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Original Article

Work Related Upper Limb Musculoskeletal Disorders among Dentist; A Cross-Sectional Study with site and onset of Upper Limb Symptoms

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ABSTRACT

Dentists' working day involves awkward and static standing and sitting positions to work within a precise mouth area, resulting in musculoskeletal problems. **Objective:** To determine frequency of musculoskeletal pain and disorders along with the body-site-specific upper limb (UL) symptoms among dentists. **Methods:** A cross-sectional study with non-probability convenience sampling was done from March to December 2021. Data were collected using three validated questionnaires, Rapid Upper Limb Assessment (RULA), Visual Analog Scale (VAS) and Upper Extremity Functional Index (UEFI). SPSS was used to analyze data. **Results:** Fifty-three dentists were enrolled, with 5 (9.4%) males and 48 (90.6%) females. Pain regions were assessed in terms of frequency and severity of pain. There were significant differences found in different regions with p-value less than 0.001. Severe pain was found more in elbow with 42.9%, moderate pain in shoulder was observed with 37.5% however, 31.8% mild pain was observed in neck region with significant p-value of 0.004. Mean Posture Score (Neck, Shoulder, Elbow and Wrist) was found to be 5.32 ± 0.85 and Mean Posture Score (Upper Back) was found to be 4.08 ± 1.68. Female Gender was found common 25.8% in neck pain, 20.9% in shoulder pain, 16.1% in elbow, 12.9% in upper back with significant p-value of 0.016. **Conclusions:** Elbow was the most painful area in upper limb among dentists working with Clients. Female were more vulnerable in pain than male and majority reported pain related problem, which results in restricted range of motion.

INTRODUCTION

A musculoskeletal disorder occurs when bones, ligaments, muscles, tendons, joints, or nerves are injured. These disorders may be acute or chronic and show multiple signs and symptoms. The etiology includes many factors, but occupation is considered as a risk factor [1, 2]. Musculoskeletal problems faced due to occupation called as work-related disorders (WMSDs), the symptoms are aggravated by the work and circumstances of its performance. These WMSDs are most common among dental personnel, who work in a restricted field that makes high demands on vision. The requirement of this job is static posture with excessive force with fine repetitive hand and wrist movements. The causes of WMSDs are vast including not only workplace conditions, workplace exposures but also organizational, psychological, social and cultural variables [3]. Among the occupational hazards that dental professionals are exposed to are infections (such as the Human Immunodeficiency Virus and viral hepatitis); percutaneous exposure incidents, dental materials, radiation, and noise; psychological problems and dermatitis; respiratory disorders; and eye problems [4]. Furthermore, dentists tend to suffer from musculoskeletal issues, especially neck pain. The trapezius muscle is particularly sensitive to stress, which

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can increase muscle tension and cause pain [5, 6]. A number of factors can increase the likelihood of developing WMSDs, including gender, height, and not enough rest [7]. Age, gender, body mass index, smoking habits, co-morbidities, and predispositions to certain ailments are among the most important factors beyond the physical and psychological characteristics of the individual [8]. A study highlighted several risk MSD risk factors in dentistry profession. Prolonged sitting, static posture, rhythmic and repetitive movements are important. Poor posture is the major risk factor for dentist [9]. Posture of people assessed by RULA is at high risk of MS injuries. They require immediate attention. If they are failed to correct their posture for longer, leaving profession is the ultimate solution. Every year dentists are specifically forced to correct their posture and reduce their working hours in order to live a better life in context of health. High treatment cost and work loss due to pain decreases the efficiency and increases the financial impact. Previously many dentists leave their clinical practices, reduced their practice time and even thought about the early retirement. Due to less working and medication, expenditure efficiency of work is decreased and evolved economic problems. Static posture has an impact on muscles to be in isotonic state for long hours and this stagnant position of muscles cause the reduced circulation and ultimately reduced oxygen to the muscles. Different parts of the body are predisposed to pain for dentists. Among dentists, dental assistants, and dentistry students, Work-related musculoskeletal disorders (WRMSDs) and symptom severity were most commonly reported in the back (36.3%-60.1%) and neck areas (19.8%-8.5%). Moreover, this study found that female dentists and dental assistants had a higher prevalence of arm, wrist, shoulder, and neck MSD symptoms compared to males (60.0%-69.5%) [10]. Dentists who performed surgeries cannot avoid long sitting, even in normal sitting position half side of the muscles of the body are contracted statically and even the vertebral column is static. This will cause damage to back, neck or shoulder. If this daily occurring pain is neglected, it will cause mega damage and the career is on stack. Basic posture for a dentist to assume is important professional health issue. It is universally accepted that working postures should be normal and banced.im proper posture will cause musculoskeletal disorders and pain. A detailed study reported physiological problem as comprehensive treatment plan is developed.in dentistry, static posture, long working hours and repetitive tasks contributes greatly to musculoskeletal disorders and pains [11]. Multiple studies show that severity of WRMSDs is more in dentistry profession than in any other occupation [12].

WRMSDs are observed when the human body's physical capabilities do not match the demands of the task. There is a significant link between the development of MSDs and work activities and conditions. Present study aimed to determine frequency of musculoskeletal pain and disorders along with the body site specific upper limb (UL) symptoms.

METHODS

This was an observational cross-sectional study conducted on dentists. A The Bahria University Medical and Dental College (BUMDC) Institute Research Ethical Committee has approved this study. Data collection period were March to December 2021. Sample size calculated from online software Openepi version 3 by using Single proportion sampling technique with statistical indications of 95% confidence interval and 5% margin of error. Researcher used 50% hypothesized prevalence to get big sample from desired population. Population size of dental faculty working in BUMDC was 60. Total sample size drawn from software was 53. Samples were collected using non-probability convenience sampling method. The inclusion criteria were all the dentist of age ranging from 25 to 40 years, engaged in clinical practice, working more than 3 hours continuously in a day having experience of more than 1 year, dentists who feel pain from doing clinical practice. Exclusion criteria were those dentists who are working in a part time job, having any congenital or musculoskeletal problem, non-consenting dentists. Three validated Questionnaires used for data collection. Rapid Upper Limb Assessment (RULA), Visual Analog Scale (VAS) and Upper Extremity Functional Index (UEFI). The RULA designed for easy use without any need for expensive equipment. RULA developed to evaluate the exposure of individual workers to ergonomic risk factors associated with upper extremity musculoskeletal disorders. By using RULA, the evaluator assigns scores of each region. after the data of score collection these scores were used to evaluate the risk factors that represents the musculoskeletal disorder [13]. In hospitals and clinics, clinicians use the VAS to measure pain severity [14]. A functional impairment caused by a disability or pain in the upper limb can be assessed by UEFI. Patients with shoulder, elbow, wrist or hand impairments can use this scale to assess how much their upper limb disability and pain affect their ability to carry out daily activities [15]. Researcher circulated this form on social media platforms (WhatsApp, Facebook & Email) to those the dentist who qualified inclusion criteria. Estimated time for completing the questionnaire was 20 minutes. Statistical Analysis has done using Statistical Package for Social Sciences (SPSS IBM Chicago, IL) version 25.0. All the continuous variables presented as mean and standard deviation. For categorical variables, frequency and percentages were shown. To check significance Fischer

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Exact test applied. p-value ≤ 0.05 considered statistically significant.

RESULTS

A total of 53 dentists participated in this study. Gender distribution was 5 (9.4%) males while 48 (90.6%) were female. There were 13 (24.5%) Assistant Professors, 4 (7.5%) Clinical Instructors, 18 (34%) Consultant dental surgeons and 18 (34%) were general dentists. Pain regions were assessed in terms of frequency and severity of pain. There were significant differences found in different regions with p-value less than 0.001. severe pain were found more in elbow with 42.9%, moderate pain in shoulder was observed with 37.5% however, 31.8% mild pain was observed in neck region with significant p-value of 0.004 (Table 1).

Region	Frequency of Pain			Severity of Pain			
	Constant	Frequent	Occasional	Mild Pain	Moderate Pain	Severe Pain	Total
Neck	3(60.0%)	7(41.2%)	5(16.1%)	7(31.8%)	6(25.0%)	2(28.6%)	15(28.3%)
Upper Back	0 (0.0%)	3 (17.6%)	10 (32.3%)	8 (36.4%)	5 (20.8%)	0 (0.0%)	13 (24.5%)
Shoulder	2(40.0%)	7(41.2%)	1(3.2%)	1(4.5%)	9(37.5%)	0(0.0%)	10(18.9%)
Elbow	0(0.0%)	0(0.0%)	5(16.1%)	2(9.1%)	0(0.0%)	3(42.9%)	5(9.4%)
Wrist	0(0.0%)	0(0.0%)	10(32.3%)	4(18.2%)	4(16.7%)	2(28.6%)	10(18.9%)
Total	5 (100.0%)	17 (100.0%)	31 (100.0%)	22 (100.0%)	24 (100.0%)	7 (100.0%)	53 (100.0%)
p-value	0.001			0.004			

*Fischer Exact test applied to see the significance

Table 1: Pain Region Associated With Upper Body during Professional Work

Mean Posture Score (Neck, Shoulder, Elbow and Wrist) was found to be 5.32 ± 0.85 and Mean Posture Score (Upper Back) was found to be 4.08 ± 1.68 (Table 2).

Mean Posture Score	Mean ± SD
Posture Score (Neck, Shoulder, Elbow and Wrist)	5.32 ± 0.85
Posture Score (Upper Back)	4.08 ± 1.68

Table 2: Mean Posture Score

RULA score was compared with complain. It was seen that restricted range of motion was common in all participants, 23.1% who need to change their posture, and 15.4% is on change soon category and 61.5% had to implement change in their posture (Table 3).

Major complain	RULA Score				P-value
	Further Investigation, change may be needed	Further investigation, change soon	Investigate and Implement change	Total	
Pain	5(12.5%)	12(30.0%)	23(57.5%)	40(100.0%)	0.461
Restricted range of motion	3(23.1%)	2(15.4%)	8(61.5%)	13(100.0%)	
Total	8(15.1%)	14(26.4%)	31(58.5%)	53(100.0%)	

*Fischer Exact test applied to see the significance

Table 3: Complain versus RULA score status of respondents

When asked about, when did you first experience pain in this occupation-related problem, with pain complain there were 19 (47.5%) having > 2-year time period, 7 (17.5%) observed with 1-2 years and 14 (35.0%) observed with less than 1 year problem (Table 4).

When did you first experience pain in this occupation-related problem?	Major Complaint		P-value
	Pain	Restricted range of motion	
> 2 years	19(47.5%)	9(69.2%)	0.202
1-2 years	7(17.5%)	0(0.0%)	
Less than 1 year	14(35.0%)	4(30.8%)	
Total	40(100.0%)	13(100.0%)	

*Fischer Exact test applied to see the significance

Table 4: Association of complain versus year of working

DISCUSSION

Dentist working in Karachi showed various MSD focusing on upper back and neck in majority those who had been working for more than 2 years. Most of the participant reported bad posture during working. Females are more prone to work related musculoskeletal disorder as compared to men. These WMSD may get worse if were not reported timely and results in restricted range of motion and osteoarthritis. Khan *et al.*, reported in their study that 86% of the dentists were suffering from MSD. The most affected area was the neck region (96%) followed by the shoulder and upper extremities. Dentists complaining of few hours of discomfort for 1 year lie in the range of 4% to 6%, daily pain complaints for 1 month were reported between 4% to 10%, and those who had no complaints ranged from 4% to 8%. Dentists that sought medical help because of pain were 10% to 14% [16]. In this study, 77.8% of general dentists and 92.3% of assistant professors had neck pain. As we focused on the period of working which showed 47.5% of dentists working for > 2 years had pain while 17.5% and 35% had pain between 1-2 years and less than 1 year respectively. According to Meisha *et al.*, 70% of dentists in Jeddah suffer from MSD as a result of their dental work. Back pain (85%), neck pain (84.6%), and shoulder pain (81.2%) were the top three locations for WMSD pain. Moreover, it was reported that dentists who torsional and flexion their necks for better vision while working were twice as likely to report MSD as dentists who don't [17]. Present study observed most frequent pain region was neck which was found in 28.3% participants, followed by upper back 24.5%, wrist and shoulder 18.9% ad elbow 9.4% with highly significant p-value 0.001. Similarly, Ali *et al.*, found that back and neck pain are highly prevalent among dentists in Karachi between the ages of 20 and 40. Seventy-five percent of respondents reported back pain, 45 percent reported shoulder pain, 10 percent reported elbow pain, 3% complained of wrist pain, and 36 percent reported upper back pain [18]. However, Current study showed 24.5% reported back pain, 18.9% had shoulder pain, 28.3% with neck pain, 9.4% had elbow pain and 18.9%

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had wrist pain with significant p-value of 0.001. A pilot study was done by 19. Alghadir *et al.,* on thirty graduated dental surgeons with working experience of 1 year or more, postgraduates, and faculty of dental college evaluated the significant association between age and stiffness of neck with p-value of 0.048 [19]. This study also highlighted severity of pain in maximum participant is elbow region which is 42.9%. However, there were 28.6% participant had severe pain in neck and wrist region with significant p-value of 0.004 [20]. Chamani *et al.,* found that the neck, shoulder, wrist, elbow, and back were the most commonly reported places of musculoskeletal pain, based on the NMQ and RULA pain scores[20].

CONCLUSIONS

This study demonstrated that Elbow was the most painful area in upper limb among dentists working with Clients. Besides this female, reported more overall pain as compared to male and majority of participants reported pain related problem within 2 years of work, which results in restricted range of motion. Further analytical studies are warranted to explore in depth the factors related to work and musculoskeletal pain at work place. here were 28.6% participant had severe pain in neck and wrist region with significant p-value of 0.004 [20]. Chamani *et al.,* found that the neck, shoulder, wrist, elbow, and back were the most commonly reported places of musculoskeletal pain, based on the NMQ and RULA pain scores[20].

Conflicts of Interest

The authors declare no conflict of interest

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