Original Article

Work-related Musculoskeletal Disorders Among Dental Staff in Armed Force Hospital in Dhahran, Saudi Arabia

Abstract

Background: Work-related musculoskeletal disorder (WMSD) is the most important public health challenge among dental staff. The objective of this study is to ascertain the prevalence and associated risk factors, which related to WMSD among dental staff in Dhahran, Saudi Arabia. **Methods:** It is a cross-sectional study and 130 dental staff were selected through simple random sampling from in Armed Forced Hospital with at least 1 year of working experience. The self-administered validated and structured Standardized Nordic questionnaire was used. Logistic regression analysis was done to determine the association of risk factors with WMSD. **Results:** The results of the present study revealed that there was a high incidence of MSDs in the neck, shoulder, and lower back pain among dental personnel (72.6%). The common risk factors that contributed to WMSD were more than 5 years of experience (AOR 1.19 (1.03–2.82)), Saudi nationality (AOR 4.88 (1.27–18.72)), working more than 12 h (AOR 3.115 (1.258–7.578)) and resident doctors (AOR 1.14 (1.02–1.94)). **Conclusions:** The study concludes that WMSDs were a common and high rate of incidence among dental staff. There is a need to make a policy that will reduce the burden of WMSD among dental staff.

Keywords: *Dental practitioner, dentists, low back pain, musculoskeletal disorders, Saudi Arabia*

**Mashael Khalid Alzayani,
Khaled F Salama[1],
Mubashir Zafar[2]**

Department of Dental, Armed Force Hospital, Dhahran, [1]Department of Environmental Health, College of Public Health, Imam Abdul Rahman Bin Faisal university, Dammam, [2]Department of Family and Community Medicine, College of Medicine, University of Hail, KSA

Introduction

Prevalence of musculoskeletal disorder (MSD) among dental staff is high.[1] According to the CDC (Center for Disease Control) and NIOSH (National Institute of Occupational Safety and Health), the MSDs are defined as soft-tissue injuries that are caused by sustained or sudden to repetitive movements, vibration, force, and awkward positions,[2] which can affect the nerves, tendons, muscles, joints, and cartilage in the limbs, neck, and lower back.[2] The common reason for work-related disability is MSDs in different occupational duties. The physical cause related to such occupations has been recognized as a risk factor of MSDs.[2]

According to WHO, there are more than 59 million healthcare workers who is exposed to a wide range of occupational hazards which increase the incidence of work-related diseases and injuries that affect the physical, emotional, and economic aspects of healthcare workers and their families.[3] Work-related MSDs (WMSDs) are basically associated with many different

professions. Many MSDs can be reduced with more concern about ergonomics.[4] Dental staff during work take asymmetric and uncomfortable positions such as rotating the head laterally with the arms extended out of the body. Long working hours which leads to exhausation of joints (Shooulder,neck) and mscles (Back), which trigger a symtoms of back and neck pain.[5]

A study among dental professionals reported that 85% of dental professionals suffered from WMSD due to dental work. The study showed the high prevalence of WMSDs in dental staff, which influences daily activities; whereas in some situations, it forces some of the dental workers to change their dental setting. Some factors are associated with work-related pain such as specialty of work, gender, age, and duration of interaction with patients.[6]

In a previous study conducted in Malaysia, findings showed that 44% of dental staff were suffered from back pain, and the maximum prevalence discovered among dental technicians (52.4%). The common risk factors associated with back pain were poor posture.[7]

*Address for correspondence:
Dr. Mashael Khalid Alzayani,
Department of Dental, Armed Force Hospital, Dhahran, KSA.
E-mail: afhdhresearch@msd.med.sa*

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A study that revealed a high prevalence of musculoskeletal pain among dentists showed that the prevalence of MSDs was observed as 58.7% as well as higher rates of pain in the neck (24%) followed by lower back region (20%) and upper back (14.7%). The associated risk factors were found to be the number of working hours, the number of cases treated per day, posture, and repetitive shoulder and hand movements (*P*<0.05).[8]

Very few researches were done in the Saudi Arabia about the importance of the prevalence of MSDs associated with working environment among dental staff, yet occupational health and safety policies in Saudi Arabia, reflect a lack of insight in relation to nature of work and others contributing risk factors. Therefore, this study aimed to determine the prevalence and identify the associated risk factors of WMSDs among dental staff at airbase hospital, Dhahran, KSA.

Methods

Study setting, study design and sampling technique

King Abdulaziz Air Base Armed Forces Hospital in Dhahran City, Eastern Province of Saudi Arabia. Dental department Containing 29 operating dental rooms for different specialty that serve between 1000 and 1448 patients include booked appointments and walk-in per week. The study design was a cross-sectional analytical study. The participants of this study were selected through simple random sampling. A list of general physician, consultant, specialist, and assistant technician dental staff from the administration department of Armed Forced Hospital to assign the arbitrary number of each staff. Random number generator software was used to require sample size in Dhahran, Saudi Arabia.

Sample size and inclusion and exclusion criteria

The sample size that was estimated based on the reported WMSDs in dental staff is 90.2%.[9] A sample of 130 subjects will be required to obtain a 95% CI of ± 5% precision around MSDs prevalence estimate of 90.2%. All dental staff (general physician, consultant, specialist, and assistant Technician dental staff) who are working in the Armed Forced Hospital and exclusion were administrative staff, new dental staff for less than 1 year, and trainee dental professional.

Study variables and data collection tool

Dependent variable: The primary outcome of the study is MSDs among dental staff. Independent variable: Socio-demographic characteristics especially the age and gender. Other factors: Marital status, education background, job title, years of experience, and daily working hours. The study tool was used for this study is Standardized Nordic questionnaires.[10] It is validated and structured questionnaire. The questionnaire is divided into two sections. The first section is about demographic data of dental staff, whereas the second section is focused on the analysis of musculoskeletal symptoms among dental staff including different regions of the body.

Statistical analysis

Data were entered and analyzed in IBM statistical package for social science software (SPSS) version 25. Descriptive Statistics will be used descriptions of the demographic characteristics such as mean, standard deviation for numerical data, and frequency and percentages for categorical data. To determine the various risk factors associated with WMSD, logistic regression models were used. Pearson correlation was used to determine the relationship between WMSD and risk factors. *P* value 0.05 was significant.

Results

The mean and SD of participant age is 39.82 ± 7.593, most of the participants were female. Married participants were constituted 81.5%. Saudi nationals were 64.6%. The

Table 1: Socio-demographic characteristics of study participants (*n*=130)

Characteristics	Frequency (*n*, %)
Age (years) (mean±SD)	39.82±7.593
25-40	78 (60%)
>40	52 (40%)
Gender	
Male	54 (41.5%)
Female	76 (58.5%)
Marital status	
Single	24 (18.5%)
Married	106 (81.5%)
Nationality	
Saudi	84 (64.6%)
Non-Saudi	46 (35.4%)
Educational level	
Technical certificate/diploma	18 (13.8%)
Bachelor	84 (64.6%)
Master	10 (7.7%)
PhD	7 (5.4%)
Board	11 (8.5%)
Job title	
Resident	27 (20.8%)
Specialist	24 (18.5%)
Consultant	11 (8.5%)
Nurse	20 (15.4%)
Technician	48 (36.9%)
Working experience (years)	
1-5	18 (13.9%)
5-10	78 (60%)
>10 Years	34 (26.2%)
Daily working hours (h)	
8-12	126 (96.9%)
>12	4 (3.1%)

proportion of bachelor degree holders was 64.6%. Resident doctors were 20.8%. The majority (60%) of participants have 5–10 years of experience. The proportion of workers who work for 8–12 h was 96.9% [Table 1].

The prevalence of musculoskeletal symptoms in the sample (*n* = 130) were as low back pain 82.3%, neck 82.3%, shoulder 75.4%, and elbow/hand 30.8% [Table 2].

The relationship between MSDs and baseline characteristics [Table 3]. The job title and year of experience are statistically significant with MSDs (*P*-value < 0.05). All other values are related with baseline characteristics but no significant.

Table 2: Prevalence of musculoskeletal symptoms among the participants (ache, pain, or discomfort)

Body region		Frequency (*n*)	Proportion (%)
Low back	Yes	107	82.3
	No	23	17.7
Neck	Yes	107	82.3
	No	23	17.7
Shoulder	Yes	98	75.4
	No	32	24.6
Elbow/hand	Yes	40	30.8
	No	90	69.2
WMSDs	Yes	99	76.2
	No	30	23.8

WMSDs, work-related musculoskeletal disorder

Table 3: Relationship between WMSDs with baseline characteristics of study participants

Characteristics		WMSDs	*P*
		n (%)	
Gender	Male	54 (41.5%)	0.230
	Female	76 (58.5%)	
Nationality	Saudi	84 (64.6%)	0.088
	Non-Saudi	46 (35.4%)	
Educational level	Technical certificate/diploma	18 (13.8%)	0.473
	Bachelor	84 (64.6%)	
	Master	10 (7.7%)	
	PhD	7 (5.4%)	
	Board	11 (8.5%)	
Job title	Resident	27 (20.8%)	0.001*
	Specialist	24 (18.5%)	
	Consultant	11 (8.5%)	
	Nurse	20 (15.4%)	
	Technician	48 (36.9%)	
Years of experience	1-5 years	18 (13.9%)	0.003*
	5-10 years	78 (60%)	
	>10 years	34 (26.2%)	
Daily working hours	8-12 h	126 (96.9%)	0.956
	>12 h	4 (3.1%)	

WMSDs, work-related musculoskeletal disorder

In the logistic regression analysis, a new variable was created and named: Presence of any MSDs. Here, any participant who reported body pain was counted. The risk factors that were studied are shown in Table 4: they revealed an association between genders (male and female), marital status, nationality, education level, job title, years of experience, and daily working hours.

Correlational analysis reveals that the number of predictors of MSDs, which are presented in Table 5. All predictors were positively correlated with MSDs except change jobs in the neck region which are negatively correlated.

Discussion

This study is revealed the high rate of WMSD prevalence (76%) among dental staff. MSDs are work-related diseases and caused by many factors.[1] The most common factors are years of experience, educational qualification, and daily working hours.

The study found that the age group from 20 to 40 years was high rate of prevalence WMSD which correlates with the study conducted in Saudi Arabia.[11]

Results found that female was common WMSD compared to male. These results were consistent with the other studies' results.[9,11-13] The reasons for this issue are female have low muscle tone and low strength, hormonal factor which contributed to osteoporosis.[14]

Majority (60%) of participants have 5–10 years of experience. The proportion of workers who work 8–12 h was 96.9%. However, those who were 25–40 years of age, males, Saudi nationals, and bachelor degree holders were suffered usually MSDs among the study participants and MSDs prevalence were high among resident doctors compare to other staff, those staff who had experience 5–10 year were high prevalence and those working 8–12 hours were high prevalence of MSDs. The data of the present study are in accordance with the study[15] done by Al Wazzan that reported complaints of neck pain in 54.4% of the subjects and back pain in 73.5%. Dentists had relatively more neck (63.7%) and back (79.1%) pain as compared with the neck (46.9%) and back (69.0%) pain among auxiliary staff (dental assistants, dental technician, and dental hygienists). Similar finding was revealed by the previous study[16] approximately 85% of subjects experienced MSD-associated symptoms that commonly affected the regions of the lower back (65.7%), ankle/foot (41.5%), and shoulders (29.0%).

Moreover, those study participants who have 5–10 years of experience were suffered a high rate of WMSD compared to those who have less than 5 years of experience. However, those study participants who were working for 8–12 h were suffered a high rate of WMSD compared to those working >12 h. The present study has found that a high prevalence (76.2%) of MSDs among dental

Table 4: Association of WMSDs with baseline characteristics of study participants

Characteristics		MSDs Crude Odd Ratio (95% CI)	MSDs-adjusted Odd Ratio (95% CI)
Gender	Male	1	1
	Female	1.68 (0.71-3.93)	1.66 (0.61-4.51)
Marital status	Single	1.92 (0.69-5.37)	1.31 (0.33-5.24)
	Married	1	1
Nationality	Saudi	2.22 (0.87-5.66)	4.88 (1.27-18.72)
	Non-Saudi	1	1
Educational level	Technical certificate/diploma	0.76 (0.13-4.30)	0.49 (0.03-6.67)
	Bachelor	0.67 (0.16-2.82)	0.46 (0.04-4.51)
	Master	1.77 (0.28-11.12)	1.57 (0.09-6.90)
	PhD	2.00 (0.27-14.78)	2.59 (0.19-34.71)
	Saudi Board	1	1
Job title	Resident	1.17 (1.03-1.84)	1.14 (1.02-1.94)
	Specialist	1.86 (1.27-5.10)	1.79 (1.23-3.43)
	Consultant	1.48 (1.09-2.54)	1.08 (1.00-2.87)
	Nurse	1.11 (1.01-1.94)	1.27 (1.02-3.35)
	Technician	1	1
Year of experience	1-5 years	1	1
	5-10 years	1.09 (0.22-3.67)	1.19 (1.03-2.82)
	>10 years	4.44 (1.08-18.27)	1.26 (1.08-3.82)
Daily working hours	8-12 h	1	1
	>12 h	1.93 (0.94-9.35)	3.115 (1.258-7.578)

WMSDs, work-related musculoskeletal disorders

Table 5: Statistical correlates and predictors of MSDs

Body Region	Predictors	Correlation r (P)
Back pain	Change jobs	0.14 (0.10)
	Work interference in home	0.42 (0.00)
Shoulder	Change jobs	0.07 (0.37)
	Work interference in home	0.47 (0.00)
Neck	Change jobs	–0.27 (0.00)
	Work interference in home	0.51 (0.00)

MSDs, musculoskeletal disorders

staff, which is consistent with the results of another study conducted in Saudi Arabia (59.2%),[17] but lower incidence in Australia (87.2%),[18] Lithuania (86.5%),[19] and Turkey (94%).[20] The prevalence of MSDs among medical physicians was higher than reports among (41.7%) in Iran[3] and Indian population (25.9%),[21] but lower prevalence in Nigeria (91.3%).[11]

In the present study, the most frequently affected body sites were low back pain (82.3%), neck (82.3%), shoulder (75.4%), and elbow/hand (30.8%). These areas may correspond to the overcapacity of the spine using during work. It means that dentists' posture contributed to this problem. The prolonged static load as a result of sustained muscle activity in the sternocleidomastoid or trapezius muscles may be a primary etiological factor for neck pain among dentists.[22]

The common factor found that who were working more than 12 h had high prevalence of WMSD; these results were consistent with other study results.[23-28]

The most common predictor which negativity correlates with WMSD was change of job ($r=-0.27$) which means that dental staff frequently change the job due to WMSD. This result was consistence with other studies (Australian dental staff ($r=-0.39$)[29] and Egyptians dental staff ($r=-0.17$),[30] Saudi Dental staff($r=-0.39$).[31]

Limitation of the study

The results of this study are limited by finding that can be biased based on multiple factors such as workload, a number of patients treated in a single sitting, work environment, type of working (government sector, clinics, and hospital) and work stress may influence the results. This is the cross-sectional study that cannot temporality of causal factors.

Conclusions

The study concludes that the prevalence of MSDs and symptoms is very high among dental staff. The low back, neck, and shoulders are the most frequently affected anatomical sited for muscular disorders. Dentists must follow the basic health and safety principles and be aware of correct working postures. In addition, regular rest intermissions between the patients and regular medical examination can be a very proactive strategy.

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Conflicts of interest

There are no conflicts of interest.

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