Self-reported musculoskeletal pain among dentists in South Africa: A 12-month prevalence study

SUMMARY
Introduction: Musculoskeletal trouble (ache, pain, discomfort) originating in the neck, shoulder, and back is a common occupational hazard among dental professionals worldwide. The significance of this problem justified research into the prevalence of these symptoms among dentists in South Africa for which there is currently no information.

Aims: The aim of this study was to investigate the one-year prevalence of self-reported musculoskeletal trouble in the neck, shoulder, and lower back areas among dentists in South Africa.

Methods: A survey questionnaire was forwarded to all members of the South African Dental Association whose email addresses were recorded on the Association data base. The email survey was performed using the previously validated Nordic Musculoskeletal Questionnaires.

Results: This cross sectional study revealed a self-reported 12-month prevalence of musculoskeletal trouble (ache, pain, discomfort) among dentists in South Africa of 77.9% involving the neck, 69.8% the lower back, and 72.4% the shoulders. Multiple regression analysis showed that a decrease in height among the respondents was associated with an increase in neck trouble (0.962 [CI 0.938; 0.992]).

Conclusions: The 12-month prevalences for musculoskeletal trouble (ache, pain, discomfort) among dentists in South Africa is high and has a considerable effect on both work and leisure activities.

Key words: Musculoskeletal pain, dentists, South Africa

BACKGROUND
The human body has been designed for movement. Any work that involves prolonged static posture has been shown to lead to in an increase of musculoskeletal disorders. Dentists assume static postures on a daily basis. These postures require more than 50 percent of the muscles of the body to contract to hold the body motionless while resisting gravity. It has been shown that both dentists and dental hygienists spend 86% of their working time with a neck and trunk flexion of at least 30 degrees. The static forces resulting from these postures have been shown to be much more taxing than dynamic (moving) forces. This is the case for dental students, dental hygienists, dental nurses and dentists. Pain resulting from these prolonged static postures is common in the dental profession as is evident by reported point and 12-month prevalence rates of 64% – 93%, 62% and 46% – 71%. The early age at which clinical symptoms become evident in an individual’s dental career has been shown by the increased prevalence of back pain among dental students when compared with a
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control group of psychology students. Further evidence for this early experience of problems has been reported.

The first presenting symptom of prolonged static posture is usually pain. This short term effect has been reported in 46% – 71% of dental students. The long term effect may be the development of a musculoskeletal disorder and the review article by Valachi and Valachi describes the following as the most common that may result from prolonged static postures in dentistry:

- **Chronic low back pain**: pain in the low back, often referred to the hip, buttock or one leg. The cause may be muscle strains or trigger points, instability due to weak postural muscles, hypomobile spinal facet joints, and degeneration or herniation of spinal disks.
- **Tension neck syndrome**: pain, stiffness and muscle spasms in the cervical musculature, often referred pain between shoulder blades or the occiput, and sometimes numbness or tingling into one arm or hand. Forward head posture may precede this syndrome, precipitating muscle imbalances, ischemia, trigger points, or cervical disk degeneration or herniation.
- **Trapezius myalgia**: pain, tenderness and muscle spasms in the upper trapezius muscle. Operating with the arm elevated can predispose the operator to this syndrome, which often is seen in the trapezius muscle on the side on which the dentist holds the mirror.
- **Rotator cuff impingement**: pain in the shoulder on overhead reaching, sustained arm elevation or sleeping on the affected arm. Incorrect body mechanics and rounded shoulder posture in the operatory can lead to the impingement.

![Diagram of musculoskeletal disorder progression](image)

The development of musculoskeletal pain and possibly a musculoskeletal disorder may result in lowered productivity due to missed work or even in a career-ending injury. In an Australian study 87.2% of dentists reported an episode of a musculoskeletal symptom in the preceding 12 months. Of this group 0.1% reported having taken leave in the previous year with the mean leave time being 11.5 days.

Professional intervention is often required to relieve pain that has manifested as a result of prolonged static posture. Effective relief from physical symptoms and an improvement in mental well-being has best been achieved with a combined treatment of physiotherapy together with a psychosomatic approach and individual ergonomic instruction rather than with the latter alone.

Since it has been shown that musculoskeletal pain can present in the daily routine of dental students, it has been proposed that an occupational health programme should be introduced into the dental curriculum in order to promote a healthy lifestyle in the academic environment and to prepare for the demands of future professional life. Such preventive strategies should make the student or dentist aware of the possible detrimental effects of body posture and the movement mechanics associated with the profession and provide instruction on how to minimise those positions of posture which predispose to the development of a musculoskeletal disorder. Regular exercise has also been proposed as part of a management programme.

A systematic review and meta-analysis has revealed that no studies investigating the prevalence of musculoskeletal pain among dentists has been done in Africa. Taking early cognizance of the symptoms of afflictions associated with established prolonged static postures will allow dental students and dentists to institute preventive measures and to embark on rehabilitative treatment where required, in order to prevent the development of possible career-threatening musculoskeletal disorders. It is important to note, however, that the self-reporting of musculoskeletal trouble (ache, pain, discomfort) does not necessarily imply the presence of a clinically diagnosed musculoskeletal disorder such as chronic low back pain, tension neck syndrome, trapezius myalgia, or rotator cuff impingement (Figure 1).

**AIMS AND OBJECTIVES**

The aim of this study was to investigate the one-year prevalence of self-reported musculoskeletal trouble (ache, pain, discomfort) in the neck, shoulder, and lower back areas among a selected sample of dentists in South Africa. The objectives were as follows:

- To examine age differences in the prevalence of neck, shoulder and back trouble among dentists.
- To determine gender differences in the prevalence of neck, shoulder and back trouble among dentists.
- To examine the relationship between the number of hours worked and the prevalence of work-related trouble (ache, pain, discomfort) among the sample.
- To determine whether work-related ache, pain or discomfort force dentists to take time off from work and if so, for how long?
METHODS AND MATERIALS
The study design was an anonymous, web-based, analytical cross sectional study using the previously validated Nordic Musculoskeletal Questionnaires.8 Therefore, the 50% proportion was used in this study in determining a sample size of 97, which would be sufficient to determine whether a similar prevalence occurred in the target population. In cognizance of the low response rates usually experienced in surveys, it was decided to sample 400 dentists from the members list of the South African Dental Association (SADA). This random sample was drawn using the Microsoft Excel® computer program and the authors were not privy to any personal information of those selected, of whom 317 had recorded email addresses. A covering letter was then emailed to the participants along with the questionnaire. After two weeks only 24 replies had been received. A reminder was sent to the group and a further nine replies were received after another 10 days. It was then decided to forward the survey to all 3112 members on the SADA database who have recorded email addresses. A reminder was then sent after a week and the survey was closed a week later with 338 replies. This amounted to a response rate of 10.9%.

Prevalence of musculoskeletal trouble
The 12-month prevalences for trouble (ache, pain, discomfort) are 77.9%, 72.4%, and 69.8% for neck, shoulder, and lower back respectively. Both males and females experienced high prevalence rates for neck, shoulder, and lower back trouble (Table 3).

Factors associated with musculoskeletal trouble
Multiple logistic regression analysis which included all risk factors (age, gender, weight, height, BMI, hours worked per week, months in practice, previous information at undergraduate level relating to possible work-related pain, employment in the private or public sector) revealed that the height of the respondents was the only variable to affect the prevalence of neck trouble (ache, pain, discomfort) amongst the respondents (p=0.01). The odds ratio for height

RESULTS
It must be noted that although a total of 338 replies were received, not all of these answered all the questions in the questionnaire. The term ‘respondent’ in the reporting of the results refers to the number of the participants (eg. n=338) who answered a specific question.

Profile of respondents
The profile of the respondents is represented in Table 1. There were 116 female and 232 male respondents. The average age of the respondents was 45 years (SD 13), with a female average age of 36.5 years (SD 10.1), the male average being 50.4 years (SD 12.3). The mean number of hours worked per week was 38.9 (SD 14.3) for females and 39.6 hours (SD 12.1) for males. The weight and height measurements and resultant Body Mass Index (Mass kg/height metres squared) (BMI) scores were similar among females and males. The average length of time the respondents had been in practice was 20 years and 3 months (SD 12 years 7 months).

Ninety two and a half percent of the respondents work in the private sector (Table 2). Of the male respondents 42.4% have been in practice for less than 20 years (compared with 63.8% of female respondents) and 57.6% have been in practice for more than 20 years (compared with 36.2% of female respondents).

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in centimetres was 0.962 (CI 0.938; 0.992), meaning that for every centimetre decrease in height of the respondents the risk of developing of neck trouble increased by 3.8%. Hence, the shorter the practitioner the greater the prevalence of neck trouble.

**Effects of neck, shoulder and lower back trouble**

Time taken off work over the preceding 12 months as a result of musculo-skeletal problems was common among the respondents with many recording 8 - 30 days away (lower back trouble 6.5%, neck trouble 5.5%, shoulder trouble 4.1%) and some respondents taking off more than 30 days over the period (lower back trouble 3.7%, neck trouble 5.5%, shoulder trouble 5.6%).

**Strengths and weaknesses of this study**

The strengths of the study lie in having obtained a statistically adequately-sized sample to validate the prevalence at the anticipated levels. This large number of respondents also allowed the use of regression analysis to examine the possible relation between age, gender, BMI, weekly work hours, years in practice and the prevalence of musculoskeletal trouble in the target population. There was adequate coverage of the target population with 3112 of the SADA members having email addresses. The appropriate use of the previously validated questionnaires in the form of the four Nordic Musculoskeletal Questionnaires was instituted. Use of a self-reported questionnaire is quick and convenient. Physical examination and assessments could provide more accurate results but would have been time-consuming and expensive. The use of the previously validated questionnaires in the form of the four Nordic Musculoskeletal Questionnaires enables the results of this study to be easily included in possible later reviews of the topic where these questionnaires have also been used.

Non-responder bias may have influenced the number of replies received. People who do not experience any work-related pain might not have deemed it necessary to partake in the survey. On the other hand, those who had had to abandon dental practice because of their musculoskeletal trouble and or subsequent musculoskeletal disorder would not have been included in the study. Admittely, the covering letter to participants should have pointed out the importance of participating in the survey irrespective of whether work-related trouble (ache, pain, discomfort) was experienced or not.

**DISCUSSION**

Prevalence of neck pain in a Canadian general population was found to be 37.3%. In a postal survey in a county in Sweden among the general population the self-reported 15-20% prevalence of pain was most common in the neck, shoulders, arms and lower back. The reported prevalence calculations for neck (77.8%) shoulder (72.6%) and lower back (69.8%) trouble in the current study are much higher than those reported for those general populations and must be seen as being clinically significant. The data are also consistent with the high prevalences of neck, shoulder and lower back trouble experienced by dentists worldwide.

This huge burden of neck, shoulder, and lower back trouble among dentists in South Africa results in many respondents having sought medical help (Table 4). In many instances these symptoms are chronic with many of the surveyed dentists experiencing more than 30 days of trouble per year and many reporting daily trouble. Further effects are a decrease in work and leisure activities (Table 4). Multiple linear regression analyses demonstrated that the only risk factor associated with increased neck trouble was height. No such association could be demonstrated with shoulder or lower back trouble. A subsequent search of the literature did not reveal any such previous findings. This finding may be elucidated on in future similar investigations.

A systematic review of musculoskeletal disorders among dental professionals has reported that musculoskeletal complaints are sometimes negatively associated with the total years of practicing dentistry. The identification of such a survivor group (healthy worker effect) in this survey was not apparent. The prevalence of neck trouble did not differ significantly between those respondents who had worked more than 20 years in practice compared with those who had worked less than 20 years (OR 0.71 CI [0.42, 1.20]). The same applied for shoulder and lower back trouble.

Of the male respondents, 42.4% had been in practice for less than 20 years (compared with 63.8% of female respondents) and 57.6% had been in practice for more than 20 years (compare: 36.2% of female respondents). This is an interesting incidental finding and suggests a changing in demographics in the dental profession in South Africa.

### Table 3: The 12-month prevalence for self-reported musculoskeletal trouble (ache, pain, discomfort) in the locomotive organs among dentists in South Africa. Included is the 7-day prevalence for lower back, neck and shoulders. (Percentage (number of respondents)
relating to a shift from the predominantly male workforce of the past. This will require further investigation and what it means in the future of the dental profession in South Africa.

Supporting the musculoskeletal needs of dental clinicians

Dentistry is a discipline prone to professional burnout with signs / symptoms of low energy and motivation as well as a negative attitude towards self, work and others. Work-related musculoskeletal trouble and its possible sequelae, musculoskeletal disorders, may substantially affect the overall well-being of the dentist.

Each clinician has certain musculoskeletal needs that should be identified. This will depend on the extent of his / her prolonged static posture associated with simultaneous fine motor function. In the past ‘four handed dentistry’ has been touted as a method to counter the effects of developing musculoskeletal symptoms. This method speaks to the posture of the clinician but the reality is that prolonged static posture is still present. The following risk factors have been investigated for musculoskeletal disorders. Some par -

The use of magnification during the performance of regular clinical tasks may alleviate the frequency and intensity of musculoskeletal trouble. A qualitative study from Vancouver has investigated the effects of working with magnification on the musculoskeletal health of dental clinicians. Some partic-

It is proposed that at the earliest signs of musculoskeletal trouble the clinician should consult with a physiotherapist in order to tailor a maintenance program. The aim of any preventive / maintenance program is ultimately to prevent musculoskeletal trouble from developing into a musculoskeletal disorder.

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