiently. This study needs to be repeated with a long-term follow-up to see how such professionals cope with such a challenge. We need to devise primary as well as secondary prevention strategies to decrease the prevalence of WRMDs among dental professionals so that can effectively take care of patient and focus on their work.

This study used a self-report questionnaire to be completed by the respondents, who described their own conditions. There is a possibility that they may have overestimated their past experiences. Dental professional who were not members of SDA were not included in the study.

ACKNOWLEDGEMENT

This project was financially supported by King Saud University, Vice Deanship of Research Chairs, Rehabilitation Research Chair.

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