

# MUSCULOSKELETAL DISORDERS AMONG DENTISTS AND PHYSICIANS AT MINIA UNIVERSITY HOSPITALS; A COMPARATIVE STUDY.

By

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## Abstract

**Introduction:** Dentistry is a high risk profession for developing MSDs (musculoskeletal disorders) because of the high visual demands, prolonged static posture, repetitive motion, inadequate lighting and mental stress that result in prolonged and affixed as well as uncomfortable postures. **Aim of Work:** To study the occurrence of MSDs among dentists in comparison to physician at Minia University Hospitals. **Materials and methods:** A cross-sectional study was conducted among 328 participants; 164 dental and 164 medical practitioners recruited, interviewed and examined during the period from February, 2015 to December, 2015. Every participant completed a questionnaire that included his socio-demographic data, full occupational history and lifestyle factors as well as information about any job-related MSDs. Describing and determining the site of pain was performed by using the Modified Standard Nordic Musculoskeletal Questionnaire (NMQ), while the severity of pain was assessed by using the Visual Analog Scale (VAS). **Results:** However, both the dentist and physician groups were matched regarding their age and sex, MSDs were significantly higher among dentists (88.4%) than physician (58.5%), ( $p=0.001$ ), (OR=5.4). Neck (63.4%), low back (54.3%), shoulder (53%), wrist (49.4%) and upper back (44.5%) were the most common MSDs among dentists. The most common factors that lead to the occurrence of MSDs were prolonged static posture, long duration of employment and increased work load and working hours. **Conclusion:** MSDs are much higher among dentists than physicians. Neck and low back are the most common sites of MSDs among dental personnel. MSDs risk factors include prolonged static posture, long duration of employment and increased work load and working hours.

**Keywords:** Musculoskeletal disorders, Dentists, Minia, Dentistry Hospital, Nordic questionnaire.

## Introduction

Musculoskeletal disorders MSDs, which are problems of musculoskeletal system, are significant and costly workplace problems affecting health, productivity and the careers of the working population. MSDs include pain, weakness and parasthesia, are reported to be associated with wide range of occupations (Abduljabbar, 2008). Nearly 2 million workers suffer from MSDs each year. These problems are caused by repetitive, awkward, or stressful motions; and dental personnel had an increased risk of developing such disorders (Laderas and Felsenfeld, 2002).

MSDs are the second most common cause of disability worldwide, measured by years lived with disability (YLDs). Disability due to MSDs is estimated to have increased by 45% from 1990 to 2010; and is expected to continue to rise with an increasingly obese, sedentary and ageing population (Vos et al., 2012).

The high prevalence of MSDs and pain among dentists are well-documented, constituting a major health problem, especially back pain (Moodley and Naidoo, 2015). Globally,

MSDs have become a significant issue for the profession of dentistry and dental hygiene. Generally, the prevalence of MSDs among dentists and dental hygienists is reported to be between 64% and 93% and the most prevalent regions for complaints are the neck, upper arms and back region (Hayes et al, 2009).

A recent survey that was conducted among 200 dental professionals practicing in and around Maharashtra state in India found that about one hundred and fifteen respondents (57.5%) had complains of musculoskeletal pain. Back pain was 34.8% in males and 41.57 % in females while neck pain was 23.60% in males and 34.8% in females (Bhagwat., 2015).

In Egypt, a study was performed to study the MSDs among dentists in 3 Egyptian cities (Cairo, Al-Mahalla El-Kobra and El-Mansoura) revealed that neck pain was the most prevalent musculoskeletal complaints in the past 12 months (75.1%), followed by low-back pain (58.5%), while hand/wrist pain was the least prevalent (47.4%) complaint (Hegazy et al., 2009).

Another study on final year Egyptian dental students in Ismailia, Suez Canal University, showed that MSDs were common (66.7%) among the studied 126 dental students. The sites of MSDs pains were mainly in the neck (64.3%), lower back (57.9%), shoulders (48.4%) and the ankle or feet 12.7% (Fahim, 2011).

The possible risk factors of MSDs have been classified as biomechanical, ergonomic and work factors.

### **Aim of Work**

To study the occurrence and severity of MSDs among dentists at Minia University Hospitals and to compare them with a matched group of physicians at Minia University Hospitals.

### **Materials and Methods**

- **Study design:** A cross-sectional study.
- **Place and duration of study:** Minia University Hospitals during the period from February, 2015 to December, 2015
- **Study sample:** was conducted among 164 dentists and 164

physicians. Dentists “house officers, residents and staff members” of Minia University Hospital of any age and both sexes were included. A matched group for age, sex and residence of medical practitioners at Minia University Hospitals were recruited for comparison purposes.

### **- Study methods:**

- Data were collected through a **questionnaire** that included the participants’ socio-demographic characteristics (age, gender, residence, educational level, occupation, and marital status); lifestyle factors (smoking, physical exercise and hours of physical exercise per week); past medical history (past history of chronic diseases, past history of MSDs, with its management and effect of such MSDs on their work if any); full occupational history (specialty, duration of employment in years, working time per day in hours, average work week days, number of patients examined per day, having frequent breaks while working, doing stretching exercises during breaks, prolonged static posture

and frequent changing positions, holding the neck in a forward bent posture for a long time, twisting posture, uncomfortable back support, use of a dental mirror for indirect vision while working and if used to have dental assistant).

- **Assessment of MSDs:** Modified Standard Nordic Musculoskeletal Questionnaire (NMQ) was used to determine the prevalence of symptoms related to musculoskeletal system. The questionnaire investigated the presence, severity, frequency of musculoskeletal system problems related to neck, shoulder, elbow, wrist, upper and lower back, hip, knee and ankle in the last 12 months (Kuorinka et al., 1987)

### **Consent**

The researcher explained the purpose of the study to all participants with confirming confidentiality of their information that will never be used for

purposes other than scientific research and informed consent was taken.

### **Ethical Approval**

The study was conducted after obtaining approvals of the ethical committee of the Faculty of Medicine, Minia University and that of Minia University dentistry hospital.

### **Data management**

The collected data were analyzed by using the statistical package for social sciences software (SPSS- version 19). Graphics were done by Excel Microsoft office 2010. Quantitative data were presented as means and standard deviations, while qualitative data were presented as frequency distribution and percentages. Chi square test, student t-test and bivariate correlations were used whenever required. Multiple regression analysis was used to study the combined effect of different independent variables on the target (dependant variable). The probability of less than 0.05 was used as a cut off point for all significant tests.

## Results

**Table (1): Distribution of dentists and physicians of Minia University Hospitals regarding their socio-demographic characteristics.**

General characteristics	Dentists (N=164)	Physicians (N=164)	t~ $\chi^2$	P
<b>Age</b>				
Range	22 - 50	24 - 52	0.03~	>0.05
Mean $\pm$ SD	26.9 $\pm$ 4.4	26.98 $\pm$ 3.96		
<b>Sex</b>				
Males	91 55.5%	89 54.3%	0.04	>0.05
Females	73 44.5%	75 45.7%		
<b>Marital status</b>				
Married	99 60.4%	63 38.4%	4.13	>0.05
Un married	65 39.6%	101 61.6%		
<b>Smoking</b>				
Smokers	20 12.2%	63 38.4%	29.82	<0.001*
Non-smokers	144 87.8%	101 61.6%		
<b>Handedness</b>				
Right handed	157 95.7%	152 92.7%	1.4	>0.05
Left handed	7 4.3%	12 7.3%		
<b>Duration of physical exercise per week )Hours)</b>				
Range	0 - 14	0 - 15	1.7~	>0.05
Mean $\pm$ SD	1.7 $\pm$ 2.4	2.25 $\pm$ 3.37		
<b>Physical activity</b>				
Yes	84 51.2%	75 45.7%	0.99	>0.05
No	80 48.8%	89 54.3%		

t~ : t test

\*: Statistically significant.

About 55.5% of the participating dentists were males and 44.5% were females, whose ages ranged between 22-50 years with a mean age of (26.9±4.4 years). Smoking was significantly more frequent among physicians than dentists (38.4% vs. 12.2%, respectively). The mean hours of exercise per week was 1.7±2.4 for dentists compared to 2.25±3.37 for physicians. Nearly, half of dentists (51.2%) and physicians (45.7%) were performing regular physical activity (Table 1).

**Table (2): Comparison between dentists and physicians at Minia University Hospitals regarding their occupational history.**

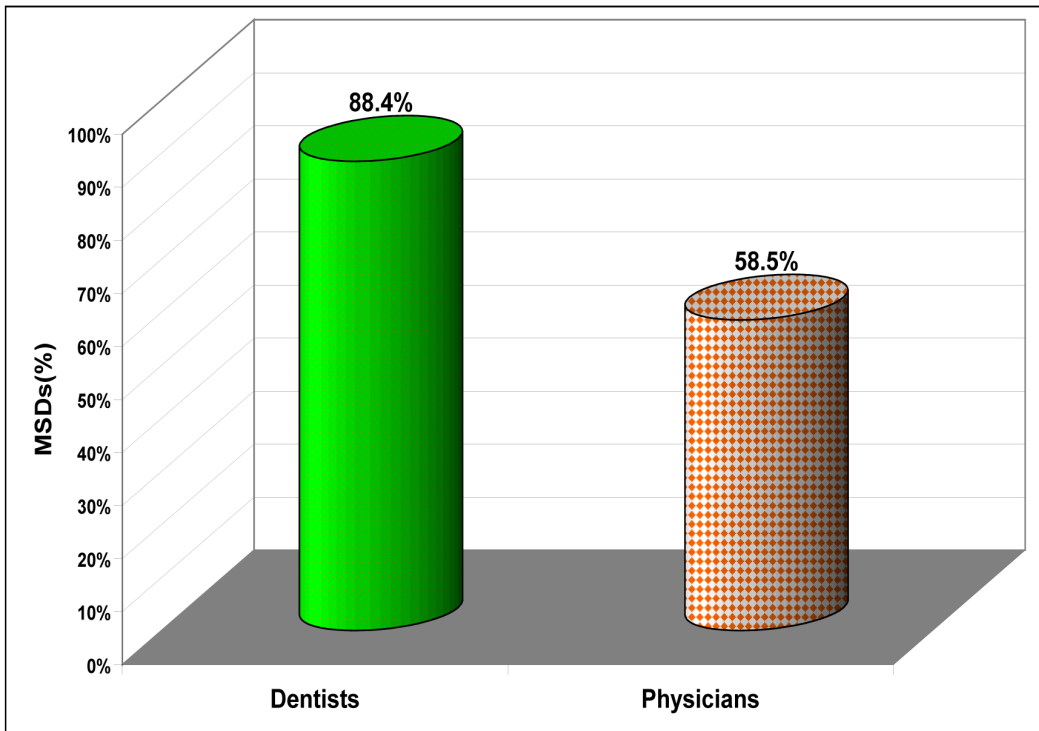
Occupational history	Dentists (N=164)	Physicians (N=164)	t <sup>~</sup> $\chi^2$	P
<b>Duration of employment (years)</b>				
Range	0.8 - 25	0.5 - 27		
Mean ± SD	5.1 ± 4.2	3.2 ± 3.8	4.36~	< 0.001*
<b>Work hours per day</b>				
Range	2 - 16	3 - 20		
Mean ± SD	7.4± 2.8	12.1± 4.4	-11.32~	< 0.001*
<b>Work days per week</b>				
Range	2 - 7	2 - 7		
Mean ± SD	5.1 ± 0.99	4.9 ± 1.1	1.87~	>0.05
<b>Number of patients examined per day</b>				
Range	1 - 70	1 - 200		
Mean ± SD	13 ± 12.3	31.4 ± 26.1	-8.17~	< 0.001*
<b>Breaks while working</b>				
• Yes	112 68.3%	69 42.1%	22.79	< 0.001*
• No	52 31.7%	95 57.9%		

<b>Prolonged static posture</b>					
• Yes	148	90.2%	140	85.4%	1.82
• No	16	9.8%	24	14.6%	>0.05
<b>Stretching exercises</b>					
Yes	26	15.9%	5	3.0%	15.7
No	138	84.1%	159	97.0%	< 0.001*
<b>Neck forward</b>					
• Yes	125	76.2%	103	62.8%	6.96
• No	39	23.8%	61	37.2%	< 0.01*
<b>Twisting</b>					
• Yes	104	63.4%	46	28.0%	41.33
• No	60	36.6%	118	72.0%	< 0.001*
<b>Back support</b>					
• Yes	129	78.7%	117	71.3%	2.34
• No	35	21.3%	47	28.7%	>0.05

t : t test

\*: Statistically significant.

Table 2 showed that the mean duration of employment was significantly higher among dentists ( $5.1 \pm 4.2$  years) compared to that of physicians ( $3.2 \pm 3.8$  years), ( $p=0.001$ ); while mean working hour per day was higher among physicians ( $12.1 \pm 4.4$  hours) than dentists ( $7.4 \pm 2.8$  hours) ( $p<0.001$ ). More than two thirds (68.3%) of dentists used to take breaks during work compared to 42.1% of physicians (statistically significant ( $p<0.001$ )). Most of dentists (90%) and physicians (85.5%) reported prolonged static postures during work. Nearly, 15.9% of dentists were regularly, doing stretching exercises compared to only 3% of physicians (statistically significant ( $p<0.001$ )). Neck forward movement was higher among dentists (76.2%) than physicians (62.8%) (statistically significant ( $p<0.001$ )). Moreover, twisting movements were higher among dentists (63.4%) than physicians (28.0%) (statistically significant ( $p<0.001$ )).



OR=5.4, CI=3.06-9.56,  $p=0.001$

**Figure (1): Comparison between dentists and physicians at Minia University Hospitals regarding the last 12 months frequency of MSDs.**

Figure 1 showed that MSDs were significantly higher among Minia University Hospitals' dentists (88.4%) compared to physicians (58.5%),  $p=0.004$ , with an odds ratio of 5.4 (3.06-9.56) for developing MSDs if being a dentist than a physician.



**Table (3): Comparison between dentists and physicians at Minia University Hospitals regarding their different body regions of MSDs.**

Site	Dentists (N=164)		Physicians (N=164)		z	p-value
	No.	%	No.	%		
Neck pain	104	63.4%	57	34.8%	5.2	<0.001*
Shoulder pain	87	53.0%	38	23.2%	5.5	<0.001*
Elbow pain	39	23.8%	21	12.8%	2.6	<0.001*
Wrist pain	81	49.4%	34	20.7%	5.5	<0.001*
Upper back	73	44.5%	39	23.8%	4.02	<0.001*
Lower back	89	54.3%	64	39.0%	2.7	<0.001*
Hip pain	24	14.6%	28	17.1%	0.7	>0.05
Knee pain	53	32.3%	47	28.7%	0.7	>0.05
Ankle pain	42	25.6%	34	20.7%	1.1	>0.05
MSD at more than one site	120	73.2%	82	50.0%	4.2	<0.001*

\*=Statistically significant.

Table 3 : shows that neck, shoulder, elbow, wrist, upper and lower back pains were significantly higher among dentists compared to physicians.

## Discussion

In this cross-sectional study, the prevalence of MSDs during the last 12 months were significantly higher among Minia university dentists (88.4%) compared to physicians (58.5%) (Figure 1). These results confirmed the hypothesis that dentistry profession is a risk factor for developing MSDs. Similar results were reported by previous studies such as that of Barghout et al., (2011) who studied the risk factors and prevalence of MSDs among Jordanian dentists and found that 86% of dentists had MSDs. Also, Leggat and Smith, (2006) investigated the prevalence and impact of MSDs among Australian dentists at Queensland, Australia and found that 87.2% of dentists had MSDs. Moreover, Rambabu and Suneetha, (2014) found that MSDs among dentists (61%) was much higher than among medical professionals (28.5%). This higher prevalence of MSDs among dentists than physicians may be because of the poor ergonomics maintained in dentistry, increased physical demands, insufficient operating light, inadequate magnification, limited accessibility to the operating field and inability to

perform relaxations or to take enough breaks during work. Mehrdad et al., (2012) found that the prevalence of MSDs among physicians was 41.5% over the last 12 months.

The mean duration of employment was significantly higher among dentists ( $5.1 \pm 4.2$  years) compared to physicians ( $3.2 \pm 3.8$  years) (Table 2) which not in agreement with Rabiei et al., (2012) who studied musculoskeletal disorders among Iranian dentists and found that the mean duration of employment among Iranian dentists was  $12.2 \pm 7.99$  years, Mehrdad et al., (2012) who found that the mean duration of employment among Iranian physicians was  $13.8 \pm 7.9$  years and Szeto et al., (2009) who studied work-related musculoskeletal symptoms in surgeons at Hong Kong and found that the mean duration of employment was  $10.0 \pm 7.3$  years.

The mean work hours per day and work days per week of Minia University dentists were similar to that of Iranian dentists reported by Rabiei et al., (2012) and to that of Malaysian dentists as reported by Abdul Samat et al., (2011) who studied prevalence and associated factors of back pain among

dental personnel in north-eastern state of Malaysia and found that the mean work hours per day was  $9.0 \pm 2.48$  hours and mean work days per week was  $5 \pm 0.29$  days. However, in our study the working hours of physicians were significantly more than the hours spent in work of dentists, yet the occurrence of MSDs was significantly higher among dentists indicating that there are other factors regarding the dentistry practice that induce MSDs.

Almost two thirds (68.3%) of Minia university dentists reported having frequent breaks during work (Table 2) which is much lower than what was reported by Shrestha et al., (2008) who studied work-related complaints among dentists at Nepal and found that 85.3% of dentists used to take breaks during their working hours.

Additionally, only about 15.9% of Minia university dentists used to do stretching exercises which was lower than that reported by Kursun et al., (2014) who found that 33% of dentists used to do stretching exercises. Having less breaks and inadequate rest time during work with neglecting performing frequent stretching exercises can be

among the stressful causes inducing much MSDs among Minia university dentists.

Nearly, two thirds of Minia university dentists (63.4%) had twisting and bending movements (Table 2) which is in accordance with that reported by Zaheda and Mohammad, (2011) who studied back and neck MSDs among Iraqi dentists in Baghdad city and found that two thirds (67%) of dentists had twisting movements. Similarly, Ganiyu et al., (2015) performed a cross-sectional study among healthcare professionals to study the pattern of occurrence of work-related MSDs and its relationship with ergonomic hazards and found that 67.5% of the participants had frequent twisting and bending movements.

Neck forward movements recorded in three quarters (76.2%) of Minia University dentists (Table 2) which is close to what reported by Kursun et al., (2014) who found that 65.2% of dentists had neck forward movements. This forward movement of the neck during work was significantly reported by the dentists than physicians and can be the direct leading cause of their frequent muscular strain and neck pain complaints.

Back support was recorded in 78.7% of dentists (Table 2) which are higher than Ganiyu et al., (2015) who found that only 45.7% of participants had back support.

MSDs in more than one site was significantly higher among dentists (73.2%) than physicians (50%) (Table 2) which was in accordance with Rambabu and Suneetha, (2014) who found that 31.6% of physicians and 60% of dentists with MSDs had musculoskeletal problems in more than one site.

Neck and low back pain were the most prevalent musculoskeletal complaints in the last 12 months among Mania university dentists (63.4% and 54.3%, respectively) and physicians (34.8% and 39%, respectively) (Table 3). This observed difference between dentists and physicians may be explained by the dentists' bending of their necks and backs during work. These results were in accordance with the findings of Rambabu and Suneetha, (2014) who reported that neck and lower back were the most commonly affected sites of MSDs among dentists and physicians. Similar findings were

reported by different studies such as Ayers et al., (2009) who studied self-reported occupational health of general dental practitioners at New Zealand and found that 59% of dentists had neck pain; Al wazzan et al., (2001) found that 65% of dentists had neck pain. Also, Chamani et al., (2012) studied the prevalence of MSDs among dentists in Kerman, Iran and found that 59% of dentists had neck pain.

Likewise, the prevalence of neck and lower back MSDs among physicians were consistent with the findings of Dhimitri et al., (2005) who studied symptoms of musculoskeletal disorders among ophthalmologists in the Northeastern US and reported that 32.6% of this group of physicians had neck pain and 39% had low back pain.

The prevalence of low back pain among our dentists (54.3%) was in agreement with what reported by Ayers et al., (2009) who found that 57% of dentists had low back pain and Abdul Samat et al., (2011) who studied prevalence and associated factors of back pain among dental personnel in north-eastern state of Malaysia and found that 45% of studied dentists had low back pain.

This study also, revealed that the prevalence of shoulder pain and wrist pain among dentists were 53% and 49.4%, respectively, and significantly higher than physicians (23.2% and 20.7%, respectively)Table 3).

Prevalence of shoulder pain among Minia university dentists (53%) was similar to what was reported by Booyens et al., (2009) who studied MSDs among practicing South African oral hygienists and found that 56.6% of them had shoulder pain; and Shresta et al., (2008) who studied work-related complaints among Nepal dentists and found that 47.1% of the studied dentists had shoulder pain; moreover, Droeze and Johnson, (2005) studied ergonomic interventions to reduce MSDs of dentists in the Netherlands and found that 52% of studied dentists had shoulder pain.

Prevalence of wrist pain among Minia university dentists (44.5%) was similar to what was reported by Hegazy et al., (2009) that 47.4% of Egyptian dentists ; Leggat and Smith, that 44.7% of Australian dentists and Chamani et al., (2012) that 41% of Iranian dentists were suffering from wrist pain.

Prevalence of shoulder and wrist pain among physicians (23.2% and 20.7%, respectively) (Table 3) were higher than shoulder and wrist pain reported by Mehrdad et al., (2012) who found that 6.4% and 4% of physicians had shoulder and wrist pain respectively, and lower than that reported by Dhimitri et al. (2005) who found that 32.9% of ophthalmologists had upper extremity symptoms.

The prevalence of elbow pain was 23.8% among dentists compared to 12.8% among physicians (Table 3) which was in agreement with that reported by Chamonix et al., (2012) who found that 18% of Iranian dentist had elbow pain

In this study, the prevalence of hip pain was 14.6% among dentists which was in agreement with Rabiei et al., (2012) who found that it was 10.86% of studied dentists group and Leggat and Smith, (2006) who found that it was 9.2% of studied dentists.

This study also, revealed that prevalence of knee and ankle pains among dentists were (32.3% and 25.6%, respectively) (Table 3). These prevalence are less than to

those reported by Udoe and Aguwa, (2006) who studied musculoskeletal symptoms amongst Nigerian dentists at south eastern Nigeria and found that knee and ankle musculoskeletal complains were 55.7% for each, and more than that reported by Rabiei et al., (2012) who found that knee and ankle musculoskeletal complains among Iranian dentists were 19.56% and 8.69%, respectively.

### **Conclusion and Recommendations**

Self-recognition of the problem is generally the first step in alerting the clinician of the need to consider changes. Dentists have also been advised to seek and receive education about their musculoskeletal health, injury prevention and ergonomics to improve their working environment.

MSDs are a major health problem among dentists in Minia University. Ergonomic work practice should be included in the training of dentists, should be reinforced in clinical training. The working conditions in dentistry should be improved and there is a need for a preventive program to reduce the risks of MSD. The profession should take these steps to prevent MSD and

to make dentistry a safer and healthier career.

### **Conflicts of interest**

The authors declare that there are no competing interests.

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