

**PREVALENCE AND RISK FACTORS ASSOCIATED
WITH MUSCULOSKELETAL PAIN AMONG KWAZULU-
NATAL PUBLIC SECTOR ORAL HEALTH WORKERS,
2016**

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ABSTRACT

Introduction

Musculoskeletal pain (MSP) is a public health concern that affects millions of people in developed and developing countries. In 2015, MSP was ranked among the top ten leading causes of years of healthy life lost due to disability globally. In addition, the consequences of MSP include a wide range of negative effects such as absenteeism, increased work restriction and reduced productivity. Musculoskeletal pain is a major threat in the workplace among oral health workers (OHW). Studies that have been identified from South Africa focus mainly on OHW in the private sector. It remains unclear what the prevalence and risk factors of MSP are among OHW in the public sector.

Aim: To determine the prevalence and risk factors associated with musculoskeletal pain among oral health workers in public health facilities in KwaZulu-Natal.

Methods

An observational, cross-sectional study with an analytical component was implemented. Self-administered questionnaires were utilized to determine the risk factors among dentists, dentist (specialists), dental therapists, oral hygienists, and dental assistants employed in the public sector in KwaZulu-Natal. Descriptive and inferential statistics were used to analyse data. Alpha level was set at $p < 0.05$.

Results

A total of 266 questionnaires were analysed (response rate 83%). The prevalence of current MSP among OHW was 50.9% and the chronic prevalence of MSP reported for the previous 12 months was 60.6%. A higher prevalence of current (47.2%) and chronic (46.9%) MSP was reported among dentists when compared with dentist (specialists), dental therapists, oral hygienists, and dental assistants. The most common sites for MSP were the lower back, neck, and shoulder. Occupational, environmental, and psychological factors were strongly associated with MSP.

Conclusion

MSP is an occupational hazard for OHW. There is a need for educational programs and adoption of strategies to reduce occupational injuries.

Key words: Musculoskeletal pain, prevalence, work-related, oral health workers, risk factors, dentist, dental therapist, oral hygienist

DECLARATION

ITreshina Govender..... declare that

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SUPERVISOR DECLARATION

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Supervisor:

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Date: 24/3/2017

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ABBREVIATIONS

MSP - Musculoskeletal Pain

MSS - Musculoskeletal System

OHW - Oral Health Workers

LBP - Lower Back Pain

KZN - KwaZulu-Natal Province

CHC - Community Health Centre

CHAPTER 1: INTRODUCTION

1.1 Introduction

Musculoskeletal pain (MSP) is a public health concern that affects millions of people in developed and developing countries (1-5). MSP originates from any part of the musculoskeletal system (MSS) such the muscles and bones (2-3). Current MSP is pain lasting less than six weeks with chronic MSP lasting for more than three months (2-3). The most common types of MSP affecting oral health workers (OHW) are lower back pain (LBP), neck, shoulder, hand, and wrist pain (4, 6-10). OHW include dentists, dentist (specialists), dental therapists, oral hygienists, and dental assistants.

MSP was ranked among the top ten leading causes of years of healthy life lost due to disability globally in 2015 (1). MSP is reported to have a significant impact on quality of life as a result of pain and discomfort experienced by those who suffer from it (1-5). The consequences of MSP include a range of negative effects which includes absenteeism, increased work restriction and reduced productivity (5, 8-11). Moreover, MSP-related disorders place a huge burden on healthcare resources which includes hospitalization and other additional costs on medical bills (5, 11).

Studies conducted in Africa on MSP revealed that lifetime prevalence ranges from 28% to 74%, compared to 30% to 80% in Australia. In Africa in 2000, 14% to 72% of people were affected by MSP (12-13). Health care workers, in particular nurses, experience occupation-related MSP rates similar to those suffered by OHW (6-9, 14-16). The prevalence of MSP among nurses in Africa ranges from 65.4% to 80.8% (14-16).

The overall prevalence of MSP among South African private sector OHW is similar to international OHW, accounting for 54.2 to 99.1% and 52 to 88%, respectively (4, 6,17-19). MSP is a significant occupational health concern identified by OHW (4, 6, 17-18). Occupation-related MSP has been attributed to static muscular positioning, incorrect postures, and ergonomically poorly structured workplaces (3, 7, 14, 20-22). Occupation-related MSP was the leading cause of pain reported by 80% of South African OHW in 2011 (18).

Studies have revealed a number of risk factors associated with MSP in the general population (2, 19, 22-29). These include: age; gender; obesity; level of activity (physical fitness); smoking;

poor posture and alignment; psychological and social factors; and occupational factors, such as prolonged standing and sitting (2, 19, 22-29).

Musculoskeletal pain is a major threat in the workplace, mainly among OHW. The key occupational risk factors for OHW are: ergonomic structuring; job organization; improper work design; poor working conditions; anxiety; depression; and stress (16, 25, 30-31).

MSP is a growing occupational health and safety issue globally and this calls for better working environments (2, 3, 21, 32). The main focus should be to determine the key factors resulting in MSP and make appropriate changes. Simple and cost-effective changes can make a great impact. At home and in-office treatment recommended by a health care professional such as a physiotherapist can help reduce symptoms of MSP. Improving posture and creating an ergonomic work environment are some strategies to prevent occupation-related MSP (3, 32-33).

1.2 Problem statement

South African oral hygienists and dentists reported a high prevalence of neck pain of 66.5% and 77.9%, respectively (7, 18). Research that has been conducted among OHW in the private sector revealed that the prevalence of MSP ranges between 73% and 99.1 % (6-7, 17-20). Studies that have been identified from South Africa focus mainly on OHW in the private sector. It remains unclear what the prevalence and risk factors of MSP are among OHW in the public sector, compared to private sector OHW. The conditions of service and environmental factors for OHW in South Africa differ for public sector employees compared to their private sector counterparts. Hence, it is crucial to investigate the prevalence and risk factors associated with MSP among OHW in the public sector.

1.3 Significance of the study

The study sought to assess the prevalence of MSP among OHW in the public sector in KwaZulu-Natal (KZN). It investigated the risk factors associated with MSP experienced by OHW. Understanding and identifying the risk factors will help provide appropriate interventions such as education program/ training on ergonomics practice to reduce the incidence of MSP.

1.4 Research question

What are the prevalence and risk factors associated with MSP among OHW in the public sector in KwaZulu-Natal?

1.5 Purpose of the research

The purpose of this research was to determine the prevalence and risk factors associated with musculoskeletal pain among oral health workers in public health facilities in KwaZulu-Natal during 2016.

1.6 Specific objectives

The research has the following specific objectives:

- To measure the prevalence of MSP among oral health workers in the public sector.
- To describe the risk factors for MSP among oral health workers in the public sector.
- To test for associations between risk factors and MSP among oral health workers in the public sector.

1.7 Format of this dissertation

This dissertation is presented in five main chapters. A short description of each chapter is outlined below:

- Chapter 1 offers an introduction to the study and the burden of MSP is outlined. In this chapter, the background, aim and objectives for the study are highlighted.
- Chapter 2 is a review of the literature. In this chapter, the burden of MSP is highlighted. The risk factors contributing to MSP are discussed.
- Chapter 3 outlines the methods used to conduct the research. The study design, study population, data collection and sampling method are explained. The statistical methods used to analyse the data are described.
- Chapter 4 presents the results in the form of a journal article, including figures and tables. The findings of the study and the significance of the results obtained are discussed in manuscript format.
- Chapter 5 provides a conclusion of the study and recommendations for future research.

1.8 Summary of chapter

In Chapter 1, the burden of MSP both globally and in South Africa was identified. The risk factors affecting both the general population and among OHW were highlighted. Numerous studies have identified MPS among the private sector OHW; however, the public sector lacks research in this area. The gap in knowledge identified was that the public sector lacks research in identifying MSP and risk factors affecting OHW in KZN. Understanding and identifying risk factors will help create appropriate treatment/management for those OHW affected by MSP. The aim and the objectives of the study were identified. The chapters to follow were briefly outlined.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter will review studies conducted on the prevalence of musculoskeletal pain (MSP) and describe predisposing risk factors associated with MSP. The impact of MSP among general health workers and the general population will be discussed. Finally, the conceptual framework that underpins the study will be presented.

This literature review has been sourced from Pub Med, SABINET, and Google Scholar using the English language for the period from 2005 to 2016. The following key words were used in the electronic database search: musculoskeletal pain, prevalence, work-related, stress, oral health workers, risk factors, dentist, dental therapist, oral hygienist.

2.2 The burden of MSP on the population

2.2.1 The global burden of MSP

In 2015, musculoskeletal pain affected over 94 million people globally resulting in disability (1). The overall global prevalence of low back pain (LBP) was 17.2%, and neck pain was 21% (1). From 2005 to 2015, LBP and neck pain was the leading cause of years lived with disability globally (1).

A study conducted in Switzerland reported that an average of 8.2 working days per person were lost due to MSP in 2005, which resulted in a 4.4% of employees were responsible for 27.7% productivity loss due to reporting absent (11). The cost of treatment and management of MSP was estimated at \$2,074 per month with a total annual cost estimated at \$2.44 billion in Switzerland during 2005 (11).

A Japanese population survey showed a 15.4% prevalence of chronic MSP (5). The survey revealed the Japanese most frequently reported pain in the lower back (65%), neck (55%), shoulder (55%), knee and surrounding body areas (26%) (5). As a result, those affected by chronic MSP experienced reduced daily activities leading to economic deficits due to absenteeism/loss of employment or absenteeism/leaving school (5). The participants in the survey reported that they most frequently used massages, medication, physical therapy, and acupuncture as their choices of treatment/management for MSP. The cost of treatment was

estimated at \$24-121 per month; however, due to the high cost of treatment, almost 70 % of those in the study delayed getting treatment (5).

A cross-sectional survey conducted among dentists in China showed a MSP prevalence of 88% (17). The high prevalence was due to occupation-related MSP symptoms in the neck (83.8%) and shoulder (73.5%) areas. The factors highlighted by respondents were long working hours, inability to select correct size instruments and high job demands (17). This is similar to studies conducted among Iranian (73%) and Indian (99.05%) dentists reporting MSP in the past 12 months (6, 34).

2.2.2 The burden of MSP in Africa

A high prevalence of MSP was reported by nurses in Africa ranging from 65.4% to 80.8% (14-16). A systematic review in Africa found that the lifetime prevalence of MSP ranged from 28% to 74%, with an average prevalence among adolescents of 36% and 62% in adults (12). Occupation-related MSP among Nigerian nurses was found to have an overall prevalence of 78% and the point prevalence was 66.1% in a 12-month period (15). The study found that 24.4% of the nurses experienced occupation-related MSP for the first time during the first five years of employment, 20.2% as student nurse, and 19.3% experienced pain at between five and 15 years of employment (15). The overall study found that the lifetime prevalence of occupation-related MSP among nurses was 84.4 % (15). Though the prevalence of MSP was high among nurses, only 30.3% sought treatment for pain (15). Poorer countries in Africa are faced with burgeoning costs of treatment/ management of MSP with over a billion U.S. dollars spent each year (12).

2.2.3 The burden of MSP in South Africa

The overall prevalence of MSP among OHW in the South African private sector ranged between 54.2% and 99.1% (18-20). The most frequent causes of MSP reported were occupation-related activities such as hand-scaling and poor body positioning (7-9, 18-20).

A majority of private dentists from KZN reported a high incidence (49.3%) of occupation-related MSP in the vertebral region (19). Poor ergonomic work posture and position accounted for the overall high incidence of 54.2% (19). A staggering 99.1% prevalence was reported in 2011 by private dentists practicing in KZN (18). Dentists practicing in the 11 o'clock position reported a greater degree (80.8%) of pain due to increased flexure of the vertebrae, whereas those using the 4 o'clock position experienced no symptoms (19).

South African dentists reported MSP predominantly in the neck (77.9%), shoulder (72.4%), and lower back (69.8%) areas (20). A similarly high prevalence of occupation-related MSP in the neck (66.5%), lower back (59.6%), and shoulder (56.6%) were noted among South African oral hygienists (7). The associated factors for oral hygienists were daily hand-scaling, operator stools that were immobile and patients' chairs that were poorly adjustable (7). Daily hand-scaling was found to be associated with pain in the hand, wrist, and shoulders (7). Neck and shoulder strain resulted from constant static placement of the hand during scaling. However, these studies had a majority of private sector respondents (7).

2.3 Demographic factors associated with MSP

2.3.1 Age

Age is a risk factor and a predisposing factor associated with MSP (5- 6, 15, 34). The association between MSP and age was frequently related to age category (6, 9, 34). Older age categories such as 30 to 50 years are considered to have a higher prevalence (36%) of MSP (5- 6, 9). In a different study, a high prevalence of MSP (71.4%) was reported by nurses in the age category 41 to 50 years (15). In contrast, an Indian study found that younger (20-29 years) dentists experienced more pain in the wrist/hand (98.5%), shoulder (89.71%), and in the neck (85.04%), compared to their older colleagues (34).

2.3.2 Gender

The association between MSP and gender has shown statistical significance in some studies while others report no association with MSP (6, 15, 17, 21, 31, 34). The overall prevalence of MSP (48.5% to 82.9%) experienced by females outweighs that for their male counterparts (20% to 70.9%) (6, 17, 33). Among female nurses, it was reported they were 2.26 times more likely to experience MSP, compared to males (14). In a survey conducted among Iranian dentists, it was found that females have a greater risk of developing occupation-related disorders of the upper limbs (6). The survey found females (48.5%) scored higher in developing upper limb complications, compared to males (33.9%). This suggests that females are more likely to develop moderate to severe posture problems, although males had a higher response rate in this study (6). Similarly, 72% of female dental students reported experiencing occupation-related MSP, compared to 20% of males (20%) (33). In contrast, a study done among Indian dentists found that males experienced a higher prevalence of LBP (98%), while females had higher prevalence of neck pain (92%) (34). Due to the structural, physiological, and anatomical differences that exist between males and females, there have been conflicting results with regard to the effect of gender on MSP (6, 15, 17, 21, 33-34).

2.3.3 Body mass index

Body mass index (BMI) is calculated using individual weight in kilograms divided by the square of the height in metres (kg/m^2). WHO classifies normal BMI to be between 18 and 25, overweight as a BMI over or equal to 25, and obese as a BMI of over or equal to 30 (35).

A systematic review found that lower limbs such as ankles and feet were most commonly affected due to obesity (26). Obesity has been found to result in an increased risk of dysfunction and deformities related to bones and joints (26, 35). A high risk of skeletal fractures was identified among the obese/overweight, compared to those with normal weight (26). This poses a great risk of developing chronic MSP (26, 35).

Although overweight and obese persons are more prone to MSP, the normal BMI group may experience MSP as well. In a study conducted among Indian dentists, neck pain was found to have the highest prevalence among those with a lower than normal BMI (34-35). Dentists with normal BMI showed a higher prevalence of MSP in the shoulder (34-35). Overweight dentists were more prone to pain in the neck, wrist/hand, and lower back areas (34). Obese dentists had experienced pain predominantly in the neck and hip areas (34).

Besides the weight of individuals resulting in MSP, height is a contributing factor as well. Shorter dentists were found to have a greater chance of developing neck pain (20). Variation in height was linked to direct vision during dental procedures by OHW, resulting in neck pain as well (6, 20).

2.4 Lifestyle factors associated with MSP

2.4.1 Smoking

On a cellular level, smoking reduces oxygen delivery to tissues, therefore resulting in tissue damage and injuries to the MSS (2, 27-28). The damaging effects caused by smoking have been linked to osteoporosis, reduced bone healing and lumbar disc disease (27). A cross-sectional survey conducted in Canada found that participants experiencing chronic back pain were 1.54 times more likely to smoke cigarettes daily than those without chronic back pain (36). Of the participants reporting chronic back pain, 23.3% reported smoking (36). A study conducted in the U.S.A. found that smokers were twice as likely to experience MSP in any body area (28). However, chronic arthritis was not found to be associated with daily cigarette smoking (36).

2.4.2 Alcohol

There have been many conflicting results regarding the influence of alcohol consumption on MSP (14, 28-29). The association between alcohol and frequency of MSP was found to be significant ($p < 0.05$) in a study conducted in Florida, U.S.A (24). Participants experiencing MSP in the study were found to self-medicate with alcohol, and younger participants were more likely ($p < .001$) to be consuming alcohol than older participants (24). Another study in the U.S.A. found that participants who consumed alcohol were five times ($OR=5.28$) more likely to experience severe symptoms in the hands/wrist area, while in Uganda, alcohol consumption was found to have a protective effect on reported MSP (14, 28). Excessive alcohol use impairs cognitive abilities and motor skills resulting in poor decisions made, reduced impulse control, and poor hand-eye coordination (33). Impaired cognitive and motor skills create a harmful environment with potential threats of becoming injured such as falling, physical violence, and drunken driving. Falling and physical violence can cause MSP during injury (25, 37).

2.5 Psychological factors

Chronic disabling MSP as a result of arthritis, rheumatism, and other bone or joint conditions was found to be associated with psychological disorders in a population survey conducted in Canada (23). Psychological stress is a known risk factor associated with MSP and showed a high risk (risk ratio 1.7) for reduced work ability and decreased work performance (38). Patients disgruntled due to long waiting hours and long queues create a stressful atmosphere for the OHW providing essential services (25). Stress has been found to increase muscle tension and tissue damage, adversely affecting the MSS (2, 15, 23, 37).

2.6 Occupational and environmental factors

MSP is the most common physical malady OHW experience daily (8-9, 32, 39). A number of studies have confirmed that prolonged standing during a dental procedure causes strain to the lower limbs in 32.8% of dentists (6-7, 17-19, 34). Retaining a static position during restoration and cleaning of the teeth, as well standing for long hours washing instruments, potentially leads to the development of MSP among OHW (8-9, 20, 32). In addition, standing for prolonged periods or working in the same position, and treating an excessive number of patients, were reported to cause MSP by 88.4% nurses in Nigeria (14-16).

A descriptive study conducted in Tehran, assessing seating and standing positions while working found a high prevalence of poor posture (3, 21). Poor posture among the OHW was

caused by frontal head (85.4%) positioning, rounded shoulder positioning (68.8%), while 18.8% of the participants were found to have an abnormal curvature of the spine (21).

Long working hours were found to increase the risk of MSP (7, 17-18). Hand numbness (19.4%) and tingling sensation (24.4%) were reported during clinical procedures when working hours extended for more than 7 hours per day (18). Oral hygienists reported significant ($p < 0.05$) hand symptoms when hand-scaling more than 5 hours per day (7). Continuous mechanical vibration from dental equipment and drilling equipment can also induce MSP (22, 32). Tools emitting vibrations such as sonic/ultrasonic scaling machines affect the hands as well as upper limbs, leading to changes in the neural, vascular and osteo-articular systems (3, 7, 22, 32, 39).

2.7 Interventions to reduce MSP

MSP is a growing occupational health and safety concern globally, and requires better working environments for all employees (1-3, 16, 18, 21). In Africa, 33% of people suffering from MSP were treated by their doctor or physiotherapist (12). The prevalence of MSP among OHW in the South African private sector ranged between 54.2% and 99.1% (18-20). The most common cause of MSP reported by OHW were occupation-related activities such as hand-scaling and poor body positioning (7-9, 18-20). The main focus of the study is to determine the key factors resulting in MSP and make appropriate changes.

Ergonomics is the science of adapting the work environment to suit the worker (3, 21). Proper ergonomic design of the workplace can prevent MSP, by creating an environment that reduces awkward positioning of the body (3, 18, 21). Training of employees and employers is vital in assessing ergonomically poor workstations and making relevant changes to improve employee health (3-4, 21). Muscle fatigue and inactivity in the workplace can be reduced by taking short breaks between activities, and by standing up and stretching of the muscles between activities (3).

Educational awareness campaigns related about MSP are conducted by health care workers to bring awareness and preventative information to the public as well as to other health care workers such as doctors (40-41). Preventative strategies include promoting the use of local physiotherapists in combination with at-home care. Simple and cost-effective changes such as use of home remedies for MSP include deep heat rubs, medication, and hot-cold packs. In

addition, keeping one's feet apart to help maintain balance during lifting at home can make a great impact (40).

Practical and educational interventions combined are methods used to reduce the frequency of MSP affecting OHW (3-4, 40-41). Interventions such as ergonomic practice, home-care and educational campaigns will help in reducing the occurrence of MSP. These changes can reduce expenditure for individuals and companies alike such as reducing number of sick days by having employees returning to work earlier provided they are placed to do light duty (3, 8, 32, 41).

2.8 Conceptual framework

The conceptual framework was used to underpin the study that has been developed from the literature review. It outlines the risk factors affecting OHW and appropriate interventions. The risk factors that have been identified are: demographic, lifestyle, psychological, occupational, and environmental factors. Demographic factors consist of age, gender, and BMI. Lifestyle factors are attributed to individual habits that include smoking and alcohol usage. Psychological factors comprise employment status, stress, anxiety, and depression. Occupational and environmental factors consist of workstation design, work-related injuries. Interventions identified to reduce MSP and provide preventative measures are ergonomic care, altering workstations, medical and alternative management methods for MSP, developing health policies and public awareness campaigns.

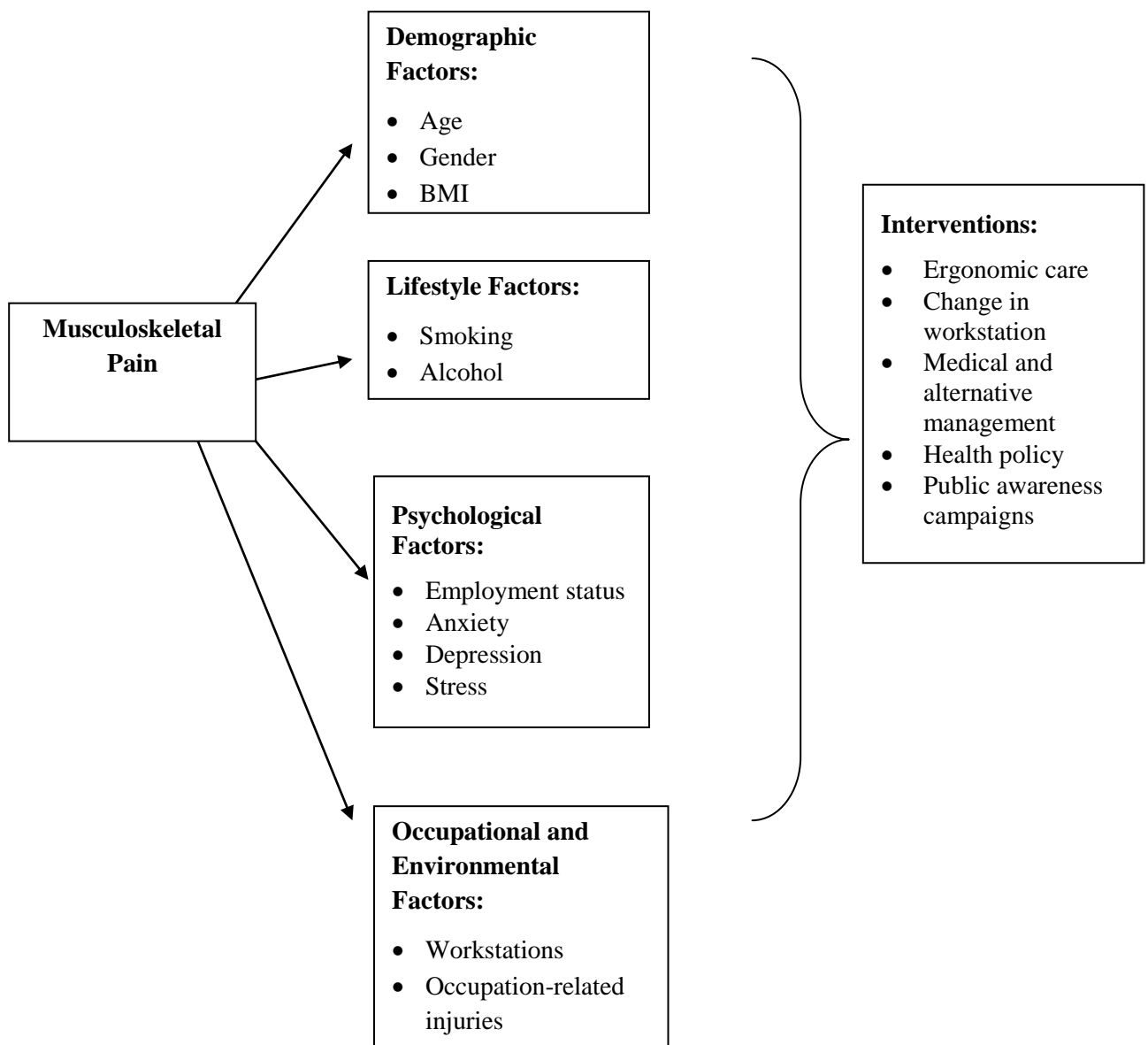


Figure 1: Conceptual framework: Factors contributing to MSP with interventions

CHAPTER 3: METHODS

3.1 Introduction

The research methodology is discussed in this chapter. The discussion includes the study design, study population, study setting, study period, sample population, data collection and analysis, and measures undertaken to ensure the validity of the study. The ethical considerations of the study will also be discussed.

3.2 Study setting

The study was based in KZN public sector health facilities. The study was conducted in all public districts, provincial and tertiary health facilities in KZN. It included dental departments from clinics, community health centres (CHC), and hospitals.

3.3 Study period

Ethical approval was obtained on 28 January 2016 (BE374/15). The pilot study began on 1 February 2016. The study data collection commenced on 5 February 2016 and continued until 10 May 2016.

3.4 Study design

An observational, cross-sectional study design with an analytic component was implemented.

3.5 Target population

The target population consisted of OHW [dentists, dentist (specialists), dental therapists, oral hygienists, and dental assistants] employed on a full-time basis in the public sector for Department of Health in KZN.

3.6 Study population

The study population consisted of dentists, dentist (specialists), dental therapists, oral hygienists, and dental assistants working at public health facilities in the KZN Department of Health. The inclusion criterion was at least one year of experience working in the public sector. Community service officers, interns, and new employees with less than one year work experience were excluded from the study.

3.7 Study sample and size

The study was based on OHW in the public sector from KZN. A purposive sample selection was chosen for the study. The low number of OHW in KZN prompted the use of all employed OHW in the public sector that met the inclusion criteria; that they have one year work experience in a government facility. The total number of OHW in KZN was 380. Out of the 380 employees, 60 OHW employed at the time were community service dentists, dental assistant and oral hygiene interns with less than a year work experience in the public sector. The total number of oral health workers that met the inclusion criteria was 320.

Staff Category	Number
Dentist	120
Dental Therapist	50
Dental Assistants	120
Oral Hygienist	30
TOTAL	320

Table 1: Occupational distribution of study sample

3.8 Data sources

3.8.1 Measurement instruments

The questionnaire (see Appendix 2) was modified from the Dutch Musculoskeletal Questionnaire and the Orebro Musculoskeletal Pain Questionnaire (OMPQ) (42). The modified questionnaire was compiled in the English language. The questionnaire was modified to include environmental and occupational factors specifically related to OHW in the public sector. The modified questionnaire was tested in the pilot study. The OMPQ is used to assess the risk of workers developing long-term disability or failing to return to work due to musculoskeletal injury. The dental department working environment was incorporated into the questionnaires. Sections 1 to 4 of the questionnaire covered personal characteristics, occupational factors, history of MSP, and general health.

Section 5 of the questionnaire consisted of psychological factors that have been identified as associated factors contributing to MSP. The Depression, Anxiety and Stress Scale (DASS 21) were used to measure the level of depression, anxiety, and stress related to the prevalence of MSP among OHW. All data were coded for the analysis phase.

	Depression	Anxiety	Stress
Normal	0-4	0-3	0-7
Mild	5-6	4-5	8-9
Moderate	7-10	6-7	10-12
Severe	11-13	8-9	13-16
Extremely	14+	10+	17+

Table 2: DASS 21 scoring tool

3.8.2 Variables measured in the questionnaire

MSP is defined as pain that originates from any part of the musculoskeletal system (MSS) such as the muscles and bones. Current MSP is pain lasting less than six weeks with chronic MSP lasting for more than three months (2-3).

3.8.2.1 Individual characteristics

Individual characteristics are personal factors relating to the participant. This section contained information relating to the participant's occupation, age, gender, height and weight, alcohol use and smoking history. Employment history was determined by identifying employment status and current work place.

3.8.2.2 Occupational factors

Work activities in a day and work environment were assessed in this section. It included possible factors contributing to MSP ranging from the work station to surrounding dental clinics. The section ended with opinion questions to obtain the views of the participants.

3.8.2.3 History of MSP

This section focused on MSP as experienced by the participant. The location, occurrence, and frequency were assessed.

3.8.2.4 General history

The general histories of the participants were obtained. The number of days absent from work and common medical conditions was identified.

3.8.2.5 Depression, anxiety and stress

The questionnaire concluded by using the psychological tool. This was to determine the level of depression, anxiety, and stress experienced by the participant.

3.9 Measures to ensure validity and reliability of the study

3.9.1 Internal validity

A possible bias identified is recall bias. The study was a 12-month prevalence study and therefore this requires the participant to recall events that transpired in the past year. Measures to reduce recall bias were to ensure the questions in the questionnaires were simple to understand and carefully constructed to ensure accuracy and completeness. The questions were specific and close-ended to reduce inappropriate answers. Information bias may pose a problem in terms of participants not understanding or completing the questionnaire correctly. Data were coded to reduce misclassification of information.

The research offered no direct benefits or incentives to the participants; therefore, reporting was to the participant's best knowledge. Reporting bias was reduced by having the data verified by the research supervisor as well as the biostatistician to prevent incorrect data analysis. Five incomplete questionnaires with significant missing data were disposed of and not used.

3.9.2 External validity/ generalizability

The study can be generalized to all public sector employed OHW from other provinces in South Africa in terms of risk factors such as psychological factors, occupational factors, and individual characteristics.

3.10 Data collection technique

3.10.1 Pilot study

The pilot study was conducted between 1 and 4 February 2016, with ten participants from the Gauteng public health sector. The aim of the pilot study was assess the modified questionnaire to determine irregularities in the questionnaire. Various OHW were sent electronic questionnaires to their private emails. The results showed no need for modifications to the research questionnaires. The results from the pilot study were not included in the data analysis of the main study.

3.10.2 Main study

The researcher met with various dental clinics in public health facilities in KZN. The researcher introduced the study to each dental clinic and explained the consent form procedure (See Appendix 1). The research questionnaires were left at the dental clinics for participants to complete, due to their high workload. The researcher collected the questionnaires within one week. The researcher also handed out questionnaires at district oral health meetings, and the questionnaires were returned on the same day. For participants that were difficult to reach, an electronic questionnaire was set up on the KZN Department of Health intranet main page for easy access by OHW. Electronic questionnaires were sent out to OHW with KZN Department of Health email addresses. An electronic questionnaire was set up using Google forms that had been sent out to private email addresses. The researcher contacted 320 dental staff personally, telephonically and electronically from 5 February to 10 May 2016. Six weekly reminders were sent to participants who had not responded.

3.11 Data management and storage

All data collected and information were kept strictly confidential and were only accessed by the researcher. All questionnaires were locked up in a drawer for security and safety. Electronic data were collected and stored to ensure no data was lost. A back-up system was set up off-site onto a flash drive. The data were captured into a Microsoft Excel spreadsheet and were then exported to the statistical program STATA 13.

3.12 Data analysis

Descriptive statistics, in the form of frequencies (count) and percentages, were computed. The data were presented in tables and figures. The overall prevalence of MSP was calculated by measuring the presence of current MSP, MSP in the past 6 months, and MSP in the past 12 months. Risk factors were compared and assessed against the presence of MSP. The dependent variable was 'the presence or absence of MSP'. The independent variables were personal characteristics, employment history, occupational factors, and psychological factors. The statistical tests performed were the Chi-square test and logistic regression reporting odds ratios, were conducted using the STATA 13 program. Multiple logistic regression analysis reporting odds ratio were used to investigate the association between MSP and the risk factors, controlling for potential confounders (age, gender) were considered.

3.13 Ethics and permissions

3.13.1 Institutional Review Board

The researcher had obtained ethical approval to conduct the study towards the Master of Public Health degree from UKZN. The Postgraduate Research and Higher Education Committee approval was granted on 12 August 2015. The Biomedical Research Ethics Committee (BREC) granted ethics approval on 28 January 2016 (BE374/15) (see Appendix 3).

3.13.2 Permissions

The KZN Provincial Department of Health- Health Research & Knowledge Management (HRKM) (HRKM374/15 KZ_2016RP49_761) granted permission for the study to be conducted on the 8 January 2016 (see Appendix 4).

3.14 Summary of the chapter

Chapter 3 discussed the method used during the research process. It stated the study site, the study design, the study period, the study population and sampling. It described the variables measured in the study, the data collection procedures and instruments, the measures taken to ensure study validity, data management and storage processes, data analysis, and the ethical considerations in this study.

CHAPTER 4: RESULTS

The results of the study are presented in this chapter in manuscript format. The manuscript will be submitted to the *South African Dental Journal*.

**PREVALENCE AND FACTORS ASSOCIATED WITH
MUSCULOSKELETAL PAIN AMONG ORAL HEALTH
WORKERS IN PUBLIC HEALTH FACILITIES IN KWAZULU-
NATAL**

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ABSTRACT

INTRODUCTION

Musculoskeletal pain (MSP) is a public health concern that affects millions of people in developed and developing countries. In 2015, MSP was ranked among the top ten leading causes of years of healthy life lost due to disability globally. In addition, the consequences of MSP include a wide range of negative effects such as absenteeism, increased work restriction and reduced productivity. Musculoskeletal pain is a major threat in the workplace among oral health workers (OHW). Studies that have been identified from South Africa focus mainly on OHW in the private sector. It remains unclear what the prevalence and risk factors of MSP are among OHW in the public sector.

AIM: To determine the prevalence and factors associated with musculoskeletal pain among oral health workers in public health facilities in KwaZulu-Natal.

METHODS

An observational, cross-sectional study with an analytical component was implemented. Self-administered questionnaires were utilized to determine the risk factors among dentists, dentist (specialists), dental therapists, oral hygienists, and dental assistants employed in the public

sector in KwaZulu-Natal. Descriptive and inferential statistics were used to analyse data. Alpha level was set at $p < 0.05$.

RESULTS

A total of 266 questionnaires were analysed (response rate 83%). The prevalence of current MSP among OHW was 50.9% and the chronic prevalence of MSP reported for the previous 12 months was 60.6%. A higher prevalence of current (47.2%) and chronic (46.9%) MSP was reported among dentists when compared with dentist (specialists), dental therapists, oral hygienists, and dental assistants. The most common sites for MSP were the lower back, neck, and shoulder. Occupational, environmental, and psychological factors were strongly associated with MSP.

CONCLUSION

MSP is an occupational hazard for OHW. There is a need for educational programs and adoption of strategies to reduce occupational injuries.

Key words: Musculoskeletal pain, prevalence, work-related, oral health workers, risk factors, dentist, dental therapist, oral hygienist

INTRODUCTION

Musculoskeletal pain (MSP) is a public health concern that affects millions of people in developed and developing countries.¹⁻⁵ MSP originates from any part of the musculoskeletal system (MSS) such the muscles and bones.²⁻³ Current MSP is pain lasting less than six weeks and chronic MSP is pain lasting for more than three months.²⁻³ The most common types of MSP affecting oral health workers (OHW) are lower back pain (LBP), neck, shoulder, hand, and wrist pain.^{4,6-9} OHW include dentists, dentist (specialists), dental therapists, oral hygienists, and dental assistants.

In 2015, musculoskeletal pain affected over 94 million people globally resulting in disability¹. The overall global prevalence of low back pain (LBP) was 17.2%, and neck pain was 21%¹. From 2005 to 2015, LBP and neck pain was the leading cause of years lived with disability globally.¹ MSP is reported to have a significant impact on quality of life as a result of pain and discomfort experienced by those who suffer it.¹⁻⁵ MSP has a range of negative effects which include absenteeism, increased work restriction and reduced productivity.^{5,8-11} Moreover, MSP-related disorders place a huge burden on health care resources, including hospitalization and other additional costs on medical bills.^{5,8}

In Africa, 14% to 72% of people were affected by MSP in 2000.¹²⁻¹³ Health care workers, in particular nurses, experience occupation-related MSP rates similar to those suffered by OHW. The prevalence of MSP among nurses in Africa ranges from 65.4% to 80.8%.¹⁴⁻¹⁶

Musculoskeletal pain is a major threat in the workplace among OHW.^{9,17} The key occupational risk factors for OHW are ergonomic structuring, job organization, improper work design, poor working conditions, anxiety, depression, and stress.^{16,18-20}

Studies that have been identified from South Africa focus mainly on OHW in the private sector. It remains unclear what are the prevalence and risk factors of MSP among OHW in the public sector. The conditions of service and environmental factors for OHW in South Africa differ for public sector employees compared with their private sector counterparts. Hence, it is crucial to investigate the prevalence and factors associated with MSP among OHW in the public sector.

The aim of the study sought to assess the prevalence of MSP among OHW in the public sector in KwaZulu-Natal (KZN). It investigated the risk factors associated with MSP experienced by OHW. Understanding and identifying the risk factors will help provide appropriate interventions such as education program/ training on ergonomics practice to reduce the incidence of MSP.

METHODS

An observational, cross-sectional study design with an analytic component was implemented. The study was conducted in all public health facilities in KZN. It included dental departments from clinics, community health centres (CHC), and hospitals.

All dentists, dentist (specialists), dental therapists, oral hygienists, and dental assistants working in the public sector for at least one year were invited to participate. Purposive sampling was used. The total number of OHW who met the inclusion criteria were 320. OHW who met the inclusion criteria were sent a questionnaire via email. OHW were sent six weekly reminders by email over a period of four months; those who had not completed the questionnaire were contacted by telephone.

A standardized self-administered questionnaire was used to determine the prevalence of MSP and its associated risk factors. The questionnaire was modified from the Dutch Musculoskeletal Questionnaire and the Orebro Musculoskeletal Pain Questionnaire (OMPQ).²¹ The questionnaire was pre-tested through a pilot study to ensure that it was user friendly. For the pilot study, ten OHW were selected from the Gauteng public sector. The variables measured in the questionnaire included personal factors, occupational, and environmental factors, history of MSP, and psychological factors.

The data were captured into a Microsoft Excel spreadsheet and were then exported to STATA 13. The statistical tests performed were the Chi-square test and logistic regression reporting odds ratios. All missing or incomplete data were omitted. Ethical approval to conduct the study was granted by the UKZN Postgraduate Research and Higher Education Committee, Biomedical Research Ethics Committee (BREC) (BE374/15) and the KZN Provincial Department of Health- Health Research & Knowledge Management (HRKM) (HRKM374/15 KZ_2016RP49_761) granted ethics approval as well.

RESULTS

A total of 320 questionnaires were administered, of which 266 were adequately completed, yielding an 83% response rate. Participants in this study comprised of dentists (40.6%), dental assistants (33.5%), dental therapists (13.9%), oral hygienists (9.8%), and dentist (specialists) (2.3%). The average age was 34 years (standard deviation= 10.12). Most of the participants were female (71.4%), aged between 20-29 years (41.7%), with normal BMI (39.1%). The majority of OHW had worked in the dental department (74.1%) and public sector (71.8%) for less than 10 years (Table 1).

The prevalence of current MSP among OHW was 50.9% and the chronic prevalence of MSP reported for previous 12 months was 60.6%. A higher prevalence of current (47.2%) and chronic (46.9%) MSP was reported among dentists when compared with dentist (specialists), dental therapists, oral hygienists, and dental assistants. This was significant with current MSP ($p=0.01$) and chronic MSP ($p < 0.001$). Being a dentist (current MSP: OR: 2.12; 95% CI: 1.18-3.82; chronic MSP: OR: 3.63; 95% CI: 1.86-7.09) had significantly increasing odds in participants who reported MSP, while obesity was significantly associated with chronic MSP ($p=0.03$; OR: 0.47) the odds of being affect by chronic MSP was low (Tables 2 and 3).

Overall, the most common areas of pain reported for current MSP were: lower back ($n=154$, 48.1%), neck ($n=155$, 48.4%), shoulder ($n=152$, 47.5%), and upper back ($n=152$, 47.5%). In addition, the most common areas of pain reported for chronic MSP were: neck ($n=185$, 57.8%), lower back ($n=183$, 57.2%), and shoulder ($n=181$, 56.6%) areas (Figure 1). In addition, hand, wrist and forearm pain were reported as the most severe level of pain experienced by OHW.

Of OHW who had worked in the dental department for 0-10 years, 69.3% reported current and 72.7% reported chronic MSP. There was a significant association between working in the dental department for 11-20 years for current ($p=0.01$) and chronic ($p=0.01$) MSP. Working in a provincial (current: $p < 0.001$; chronic: $p=0.01$) or district health facility (current: $p=0.01$; chronic: $p=0.03$) was found to be associated with MSP (Tables 4 and 5).

Among workplace factors, standing and working ($p < 0.001$), working in the same position ($p=0.05$), and reaching/working away from the body ($p < 0.001$) were significantly associated with current MSP. In addition, participants who felt rushed to complete patients for the day (current MSP: OR: 4.10; 95% CI: 2.05 to 8.20; chronic MSP: OR: 2.79; 95% CI: 1.39 to 5.65) and those experiencing trembling during working (current MSP: OR: 2.77; 95% CI: 1.45 to

5.30; chronic MSP: OR: 2.15; 95% CI: 1.09 to 4.24) showed significant associations with MSP (Tables 6 and 7).

Sitting and working ($p=0.01$) and carrying/lifting or moving heavy materials or equipment ($p=0.03$) were shown to be associated with chronic MSP. Working in a cramped/awkward space showed a significant association with current ($p=0.01$) and chronic ($p=0.03$) MSP.

Several psychosocial factors were considered and a significant association was found between those suffering with mild levels of anxiety and current MSP ($p=0.05$). Anxiety and depression during the day were experienced by 51.5% of participants and there was a significant association ($p=0.01$) with current MSP (Table 8).

Table 1: Demographic distribution and employment history of study sample

Personal Characteristics	Category	No. of Participants	% of total Participants
Professional profile	Dentist (specialist)	6	2.3%
	Dentist	108	40.6%
	Dental Therapist	37	13.9%
	Oral Hygienist	26	9.8%
	Dental Assistant	89	33.5%
Age	20-29 years	111	41.7%
	30-39 years	81	30.5%
	40-49 years	44	16.5%
	Older than 50	30	11.3%
Gender	Male	76	28.6%
	Female	190	71.4%
BMI*	Normal	104	39.1%
	Overweight	98	36.8%
	Obese	64	24.1%
Smoking	Never smoked	148	55.6%
	Ex-smoker	28	10.5%
	Current smoker	17	6.4%
Alcohol consumed	General usage	89	33.5%
Employment History			
Years worked in dental department	0-10	197	74.1%
	11-20	48	18.1%
	21-30	16	6.0%
	31-40	5	1.9%
Years worked in public sector	0-10	191	71.8%
	11-20	51	19.2%
	21-30	18	6.8%
	31-40	6	2.3%
Health facility worked in most	Hospital	174	65.4%
	CHC**	57	21.4%
	Clinic	30	11.3%
	Other	5	1.9%
Health institution presently working in	Tertiary	11	4.1%
	Provincial	84	31.6%
	District	159	59.6%
	Other	12	4.5%

*BMI- Body Mass Index

** CHC- Community Health Centres

Table 2: Demographic associations with current MSP

Personal Characteristics	Category	MSP n (%)	Odds ratio	95% CI	p-value
Professional profile	Dentist (specialist)	4 (2.5%)	1.71	0.29 - 9.81	0.55
	Dentist	77 (47.2%)	2.12	1.18 - 3.82	0.01***
	Dental Therapist	20 (12.2%)	1.00	0.46 - 2.17	0.99
	Oral Hygienist	20 (8.6%)	1.00	0.41 - 2.39	0.99
	Dental Assistant	48 (29.5%)	1.00	0.42 - 2.41	0.99
Age	20-29 years	63 (38.7%)	0.71	0.39 - 1.30	0.27
	30-39 years	52 (31.9%)	0.97	0.50 - 1.88	0.93
	40-49 years	29 (17.8%)	1.29	0.65 - 2.57	0.46
	Older than 50	19 (11.7%)	1.16	0.52 - 2.56	0.72
Gender	Male	49 (30.1%)	1.21	0.69 - 2.10	0.49
	Female	114 (69.9%)	0.83	0.47 - 1.43	0.49
BMI *	Normal	63 (38.7%)	0.80	0.42 - 1.54	0.51
	Overweight	58 (35.6%)	0.76	0.39 - 1.46	0.41
	Obese	42 (25.8%)	1.28	0.71 - 2.29	0.41
Smoking	Never smoked	91 (55.8%)	0.98	0.59 - 1.62	0.94
	Ex-smoker	20 (12.3%)	1.44	0.57 - 3.64	0.44
	Current smoker	11 (6.8%)	0.92	0.31 - 2.69	0.87
Alcohol consumed	General usage	60 (36.8%)	1.40	0.79 - 0.46	0.25

Level of significance ≤ 0.05
 ***statistically significant

*BMI- Body Mass Index ** CHC- Community Health Centres

Table 3: Demographic association with chronic MSP

Personal Characteristics	Category	MSP (%)	Odds Ratio	95% CI	p-value
Professional Profile	Dentist (specialist)	4 (2.1%)	1.36	0.23 - 7.81	0.73
	Dentist	91 (46.9%)	3.63	1.86 - 7.09	<0.001***
	Dental Therapist	26 (13.4%)	1.60	0.71 - 0.65	0.26
	Oral Hygienist	20 (10.3%)	2.26	0.83 - 6.19	0.11
	Dental Assistant	53 (27.3%)	0.37	0.21 - 0.66	<0.001***
Age	20-29 years	77 (39.7%)	0.95	0.44 - 2.04	0.89
	30-39 years	63 (32.5%)	1.47	0.64 - 3.37	0.37
	40-49 years	31(15.9%)	0.72	0.25 - 2.11	0.55
	Older than 50	23 (11.9%)	1.38	0.47 - 3.99	0.55
Gender	Male	59 (30.4%)	1.41	0.76 - 2.64	0.28
	Female	135 (69.6%)	0.71	0.38 - 1.32	0.28
BMI *	Normal	81 (41.8%)	1.21	0.63 - 2.31	0.57
	Overweight	73 (37.6%)	0.83	0.43 - 1.58	0.57
	Obese	40 (20.6%)	0.47	0.24 - 0.94	0.03***
Smoking	Never smoked	109(56.2%)	1.06	0.61 - 1.83	0.84
	Ex- smoker	22 (11.3%)	1.21	0.44 - 3.36	0.71
	Current smoker	14 (7.2%)	1.61	0.43 - 6.04	0.48
Alcohol consumed	General usage	67(34.5%)	1.10	0.59 - 2.04	0.76

Level of significance ≤ 0.05 *BMI- Body Mass Index ** CHC- Community Health Centres

***statistically significant

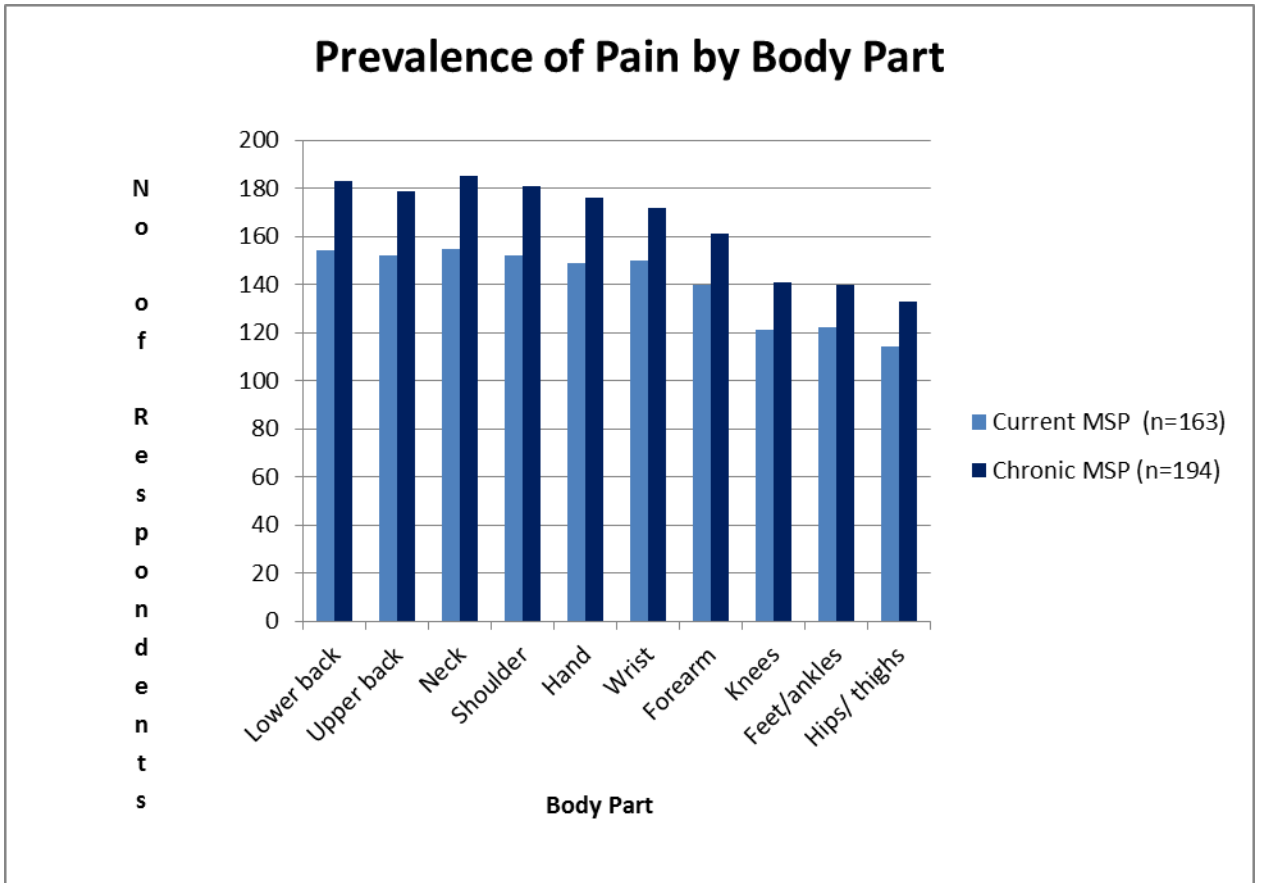


Figure 1: Prevalence of pain by body part

Table 4: Employment history associated with current MSP

Personal characteristics	Category	MSP (%)	Odds ratio	95% CI	p-value
Years worked in dental department	0-10	113 (69.3%)	1.73	0.62 - 4.83	0.29
	11-20	39 (23.9%)	5.57	1.64 - 18.97	0.01***
	21-30	7 (4.3%)	0.19	0.02 - 2.15	0.18
	31-40	4 (2.5%)	5.14	0.46 - 56.89	0.18
Years worked in public sector	0-10	112 (68.7%)	0.61	0.23 - 1.60	0.32
	11-20	38 (23.3%)	1.23	0.22 - 6.83	0.82
	21-30	9 (5.5%)	0.61	0.23 - 1.60	0.32
	31-40	4 (2.5%)	1.23	0.22 - 6.83	0.82
Health facility worked in most	Hospital	109 (66.9%)	3.35	0.29 - 37.72	0.33
	CHC **	38 (23.3%)	4.00	0.34 - 46.95	0.27
	Clinic	15 (9.2%)	2.00	0.16 - 24.48	0.59
	Other	1 (0.6%)	-	-	-
Health institution presently working in	Tertiary	4 (2.5%)	2.86	0.40 - 20.14	0.29
	Provincial	59 (36.2%)	11.8	2.41 - 57.78	<0.001***
	District	98 (60.1%)	8.03	1.70 - 37.90	0.01***
	Other	2 (1.2%)	0.35	0.05 - 2.47	0.29

Level of significance ≤ 0.05
 ***statistically significant

*BMI- Body Mass Index

** CHC- Community Health Centres

Table 5: Employment history associated with chronic MSP

Personal characteristics	Category	MSP (%)	Odds ratio	95% CI	p-value
Years worked in dental department	0-10	141 (72.7%)	1.68	0.27 - 10.32	0.58
	11-20	43 (22.2%)	3.41	1.29 - 9.07	0.01***
	21-30	7 (3.6%)	0.31	0.11 - 0.869	0.03***
	31-40	3 (1.6%)	0.59	0.09 - 3.66	0.58
Years worked in public sector	0-10	135 (69.6%)	1.53	0.56 - 4.16	0.40
	11-20	45 (23.2%)	4.77	1.33 - 17.07	0.02***
	21-30	11 (5.7%)	1.57	0.24 - 10.09	0.63
	31-40	3 (1.6%)	0.64	0.09 - 4.09	0.63
Health facility worked in most	Hospital	124 (63.9%)	9.92	1.08 - 90.95	0.04***
	CHC **	47 (24.2%)	18.80	1.89 - 186.61	0.01***
	Clinic	22 (11.3%)	11.00	1.06 - 113.73	0.04***
	Other	1 (0.5%)	0.17	0.015 - 1.97	0.16
Health institution presently working in	Tertiary	7 (3.6%)	2.45	0.46 - 13.16	0.29
	Provincial	67 (34.5%)	5.52	1.56 - 19.55	0.01***
	District	115 (59.3%)	3.66	1.10 - 12.13	0.03***
	Other	5 (2.6%)	0.41	0.07 - 2.19	0.29

Level of significance ≤ 0.05
 ***statistically significant

*BMI- Body Mass Index ** CHC- Community Health Centres

Table 6: Occupational and environmental factors associated with current MSP

Occupational Factors	Odds ratio	95% CI	p-value
Time spent standing and working	1.52	1.15 - 2.02	<0.001***
Working in the same position for long periods of time	0.17	0.03 - 1.01	0.05***
Reaching or working away from your body	8.38	2.02 - 34.73	<0.001***
Do you feel rushed to finish patients in a day?	4.10	2.05 - 8.20	<0.001***
Do you find yourself unable to complete the task due to MSP?	2.59	1.29 - 5.20	0.01***
Have you experienced trembling during work of your hands, shoulder or knees?	2.77	1.45 - 5.30	<0.001***
Chair-side assistance	0.83	0.61 - 1.13	0.24
Time spent sitting and working	1.31	0.94 - 1.81	0.11
Carrying/lifting or moving heavy materials and equipment (e.g. on a school visit)	0.60	0.28 - 1.31	0.20
Environmental Factors			
Do you work in a cramped/awkward space?	2.35	1.28 - 4.34	0.01***

Level of significance ≤ 0.05
 ***statistically significant

*BMI- Body Mass Index

** CHC- Community Health Centres

Table 7: Occupational and environmental factors associated with chronic MSP

Occupational Factors	Odds ratio	95% CI	p-value
Time spent standing and working	1.09	0.81 - 1.48	0.57
Working in the same position for long periods of time	0.91	0.21 - 4.03	0.90
Reaching or working away from your body	2.24	0.71 - 7.09	0.17
Do you feel rushed to finish patients in a day?	2.79	1.39 - 5.61	<0.001***
Do you find yourself unable to complete the task due to MSP?	0.97	0.46 - 2.06	0.94
Have you experienced trembling during work of your hands, shoulder or knees?	2.15	1.09 - 4.24	0.03***
Chair-side assistance	0.73	0.53 - 1.01	0.06
Time spent sitting and working	1.66	1.15 - 2.39	0.01***
Carrying/lifting or moving heavy materials and equipment (e.g. on a school visit)	0.36	0.15 - 0.89	0.03*
Environmental Factors			
Do you work in a cramped/awkward space?	2.07	1.08 - 3.98	0.03***

Level of significance ≤ 0.05
 ***statistically significant

*BMI- Body Mass Index ** CHC- Community Health Centres

Table 8: Psychological factors associated with current MSP

Personal Characteristics	Category	MSP n (%)	Odds ratio	95% CI	p-value
Depression	Normal	112 (68.7%)	0.59	0.15 - 2.36	0.46
	Mild	10 (6.1%)	0.71	0.13 - 3.87	0.69
	Moderate	34 (20.9%)	1.86	0.93 - 3.74	0.08
	Severe	2 (1.2%)	1.43	0.13 - 15.98	0.77
	Extremely severe	5 (3.1%)	1.78	0.34 - 9.40	0.49
Anxiety	Normal	85 (52.2%)	0.18	0.06 - 0.55	<0.001***
	Mild	15 (9.2%)	0.27	0.07 - 1.02	0.05***
	Moderate	38 (23.3%)	0.38	0.11 - 1.27	0.12
	Severe¹	12 (7.4%)	-	-	-
	Extremely severe	13 (7.9%)	2.33	0.74 - 7.36	0.15
Stress	Normal	125 (76.7%)	0.45	0.12 - 0.70	0.24
	Mild	15 (9.2%)	2.50	0.35 - 17.94	0.36
	Moderate	14 (8.6%)	1.90	0.66 - 0.45	0.23
	Severe	7 (4.3%)	2.37	0.48 - 1.68	0.29
	Extremely severe	2 (1.2%)	1.36	0.12 - 15.18	0.80
Do you experience anxiety/ depression during the day?		84 (51.5%)	0.37	0.17 - 0.77	0.01***

Level of significance ≤ 0.05 *BMI- Body Mass Index ** CHC- Community Health Centres

***statistically significant

¹ Dash (-) value indicates: Severe Anxiety and Extremely Severe Stress was omitted because of collinearity

Table 9: Psychological factors associated with chronic MSP

Personal Characteristics	Category	MSP (%)	Odds ratio	95% CI	p-value
Depression	Normal	141 (72.7%)	1.08	0.20 - 5.76	0.92
	Mild	11 (5.7%)	0.88	0.12 - 6.19	0.89
	Moderate	35 (18%)	1.17	0.19 - 6.82	0.86
	Severe	2 (1%)	0.80	0.04 -14.64	0.88
	Extremely severe	5 (2.6%)	1.25	0.07- 22.88	0.88
Anxiety	Normal	110 (56.7%)	0.69	0.21 - 2.22	0.53
	Mild	16 (8.3%)	0.61	0.15 - 2.51	0.49
	Moderate	43 (22.2%)	1.20	0.32 - 4.42	0.78
	Severe ¹	12 (6.2%)	-	-	-
	Extremely severe	13 (6.7%)	1.44	0.45 - 4.66	0.53
Stress	Normal	151 (77.8%)	0.64	0.13 - 3.18	0.59
	Mild	16 (8.3%)	4.57	0.35 - 59.10	0.24
	Moderate	17 (8.8%)	2.42	0.28 - 20.82	0.42
	Severe	7 (3.6%)	1.55	0.31 - 7.67	0.59
	Extremely severe ¹	3 (1.6%)	-	-	-
Do you experience anxiety/ depression during the day		97 (50%)	0.60	0.29 - 1.23	0.17

Level of significance ≤ 0.05
 ***statistically significant

*BMI- Body Mass Index

** CHC- Community Health Centres

DISCUSSION

This study assessed the prevalence and risk factors associated with MSP among OHW working in public health facilities in KZN. The prevalence of current MSP was 50.9 % and chronic MSP was 60.6%, which is consistent with a study conducted among OHW (54.2 – 99.1%) in South Africa.^{11, 22}

Dentists in the current study were found to have the highest prevalence of MSP when compared with dentist (specialists), dental therapists, oral hygienists, and dental assistants. A statistically significant positive association was found between being a dentist and current and chronic MSP. These findings are similar to the prevalence from a study done among private dentists (54.26%) in KZN.²² The higher prevalence of MSP among dentists in this study could be a result of the nature of the dental procedures they are expected to perform, including tooth extraction, scaling, and restoration, as well as the high volume of patients seen in most public health facilities.^{9,17} A study in Poland found that 63.6% of dentists, who performed dental procedures without a dental assistant, resulted in them assuming awkward body positions which could lead to development of MSP.^{9-10,23} In South Africa, there is one dentist for every 50,000 people, which places a great burden on public sector dentists.²⁴ Public sector OHW attending to more patients in the day reported a higher prevalence of MSP compared to those attending to fewer patients in Saudi Arabia.⁹

A majority of female participants suffered from current MSP (69.6%) or chronic MSP (69.9%) respectively. The findings of this study concur with studies done among OHW in Iran, China, and Saudi Arabia which reported a high prevalence of MSP among females.^{6,9,25} Public sector female OHW in Saudi Arabia were found to experience a longer duration of pain compared to males.⁹ In contrast, South African male dentists reported a high prevalence of MSP in the neck,

shoulder, and lower back (79.6%, 73.3%, and 70.1%) than females (74.8%, 70.7%, and 69.1%).²⁶ However, no significant association was identified between gender and MSP in this study.

Overweight participants reported a higher percentage of current (35.6%) and chronic (37.6%) MSP. Obesity was significantly associated with chronic MSP in this study. Though obesity was found to be associated a protective relationship was identified with chronic MSP. A longitudinal population study in Norway identified that obese people had a 20% higher risk of experiencing chronic MSP compared with those of normal weight.²⁷ Similarly, for dentists in an Indian study, overweight and obesity were found to be associated with MSP.²³

Among occupation-related factors, a career duration of 11-20 years of employment was significantly associated with current ($p=0.01$) and chronic ($p=0.01$) MSP, respectively. The findings of this study concur with a Tunisian study which found that there was significant association between being employed on long service ($p=0.001$) and MSP.¹⁰ In addition, a study in Saudi Arabia found that the majority of participants employed in the public sector for five years or more had a high prevalence of MSP.⁹

The lower back, neck, shoulder, hand, and wrist are the most painful body sites reported by OHW in this study; this is similar to OHW in the public sector in Thailand.¹⁷ Level of pain reported globally by OHW ranged between: lower back (54%-72.01%), neck (48%-75.74%), and shoulder (48%-69.4%) areas.^{4,18,17,26}

Occupational factors were significantly associated with current MSP when participants were standing and working ($p=0.00$), working in the same position ($p=0.05$), and reaching/working

away from the body ($p=0.00$). Tunisian health care workers were found to have occupation-related MSP caused by prolonged standing or sitting ($p=0.023$; $p=0.016$).¹⁰ Awkward back posture while standing to extract teeth, repetitive shoulder/hand movements, and use of vibrating tools were also associated with MSP by OHW in the public sector from Thailand and Saudi Arabia.^{9,17} Participants in this study reported that they were unable to complete tasks due to MSP and experienced trembling while working. Dental procedures such as scaling and restoration were identified by 81% of dentists in KZN as causes of hand pain, which can be associated with trembling experienced during procedures.^{7,9,11,17} Furthermore, extended hand-scaling for more than five hours per day by oral hygienists was significantly associated ($p=0.05$) with hand pain.⁷

Sitting and working ($p=0.01$) and carrying/lifting or moving heavy materials or equipment ($p=0.03$) were shown to be associated with chronic MSP in this study. Dental procedures while seated were considered as high risk occupation-related factors associated with MSP among public sector OHW in Thailand.¹⁷ South African oral hygienists reported experiencing neck (66.5%) and shoulder (56.6%) pain associated with time spent on poor seating.⁷ Incorrect seating position was identified as a major cause of MSP among dentists in KZN as well.²² OHW in this study reported working in a cramped/awkward space to be strongly associated with current ($p=0.01$) and chronic ($p=0.03$) MSP. Clinical procedures were associated with neck pain resulting in the OHW rotating the neck and tilting the shoulders towards the dominant hand, causing awkward posture.¹¹ Lower back pain was a complaint related to inability of OHW to adjust the dental chair, resulting in standing or sitting in awkward positions.⁷

In this study, depression and anxiety were identified to affect OHW with current MSP more than those with chronic MSP. When participants were asked if they suffer from anxiety/depression during the day, 51.5% reported that they had, which was significantly

associated ($p=0.01$) with current MSP. The odds of OHW being affected by anxiety/depression during the day were lower among OHW affected by current MSP. The findings show statistical significant and may indicate that anxiety/ depression during the day may indicate the risk of current MSP is a protective factor for anxiety/ depression.

Similarly, depression ($p=0.001$) and anxiety ($p=0.001$) were significantly associated with MSP in a study from the USA and Qatar.^{28,29} The study in the USA found health workers with upper and lower MSP reported experiencing depression and anxiety compared to those without MSP.²⁸ Depression and anxiety were associated with feelings of fear, feeling down and hopelessness among health workers which caused interferences in their work.^{28, 29} Psychological factors such as depression and anxiety associated with MPS needs to further assessed and managed to prevent health workers from developing negative thoughts such as suicide.^{28,29}

LIMITATIONS OF THE STUDY

The inference of a causal relationship between MSP and the various risk factors could not be determined due to the cross-sectional design of the study. The reliance on self-reporting data is a limitation of the study as participants may have over- or under-reported in the questionnaire. Direct observation was not included in the study and the accuracy of reports of time spent in a day seated and standing while working is a limitation to the study. The inclusion criteria of the study allowed for healthy OHW to participate. Healthy worker selection could have biased the results due to the fact that OHW suffering from MSP might have left the profession or left working in the public sector prior to data collection. Recall bias may have affected the results as the participants were required to recall events that transpired in the past year. In addition, small number of participants in the sub- groups was found to be a limitation to this study. A

limitation of the questionnaire was that leisure or recreational activities were not assessed. Leisure or recreational activities such as sports may be an aggravating factor with MSP. In addition, a limitation of the questionnaire is that test- retest reliability and content validity was not established in the modified questionnaire.

RECOMMENDATIONS

The planning of dental departments should be carefully developed to ensure proper ergonomic practices are followed. Incorporating input from public sector departments such as dietetics and rehabilitation (physiotherapists and occupational therapists) would be helpful to assist employed OHW to achieve/maintain an ideal BMI and ensure OHW are working in a proper body position during procedures. Future research needs to be conducted to investigate the influence of cumulative effects of various dental procedures on MSP. Participant observation should be conducted to determine the accuracy of reporting of posture and body positions assumed by participants. Further research is required to assess sub- groups (dental assistants, dental therapist and oral hygienists) in detail.

CONCLUSION

MSP is an occupational hazard for OHW. The prevalence of MSP among OHW in the public sector in KZN was determined to be 50.9% for current MSP and 60.6% for chronic MSP. The findings from the study indicate the majority of dentists suffer from MSP. The overall prevalence of MSP is high and similar to findings in various other studies globally. The lower back, neck, and shoulder were reported as areas with the highest prevalence of pain experienced by OHW. OHW were exposed to occupation-related MSP in the current study and therefore ergonomic practices in the dental departments should be considered. In addition to occupational factors, psychological factors were found to have significant associations with MSP.

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CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter will highlight the findings and limitations of the study. Furthermore, the recommendations and suggestions for further research will be presented. A general conclusion based on the study findings will conclude this chapter.

5.2 Review of findings

An eighty-three percent response rate was achieved. Most of the participants were female, aged between 20 and 29 years, with normal BMI. A higher prevalence of current and chronic MSP was reported among dentists when compared with dentist (specialists), dental therapists, oral hygienists, and dental assistants. There was a significant association between working in the dental department for 11 to 20 years and current and chronic MSP. Overall, the most common areas of pain reported for current MSP were: lower back, neck, shoulder, upper back, hand, and wrist.

Occupation-related factors, including standing and working, working in the same position and reaching/working away from the body were significantly associated with current MSP. Sitting and working, and carrying/lifting or moving heavy materials or equipment were shown to be associated with chronic MSP. In addition, participants who felt rushed to complete patients for the day and those experiencing trembling during working showed significant associations with MSP. The environmental factors of working in a cramped/awkward space showed a significant association with current and chronic MSP. Anxiety and depression during the day showed a significant association with current MSP.

5.3 Key findings

The prevalence of current MSP among OHW was 50.9% and the chronic prevalence of MSP reported for the previous 12 months was 60.6%. Occupational, environmental, and psychological factors were identified to be strongly associated with MSP. In addition, the demographic factor of BMI was significantly associated with chronic MSP. This study revealed no significant associations between the risk factors of age, gender, smoking and alcohol, and MSP.

5.4 Study limitations

The causal relationship between MSP and the various risk factors could not be determined due to the nature of the cross-sectional design of the study. The reliance on self-reporting data is a limitation of the study as participants may have over- or under-reported in the questionnaire. Direct observation was not included in the study and the potential inaccuracy of reports of time spent in a day seated and standing while working is a limitation to the study. The inclusion criteria of the study allowed for healthy OHW to participate. Healthy worker selection could have biased the results due to the fact that OHW suffering from MSP might have left the profession or left working in the public sector prior to data collection. In addition, small number of participants in the sub- groups was found to be a limitation to this study. Recall bias may have affected the results as the participants were required to recall events that transpired in the past year. A limitation of the questionnaire was that leisure or recreational activities were not assessed. Leisure or recreational activities such as sports may be an aggravating factor with MSP. In addition, a limitation of the questionnaire is that test- retest reliability and content validity was not established in the modified questionnaire.

5.5 Recommendations

5.5.1 Oral health managers

OHW training curricula must address safe body mechanics, injury prevention, and safety improvement. The planning of dental departments should be carefully developed to ensure proper ergonomic practices are followed.

Health facility management should work together to develop a musculoskeletal prevention program and policies that will prevent, reduce, and sufficiently manage those affected by MSP. Employee wellness practitioners should encourage employees to participate in exercise programs during working hours, such as aerobic classes during lunch hour two to three times per week. Regular in-service training on MSP prevention and ergonomics must be conducted in dental departments to assist practitioners to refresh appropriate ergonomic practices. In addition, occupational health specialists employed in the public sector should visit health facilities to determine problems experienced by OHW.

5.5.2 Oral health workers

OHW should have introductory and ongoing workshops on prevention of MSP upon been employed in a health facility. Public sector departments such as dietetics and rehabilitation

departments (physiotherapists and occupational therapists) should be incorporated to assist OHW to achieve/maintain an ideal BMI and ensure OHW are working with their body in a proper position during dental procedures. In addition, OHW need to take their own health into consideration and follow appropriate ergonomic practices to prevent MPS.

5.6 Recommendations for future studies

- Further research will need to be conducted to establish the prevalence of MSP among public sector OHW in South Africa.
- A prospective cohort study design with a larger sample size is warranted in the future to provide more sound research evidence on MSP and 'healthy survivor' effects among OHW.
- Further research needs to be conducted to investigate the influence of cumulative effects of various dental procedures on MSP.
- Participant observation should be conducted to determine the accuracy of reporting of posture and body positions assumed by participants.
- Further research is required to assess sub- groups (dental assistants, dental therapist and oral hygienists) in detail.

5.7 Conclusion

The prevalence of MSP among OHW in the public sector from KZN was determined to be 50.9% for current MSP and 60.6% for chronic MSP. The findings from the study indicate that the majority of dentists suffer from MSP. The lower back, neck, and shoulder were reported as areas with the highest prevalence of pain experienced by OHW. In addition, occupational, environmental, and psychological factors were found to have significant associations with MSP.

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APPENDICES

Appendix 1: Consent Form

CONSENT FORM

I have been informed about the study entitled “Prevalence and risk factors associated with musculoskeletal pain among KZN public sector oral health workers”.

by Dr.T.Govender

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at Cell Phone Number: 0844041284

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

BIOMEDICAL RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

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Tel: 27 31 2604769 - Fax: 27 31 2604609

Email: [BREC@ukzn.ac.za](mailto: BREC@ukzn.ac.za)

Signature of Participant **Date**

Signature of Translator **Date**
(Where applicable)

Appendix 2: Questionnaire

Dear Participant

The questionnaire provided has been designed as part of my studies in Master of Public Health. The study will investigate “Prevalence and risk factors associated with musculoskeletal pain among KZN public sector oral health workers “.

Please fill in the questionnaire provided below and if you have any questions, please feel free to ask the researcher: Dr. Treshina Govender (0844041284).

Thank you

Research Questionnaire

Please answer the following questions. Where there is a choice of responses, please circle the correct response or tick the correct box. **Dental assistances can tick or respond were they have assisted the operator.**

Section 1: Personal characteristics

1. Professional Profile: please tick in the box

Dentist (Specialist) 1					
Dentist 2					
Dental Therapist 3					
Oral Hygienist 4					
Dental Assistant 5					
Do you work in	Tertiary 1	Provincial 2	District 3	Other 4	
2. What is your age?		Years			
3. What is your gender?		Male 0	Female 1		
4. What is your height?		Cm			
5. What is your weight?		Kg			

6. Employment History

6.1 How many years have you been working in a dental department	years	
6.2 How many years have you worked in the public sector	years	
6.3 Are you full time employed	Yes 1	No 0
6.3 Are you part time employed	Yes 1	No 0
6.4 Do you work overtime	Yes 1	No 0
If yes, how many hours	Hours	

7. History of Smoking/Alcohol		
8.1 Have you ever smoked	Yes 1	No 0
8.2 Are you an ex- smoker	Yes 1	No 0
8.3 Are you a current smoker	Yes 1	No 0
8.3 Do you drink alcohol	Yes 1	No 0

8. Where do you work most of the week			
Hospital 1	Community health centres 2	Clinic 3	Other 4

Section 2: Occupational factors

In an 8-hour day, how many hours are spent on the following activities: Please mark all that apply. Dental assistants can tick were they have assisted the operator.

Types of Occupational Activities	0-1 hour 1	2-4 hours 2	5-6 hours 3	+6 hours 4	Not offered : Equipment broken/ no material 5
Administrative					
Dental extractions					
Scale and polish					
Dental restorations					
Surgical procedure on the dental chair					
Surgical procedure in theater					
Cleaning dental instruments					
Lifting and moving equipment					
Chair-side assistance					
Time spent sitting and working					
Time spent standing and working					
Cleaning equipment					

Working Environment:		
Do you work on a chair with a functional light	Yes 1	No 0
Does the chair move up and down, back and forward	Yes 1	No 0
Do you have the correct instruments to perform your task	Yes 1	No 0
When visiting a school, do you have a functional dental chair	Yes 1	No 0
When visiting a clinic, do you have a functional dental chair?	Yes 1	No 0
Do you work in a cramped/awkward space	Yes 1	No 0

Do you work alone	Yes 1	No 0
Do you have colleagues to take up the work load	Yes 1	No 0
Do you work with an assistant	Yes 1	No 0
How many breaks do you take in a day		

How many patients are seen in :	<10 1	10-20 2	20-40 3	40+ 4
One day				
One week				

Occupational factors contributing to musculoskeletal pain:		
Standing during dental extractions	Yes 1	No 0
Performing the same task over and over	Yes 1	No 0
Working in the same position for long periods of time	Yes 1	No 0
Bending or twisting your back in an awkward way	Yes 1	No 0
Reaching or working away from your body	Yes 1	No 0
Working in awkward or cramped positions	Yes 1	No 0
Continuing to work when injured or hurt	Yes 1	No 0
Working near to or at your physical limits	Yes 1	No 0
Insufficient rest breaks between patients	Yes 1	No 0
Carrying/lifting or moving heavy materials and equipment (e.g. on a school visit)	Yes 1	No 0
Inadequate training in injury prevention	Yes 1	No 0
Stress from management	Yes 1	No 0
In your own opinion do you feel :		
Stressed from colleagues	Yes 1	No 0
Stressed due to patients	Yes 1	No 0
Dissatisfied from frustrated patients	Yes 1	No 0
Do you feel rushed to finish patient in a day	Yes 1	No 0
Do you feel happy to come to work	Yes 1	No 0
Do you experience anxiety/depression during the day	Yes 1	No 0
Do you feel physically drain at the end of the day	Yes 1	No 0
Do you feel mentally drained at the end of the day	Yes 1	No 0
Do you find yourself unable to complete the task due to MSP	Yes 1	No 0
Have you felt faint at work	Yes 1	No 0
Have you experience trembling during work of your hands, shoulder or knees	Yes 1	No0

Section 3: History of musculoskeletal pain (MSP)

Are you currently suffering from MSP	Yes 1	No 0
Have you experienced MSP in last 6 months	Yes 1	No 0
Have you experienced MSP in last 12 months	Yes 1	No 0
Have you received medical treatment/management	Yes 1	No 0
Do you ignore the pain and continue working	Yes 1	No 0
Have you taken sick leave for any MSP	Yes 1	No 0
Do you believe your MSP is due to your job	Yes 1	No 0
Do you believe that your job exacerbated MSP	Yes 1	No 0
Do you avoid tasks at work due to the MSP	Yes 1	No 0
Have you experienced MSP as a dental student	Yes 1	No 0
Have you had any training to avoid MSP	Yes 1	No 0

On a scale of 0-5, 0 being no problem and 5 being a major problem, please select.

Identify the location of the pain and please rate it:	0	1	2	3	4	5
Lower back						
Upper back						
Neck						
Shoulder						
Hand						
Wrist						
Forearm						
Knees						
Feet/ankles						
Hips/thighs						

Have you experienced pain in these places?	Last 2 days 1	Last week 2	Last 3 months 3	Last 6 months 4	Last 12 months 5
Lower back					
Upper back					
Neck					
Shoulder					
Hand					
Wrist					
Forearm					
Knees					
Feet/ankles					
Hips/thighs					

Describe the frequency of your pain? Please tick.	Never 0	Infrequent (1-2 days/wk) 1	Frequent (3-5 days/wk) 2	Constant (Daily pain) 3
Lower back				
Upper back				
Neck				
Shoulder				
Hand				
Wrist				
Forearm				
Knees				
Feet/ankles				
Hips/ thighs				

When do you think you first experienced MSP in these areas?

	Before becoming a student 1	As a student 2	First year of working 3	In the last 5-10 years of being employed 4	10 plus years of employment 5
Lower back					
Upper back					
Neck					
Shoulder					
Hand					
Wrist					
Forearm					
Knees					
Feet/ankles					
Hips/thighs					

Section 4: General health

1. Have you taken sick leave/been absent from work in the last 12 months due to :					
Musculoskeletal pain 1	Flu 2	Depression 3		Others 4	
2. How many days have you taken sick leave/absent from work in the last 12 months:					
1 day 1	2-3 days 2	1 week 3	More than a week 4	Other 5	None 6
3. Do you have any of the following health conditions:					
Hypertension				Yes 1	No 0
Diabetes				Yes 1	No 0
Arthritis				Yes 1	No 0
Cancer				Yes 1	No 0
Other				Yes 1	No 0
4. In treating/managing your MSP, have you seen a:					
Medical Doctor 1	Occupational Nurse 2	Physiotherapist 3	Self- treated 4	Over-the-counter medication 5	Been hospitalized 6
Other Medical Conditions:					

Section 5: DASS 21

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0	Did not apply to me at all
1	Applied to me to some degree, or some of the time
2	Applied to me to a considerable degree, or a good part of time
3	Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (e.g., in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3

19	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

Scores on the DASS- 21 question will need to be multiplied by 2 to calculate the final score.

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely	28+	20+	34+

Appendix 3: BREC Approval Letter



28 January 2016

Ms T Govender (214576222)
Discipline of Public Health
School Of Nursing and Public Health Medicine
trshinas@gmail.com

Protocol: Prevalence and risk factors associated with musculoskeletal pain amongst oral health workers in public sector from KZN, 2015.

Degree: M-PH

BREC reference number: BE374/15

EXPEDITED APPLICATION

The Biomedical Research Ethics Committee has considered and noted your application received on 18 August 2015.

The study was provisionally approved pending appropriate responses to queries raised. Your responses dated 14 January 2016 to queries raised on 23 September 2015 have been noted and approved by a sub-committee of the Biomedical Research Ethics Committee. The conditions have now been met and the study is given full ethics approval.

This approval is valid for one year from 28 January 2016. To ensure uninterrupted approval of this study beyond the approval expiry date, an application for recertification must be submitted to BREC on the appropriate BREC form 2-3 months before the expiry date.

Any amendments to this study, unless urgently required to ensure safety of participants, must be approved by BREC prior to implementation.

Your acceptance of this approval denotes your compliance with South African National Research Ethics Guidelines (2015), South African National Good Clinical Practice Guidelines (2006) (if applicable) and with UKZN BREC ethics requirements as contained in the UKZN BREC Terms of Reference and Standard Operating Procedures, all available at <http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx>.

BREC is registered with the South African National Health Research Ethics Council (REC-290408-009). BREC has US Office for Human Research Protections (OHRP) Federal-wide Assurance (FWA 678).

The sub-committee's decision will be **RATIFIED** by a full Committee at its meeting taking place on **08 March 2016**.

We wish you well with this study. We would appreciate receiving copies of all publications arising out of this study.

Yours sincerely

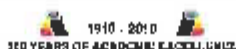
Professor J Tsolka-Gwegweni
Chair: Biomedical Research Ethics Committee

cc supervisor: dlngwane@ukzn.ac.za
cc: prntgrac@ukzn.ac.za

Biomedical Research Ethics Committee
Professor J Tsolka-Gwegweni (Chair)
Westville Campus, Govan Mbeki Building
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Website: <http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx>



Founding Colleges: Durban Edgewood Howard College Medical School Pietermaritzburg Westville

Appendix 4: KZN Provincial Department of Health permission



health

Department:
Health
PROVINCE OF KWAZULU-NATAL

330 Langalibalele street,
Private Bag X9051 PMB, 3200
Tel: 033 395 2805/3189/3123 Fax: 033 394 3782
Email: hrkm@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:

Health Research & Knowledge
Management (HRKM)

Reference: **HRKM374/15**
KZ_2015RP49_761

08 January 2016

Dear Dr T Govender
(University of KwaZulu-Natal)

Subject: Approval of a Research Proposal

1. The research proposal titled 'Prevalence and risk factors associated with musculoskeletal pain amongst oral health workers in the public sector from KZN, 2015' was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

The proposal is hereby **approved** for research to be undertaken at all KZN-DoH health districts.

2. You are requested to take note of the following:
 - a. Make the necessary arrangement with the identified facility before commencing with your research project.
 - b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.
3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Ms G Khumalo on 033-395 3189.

Yours Sincerely

Dr E Lutge

Chairperson, Health Research Committee

Date: 08/01/15

Fighting Disease, Fighting Poverty, Giving Hope

Appendix 5: Ethical Certificate- Introduction to Research



Zertifikat **Certificado**
Certificat **Certificate**

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants



Certificat de formation - Training Certificate
Ce document atteste que - this document certifies that
Treshina Govender
a complété avec succès - has successfully completed
Introduction to Research
du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

March 27, 2015
CID : UHMyN0G



Professeur Dominique Spramont
Coordonnateur TRREE Coordinator



Ce programme est soutenu par - This program is supported by:
European and Developing Countries Clinical Trials Partnership (EDCTP) (www.edctp.org) - Swiss National Science Foundation (www.snf.ch) - Canadian Institutes of Health Research (<http://www.cihr-irsc.gc.ca/091.html>) -
Swiss Academy of Medical Sciences (SAMS/ASMS/AMS) (www.sams.ch) - Commission for Research Partnership with Developing Countries (www.crpw.ch)

[REV : 20140328]

Appendix 6: Ethical Certificate- Informed Consent



Zertifikat **Certificado**
Certificat **Certificate**

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants



Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that

Treshina Govender

a complété avec succès - has successfully completed

Informed Consent

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

March 28, 2015
CU 233042/01

Professeur Dominique Sprumont
Coordinateur TRREE Coordinator



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TRFV - 210401201

Appendix 7: Ethical Certificate- Good Clinical Practice



Zertifikat **Certificado**
Certificat **Certificate**

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants



Certificat de formation - Training Certificate
Ce document atteste que - this document certifies that

Treshina Govender

a complété avec succès - has successfully completed
Good Clinical Practice (GCP)

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

March 28th, 2015
CID : 20150977



Professeur Dominique Sprumont
Coordonateur TRREE Coordinator



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Swiss Academy of Medical Sciences (SAMBS/ASSM/SAMP) (www.sam.ch) - Commission for Research Partnerships with Developing Countries (www.cpr.ch) - Universität de Vordel (www.uv.ch)

[REV : 2014020]

Appendix 8: Ethical Certificate- Research Ethics Evaluation



Zertifikat **Certificado**
Certificat **Certificate**

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants



Certificat de formation - Training Certificate

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Treshina Govender

a complété avec succès - has successfully completed

Research Ethics Evaluation

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

March 28, 2015
CID: ghqKTFr2

Professeur Dominique Sprumont
Coordonateur TRREE Coordinator



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Appendix 9: Turnitin Report

	Info	Dates	Similarity	
				Resubmit View
History of Public Health	Start	27-Feb- 2017 11:34AM		
	Due	07-Mar- 2017 11:59PM	<u>12%</u>	<ul style="list-style-type: none">• Originally submitted format• PDF format• Digital receipt
	Post	21-Mar- 2017 12:00AM		