

How to Cite:

Sohail, S. ., Sana, M., Tooba, G., Sadaf, A., Ather M., K., & Ziaullah, C. (2023). Prevalence of musculoskeletal disorders among dentists and dental hygienists. *International Journal of Health Sciences*, 6(S9), 4557–4567. <https://doi.org/10.53730/ijhs.v6nS9.13836>

Prevalence of musculoskeletal disorders among dentists and dental hygienists

Sohail Saadat, MDS, PhD Scholar

Department of Community & Preventive Dentistry, Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences Ojha Campus Karachi

Sana Masood, BDS

Department of Community and Preventive Dentistry, Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences Ojha Campus Karachi

Corresponding author email: sanamasood31@hotmail.com

Tooba Ghazal, MDS

Department of Operative Dentistry, Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences Ojha Campus Karachi

Sadaf Arshi, MSc.DS

Department of Community and Preventive Dentistry, Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences Ojha Campus Karachi

M. Ather Khan, BDS

Department of Community & Preventive Dentistry, Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences Ohja Campus Karachi

Ziaullah Chaudhry, MDS

Department of Prosthodontics, Dow University of Health Sciences Ojha Campus Karachi

Abstract---Background: A dentist should be able to maintain a good occupational posture for prolonged periods of time. Lack of any of these abilities causes hindrance in the performance of dental practice and productivity. MSD not only affects one's physical but also psychosocial aspects of life and may lead to early retirement. Objectives: To assess self-reported prevalence of MSD among dentists and dental hygienists with respect to designation, specialties, and working conditions. Methodology: It was a cross-sectional study. After taking informed consent, designed survey questionnaire was distributed among two hundred and forty-six dental practitioners and hygienists, above twenty-two years old working in Dow University of Health Sciences. The samples were collected using convenience

sampling technique. Data was analyzed using SPSS version 21. The results were reported as frequencies and association of pain with wrong conditions and durations was reported using Chi-square test. Results: The pain is found to be greater in those above twenty-five years of age (p-value 0.045). Out of two hundred and forty-six research participants, 96.7% of postgraduates and faculty members reported musculoskeletal pain. Majority affected were above twenty-five years of age (97.4%, n=74). Females were slightly more affected more than males. The higher percentage was reported by the clinicians working in periodontology department (96.9%, n=31) and those working without assistant (94.2%, n=49). However, the only statistically significant association was found between pain and age of the practitioners. Conclusion: The prevalence of MSD among dentists and dental hygienists increases with age and years of clinical practice.

Keywords---Musculoskeletal disorders, Dentistry, Posture, Prevalence.

Introduction

Musculoskeletal Disorders (MSD) is a group of disorders or injuries which affect musculoskeletal system including muscles, tendons, ligaments, discs and nerves etc. Upon worsening, these disorders may be detrimental to physical and mental health with substantial financial consequences. Numerous predisposing factors have been reported in disease progression i.e., working or sitting in awkward postures for prolonged periods of time, overstrained working movements or positions, frequent repetitive movements and psychosocial stresses.¹ These factors individually or collectively may lead to pain in back, neck and shoulders and/or limited joint movements. Upon continuous exposure to these risk factors, individuals begin to fatigue which outruns the recovery system and they develop a musculoskeletal imbalance. With the passage of time, if musculoskeletal imbalance persists, it leads to a musculoskeletal disorder.²

Dentistry is a profession which demands highly functioning musculoskeletal system and adequate levels of mind and body coordination to perform and practice efficiently. A dentist requires good vision; proper hearing along with optimum psychosocial skills. While practicing, a dentist should be able to maintain a good occupational posture following the principles of ergonomics. Lack of any of these abilities cause hindrances in the performance of dental practice and productivity.³ Despite a number of advancements and literature available on ergonomics health problems still exist.

MSD are among the top five dentistry-related occupational hazards.⁴ It is one of the most common causes of persistent pain that affects millions of people including dentists. MSD are represented by feeling of discomfort, disability and/or persistent pain in the joint that leads to complete loss of ability to perform tasks. It also includes persistent pain in muscle; tendon and other soft tissue, which is aggravated by sudden movements, prolonging the same body posture.⁵

Researches across the world have shown high prevalence of MSD particularly among dentists. Female participants suffered more frequent pain, especially in the areas of neck, shoulders and upper back.⁶ Dentists maintain a particular posture at work for a prolonged period of time which requires more than 50% of body muscles functioning while resisting gravity. When the body remains in the same posture for an extended time it ultimately results in discomfort, pain, injury or worst career ending MSD. The percentage of MSD increases with prolonged working hours.⁷ Working for more than eight hours is associated with one or more MSD in 90% of cases and is positively correlated with poor posture.⁸ These strained postures can induce musculoskeletal disorders affecting 54-93% of dental professionals.⁹ The most commonly observed awkward postures among dental professionals are flexion of head and neck, inclination of trunk, and rotating to one side while lifting one or both shoulders increasing the thoracic curvature of the vertebral column and positioning lower limb with the thigh-leg angle of greater than 90°.¹⁰ MSD most commonly involve neck (59.9%), followed by shoulders (43.3%), dorsum (37.7%) and hand and wrist (30.6%). According to the literature, the occurrence of MSD significantly increases from 30.1% to 45.2% during the five years program of undergraduate dental students.¹¹ Another study showed that the incidence of MSD increased with years of clinical practice with pain lasting for more than two days in over two-third of the population.¹²

Studies have reported that around 70-90% of dental practitioners suffer from lower back pain.¹³ The prevalence of MSD has been reported highest in endodontists which is 29.2%. Other than that, it was reported 23.1% in restorative dentists, 12.3% in prosthodontists, 10.2% in periodontists, 8.6% in oral surgeons, 8.7% in orthodontists, and 7.5% in implantologists.⁷ The aim of this study was to assess self-reported prevalence of MSD among dentists and dental hygienists with respect to designation, specialties, and working conditions.

Materials and Methods

A cross-sectional study was conducted among dental practitioners and hygienists of a public sector university. The convenience sample consisted of all final year undergraduate dental students and house officers, postgraduate students and faculty members working in dental OPDs and private clinics and dental hygienists who were all above twenty-two years.

Informed consent was taken before initiation of the study. Total three hundred questionnaires were distributed out of which two hundred and forty-six participants agreed to be part of the study. A modified, validated self-reported questionnaire was distributed among these participants. The questionnaire was divided into four parts. The first part was about their basic details i.e., gender, age, designation and department/field of specialty. The second part included questions about duration of working hours, length of procedures and interappointment breaks. The third part included questions about the occurrence, sites, frequency and severity of pain. The fourth part inquired about their knowledge, awareness and implementation of ergonomics principles in their practice. The collected data was analyzed using SPSS version 21. Frequencies were reported in percentages. The association of pain with each variable was

reported with Chi-square test. p-value of less than 0.05 was considered significant.

Results

Characteristics of Study Participants

Sixty-nine percent of the participants were below 25 years. Majority of the subjects were females (69.9%); and were undergraduates (58.9%). Most of them were working in government sector (88.6%). Among the research participants, 70% belonged to operative department followed by 26.4% from oral and maxillofacial surgery, 26.0% from prosthodontics, 13.0% from periodontology department and 6.1% in orthodontics department. Most of the participants worked greater than five hours daily (70.7%). Frequently used was 11 o'clock position when working on right side (45.1%) and left side (31.3%) of the patient. There were 62.6% of those who often work with an assistant. Majority of subjects (81.7%) reported to take break before doing five patients. (Table 1)

Pain Characteristics of Study Participants

Among the 92.3% subjects who reported pain while working, 19.1% always reported pain while 70.3% had often complain of pain. The most common site of pain was back and shoulder (52.4%). Most of them complained of slowly progressing pain (66.7%). This complaint of pain started after dental practice in most of the subjects (71.1%). (Table 2)

MSD Awareness and Implementation

Around 81% of the participants who received instructions about pain associated with wrong chair position, mostly (65%) received awareness of MSD from their undergraduate curriculum. Majority (72%) implemented these guidelines in their dental practice. (Table 3)

Distribution of pain with characteristics of participants

Out of 246 research participants, 96.7% of postgraduates and faculty members complained of pain. Majority affected were females (92.4%) above 25 years age group (97.4%). The one working in private sector reported more pain (96.2%) as compared to government sector (91.7%). This includes mostly those working in periodontology department 96.9%, followed by 94.3% in operative department, 93.3% in orthodontics, 90.6% in prosthodontics and 89.2% in maxillofacial surgery department. The pain is found to be more in those who were working less than five hours per day (93.1%). Those never working with assistant reported more pain (94.2%) as compared to those always working with assistant (90.0%). The majority affected practitioners tend to attend more than five patients before taking break (95.6%). The participants complaining about pain reported to take break of more than 60 minutes (100.0%) while those who took break of less than 30 minutes reported 91.1% of pain. Majority of them performing procedure of more than 60 minutes (93.0%). However, all these results were found to be

statistically non-significant except pain associated with age group. The pain is found to be greater in those above 25 years of age (*p-value 0.045*). (Table 4)

Discussion

The prolonged static postures, repetitive movements and use of vibrations and forces are considered risk factors for MSD and had contributed to its high prevalence.^{14,15} It has resulted in frequent absence from work, and in extreme cases, it has led to early retirement. In Pakistan, the prevalence of MSD among dental practitioners is not reported well. Hence, this study was carried out to determine the prevalence of MSD among dental practitioners.

The present study has shown a high prevalence (92.3%) of MSD among dental practitioners and hygienists. It was higher than reported among medical physicians (41.7%) in Iran¹⁶ and physiotherapists in Nigeria (91.3%)¹⁷ and by practitioners in Lithuania (86.5%)¹⁵, Saudi Arabia (59.2%)¹⁸ and Australia (87.2%)¹⁹ but was lower than reported in Turkey (94%)²⁰.

With respect to pathophysiology, MSD are among a diverse group of disorders. Its burden can be assessed in terms of pain and impaired functioning or disability linked with the musculoskeletal system or relative to the causes such as trauma or any joint disease.²¹ In our study, a significant difference was observed between MSD and increasing age (*p-value 0.045*). This was in accordance with other studies.²²

The type of work and the position adopted by dentists was responsible for pain or injury in different body sites.¹⁴ In this study, the most common were shoulders and lower back (52.4%), followed by neck (24.8%) indicating that inappropriate positions of most of the practitioners frequently resulted in MSD of the neck and lower back regions.

The present study only showed that females experienced slightly more pain (92.4%). Literature has reported that MSD among males is more common.^{19,23} The areas of shoulders, neck, wrist/hand, and upper back are more common sites in females¹⁹ but in this study back and shoulder pain is more common (52.4%). However, no such difference related to site of pain according to gender basis was observed which could be attributed to the small sample size.

MSD affect the physical and psychosocial aspects of practitioners significantly affecting their productivity and ultimately reducing their quality of life. This was evident from reduced working and leisure activities and increase in sick leaves and doctor consultations. Around 40% of the practitioners needed sick leaves. This was higher than the Australian dental practitioners but lower than the Polish study by Szymańska.²⁴

MSD among dental practitioners is worsening day by day as the magnitude of the problem is increasing and shifting curves slowly. There is a need for implementing professional measures and protocols for MSD unanimously before it becomes a career-limiting hazard.²⁵ Several ergonomic interventions were found to possess a positive effect on the prevalence of MSD.²⁶ Numerous evidence-based studies have

reported that, strengthening exercises, frequent breaks, limiting the duration of appointments and joint mobilizations can improve the function and decrease pain.²⁷

Conclusion

This study concludes that prevalence of MSD among dentists and dentalhygienists increases with age and years of clinical practice. There is a need to educate dental students and clinicians about ergonomics, proper operator and patient chair positioning to prevent MSD.

References

1. Alexopoulos EC, Stathi IC, Charizani F. Prevalence of musculoskeletal disorders in dentists. *BMC musculoskeletal disorders*. 2004 Dec;5(1):1-8.
2. Mukhtad AA, Aminese HA, Mansor MA, Mansour HS, Elmesmary HA. Ergonomic risk assessment among healthcare laboratory technicians in Benghazi medical centre. *International Journal for Advance Research and Development*. 2018;3(3):318-27.
3. Gupta A, Bhat M, TM B. N., & Gupta, G.(2014). Ergonomics in dentistry. *International journal of clinical pediatric dentistry*.;7(1):30-4.
4. Reddy V, Bennadi D, Satish G, Kura U. Occupational hazards among dentists: A descriptive study. *Journal of Oral Hygiene & Health*. 2015 Sep 4.
5. National Academies of Sciences, Engineering, and Medicine. *Musculoskeletal Disorders. In Selected Health Conditions and Likelihood of Improvement with Treatment* 2020 Apr 21. National Academies Press (US).
6. Ohlendorf D, Naser A, Haas Y, Haenel J, Fraeulin L, Holzgreve F, Erbe C, Betz W, Wanke EM, Brueggmann D, Nienhaus A. Prevalence of musculoskeletal disorders among dentists and dental students in Germany. *International Journal of Environmental Research and Public Health*. 2020 Dec;17(23):8740.
7. Gandolfi MG, Zamparini F, Spinelli A, Risi A, Prati C. Musculoskeletal Disorders among Italian Dentists and Dental Hygienists. *International Journal of Environmental Research and Public Health*. 2021 Mar 8;18(5):2705.
8. Kamal AM, Ahmed DR, Habib SF, Al-Mohareb RA. Ergonomics of preclinical dental students and potential musculoskeletal disorders. *Journal of Dental Education*. 2020 Dec;84(12):1438-46.
9. De Sio S, Traversini V, Rinaldo F, Colasanti V, Buomprisco G, Perri R, Mormone F, La Torre G, Guerra F. Ergonomic risk and preventive measures of musculoskeletal disorders in the dentistry environment: an umbrella review. *PeerJ*. 2018 Jan 15;6:e4154.
10. Nowotny-Czupryna O, Czupryna K, Skucha-Nowak M, Szymanska J. Spine Arrangement During Work In Sitting Position And Occurrence Of Pain Among Dentists And Medical Assistants/Ustawienie Kregoslupa Podczas Pracy W Pozycji Siedzacej A Dolegliwosci Bolowe U Stomatologow I Asystentek Medycznych. *Medycyna Pracy*. 2018 Sep 1;69(5):509-23.
11. El-Sallamy RM, Atlam SA, Kabbash I, El-fatah SA, El-Flaky A. Knowledge, attitude, and practice towards ergonomics among undergraduates of Faculty

- of Dentistry, Tanta University, Egypt. *Environmental Science and Pollution Research*. 2018 Nov;25(31):30793-801.
12. Harris ML, Sentner SM, Doucette HJ, Brilliant MG. Musculoskeletal disorders among dental hygienists in Canada. *Canadian Journal of Dental Hygiene*. 2020 Jun;54(2):61.
 13. Garcia PP, Gottardello AC, Wajngarten D, Presoto CD, Campos JA. Ergonomics in dentistry: experiences of the practice by dental students. *European Journal of Dental Education*. 2017 Aug;21(3):175-9.
 14. Valachi B, Valachi K. Preventing musculoskeletal disorders in clinical dentistry: strategies to address the mechanisms leading to musculoskeletal disorders. *The Journal of the American Dental Association*. 2003 Dec 1;134(12):1604-12.
 15. Puriene A, Janulyte V, Musteikyte M, Bendinskaite R. General health of dentists. Literature review. *Stomatologija*. 2007 Jan 1;9(1):10-20.
 16. Mehrdad R, Dennerlein JT, Morshedizadeh M. Musculoskeletal disorders and ergonomic hazards among Iranian physicians. *Archives of Iranian medicine*. 2012 Jun 1;15(6):0-.
 17. Adegoke BO, Akodu AK, Oyeyemi AL. Work-related musculoskeletal disorders among Nigerian physiotherapists. *BMC musculoskeletal disorders*. 2008 Dec;9(1):1-9.
 18. Abduljabbar TA. Musculoskeletal disorders among dentists in Saudi Arabia. *Pakistan Oral & Dental Journal*. 2008;28(1):135-44.
 19. Leggat PA, Smith DR. Musculoskeletal disorders self-reported by dentists in Queensland, Australia. *Australian dental journal*. 2006 Dec;51(4):324-7.
 20. Polat Z, Başkan S, Altun S, Tacir I. Musculoskeletal symptoms of dentists from South-East Turkey. *Biotechnology & Biotechnological Equipment*. 2007 Jan 1;21(1):86-90.
 21. Cieza, A., Causey, K., Kamenov, K., Hanson, S. W., Chatterji, S., & Vos, T. (2021). *Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: a systematic analysis for the Global Burden of Disease Study 2019*. *The Lancet*, 396(10267), 2006-2017.
 22. Gandham A, Boppana NK, Vinnakota NR, Burri KK, Th UK, Pallepati A. Assessment of musculoskeletal disorders and associated risk factors among dentists in Rajahmundry City: A cross-sectional study. *Journal of Indian Association of Public Health Dentistry*. 2019 Apr 1;17(2):114.
 23. Decharat, S., Phethuayluk, P., & Maneelok, S. (2016). Prevalence of Musculoskeletal Symptoms among Dental Health Workers, Southern Thailand. *Advances in preventive medicine*, 2016, 5494821. <https://doi.org/10.1155/2016/5494821>
 24. Szymanska J. Disorders of the musculoskeletal system among dentists from the aspect of ergonomics and prophylaxis. *Annals of Agricultural and Environmental Medicine*. 2002;9(2).
 25. Shekhawat KS, Chauhan A, Sakthidevi S, Nimbeni B, Golai S, Stephen L. Work-related musculoskeletal pain and its self-reported impact among practicing dentists in Puducherry, India. *Indian Journal of Dental Research*. 2020 May 1;31(3):354.
 26. Lietz J, Ulusoy N, Nienhaus A. Prevention of musculoskeletal diseases and pain among dental professionals through ergonomic interventions: a systematic literature review. *International journal of environmental research and public health*. 2020 Jan;17(10):3482.

27. Gupta A, Bhat M, Mohammed T, Bansal N, Gupta G. Ergonomics in dentistry. International journal of clinical pediatric dentistry. 2014 Jan;7(1):30.

Tables**Table 1: Characteristics of Study Participants (n=246)**

	n (%)
Age group (years)	
<25 years	170 (69.1)
>25 years	76 (30.9)
Gender	
Male	74 (30.1)
Female	172 (69.9)
Designation	
Undergraduates and House Officers	145 (58.9)
Postgraduates and Faculty Members	61 (24.8)
Dental Hygienists	40 (16.3)
Workplace	
Government	218 (88.6)
Private	26 (10.6)
Both	2 (0.8)
Department	
Maxillofacial surgery	65 (26.4)
Prosthodontics	64 (26.0)
Periodontology	32 (13.0)
Operative	70 (28.5)
Orthodontics	15 (6.1)
Working Hours	
<5 hours	72 (29.3)
>5 hours	174 (70.7)
Working position on right side of patient	
7 o'clock	40 (16.3)
9 o'clock	79 (32.1)
11 o'clock	111 (45.1)
12 o'clock	16 (6.5)
Working position on left side of patient	
7 o'clock	25 (10.2)
9 o'clock	75 (30.5)
11 o'clock	77 (31.3)
12 o'clock	69 (28.0)
Work with assistant	
Always	40 (16.3)
Often	154 (62.6)
Never	52 (21.1)
Break in practice	
<5 patients	201 (81.7)
>5 patients	45 (18.3)

Table 2: Pain Characteristics of Study Participants (n=246)

	n (%)
Feel any pain while working	
Yes	227 (92.3)
No	19 (7.7)
How often feel pain	
Always	47 (19.1)
Often/sometimes	173 (70.3)
Never	7 (2.8)
Site of pain	
Neck and head	61 (24.8)
Back and shoulder	129 (52.4)
Both	37 (15.0)
Progression of pain	
Slowly	164 (66.7)
Moderately	49 (19.9)
Immediately	14 (5.7)
Complain of pain before starting dental practice	
Yes	71 (28.9)
No	175 (71.1)

Table 3: MSD Awareness and Implementation

	n (%)
Instructed about pain associated with wrong chair position	
Yes	200 (81.3)
No	46 (18.7)
Where did you get awareness about MSD	
Undergraduate curriculum	160 (65.0)
Postgraduate curriculum	15 (6.1)
Seminars and workshops	7 (2.8)
Research articles	17 (6.9)
Seminars, workshops, articles	1 (4)
Implement these guidelines in your dental practice	
Yes	177 (72.0)
No	23 (9.3)

Table 4: Distribution of pain with characteristics of participants (n=246)

	Pain		p-value
	Yes (n=227)	No (n=19)	
Designation			
Undergraduates and House Officers	133 (91.7)	12 (8.3)	0.204
Postgraduates and Faculty Members	59 (96.7)	2 (3.3)	
Dental Hygienists	35 (87.5)	5 (12.5)	
Age group			
<25 years	153 (90.0)	17 (10.0)	0.045*
>25 years	74 (97.4)	2 (2.6)	
Gender			
Male	68 (91.9)	6 (8.1)	0.882
Female	159 (92.4)	13 (7.6)	
Workplace			
Government	200 (91.7)	18 (8.3)	0.747
Private	25 (96.2)	1 (3.8)	
Both	2 (100.0)	0 (0)	
Department			
Maxillofacial Surgery	58 (89.2)	7 (10.8)	0.673
Prosthodontics	58 (90.6)	6 (9.4)	
Periodontology	31 (96.9)	1 (3.1)	
Operative Dentistry	66 (94.3)	4 (5.7)	
Orthodontics	14 (93.3)	1 (6.7)	
Working Hours			
<5 hours	67 (93.1)	5 (6.9)	0.768
>5 hours	160 (92.0)	14 (8.0)	
Work with assistant			
Always	36 (90.0)	4 (10.0)	0.698
Often/Sometimes	142 (92.2)	12 (7.8)	
Never	49 (94.2)	3 (5.8)	
Break in practice			
<5 patients	184 (91.5)	17 (8.5)	0.540
>5 patients	43 (95.6)	2 (4.4)	
Lengths of breaks			
<30 minutes	146 (91.8)	13 (8.2)	0.817
30-60 minutes	43 (91.5)	4 (8.5)	
>60 minutes	14 (100.0)	0 (0)	
Length of procedure			
<30 minutes	82 (91.1)	8 (8.9)	0.949
30-60 minutes	105 (92.9)	8 (7.1)	
>60 minutes	40 (93.0)	3 (7.0)	

(*p-value <0.05 significant)