Assessing the Prevalence of Musculoskeletal Disorders among Post Graduate Dental Students of Uttar Pradesh

Dalai S[1], Gupta A[1]*, Anjali[2] and Singh R[1]

[1]All India Institute of Medical Sciences Bathinda, India

[2]Teerthankar Mahaveer University, India

*Corresponding author: Aakash Gupta, All India Institute of Medical Sciences Bathinda, Room Number 3028, C-Block, Ground Floor, AIIMS Bathinda, India, Tel: +919877939523; Email: guptaaakash95@gmail.com

Abstract

Context: Musculoskeletal Disorder (MSD) is one such work-related disorder which has been reported in high frequency amongst the dentists than other professions. Disorders associated with persistent pain, restricted bodily movement and disability can impact daily activities, the Quality of Life and capability of earning livelihood and hence independence of the individual.

Aim: To assess the prevalence and distribution of symptoms of MSD among dental postgraduates of Uttar Pradesh state.

Settings and Design: A cross-sectional study was conducted among all the postgraduate students of Uttar Pradesh.

Methods and Material: A self-administered questionnaire was used for recording demographic data and to collect information related to musculoskeletal symptoms. Data from all dental postgraduate students was collected in the time interval from months October to November 2021.

Statistical Analysis Used: The data were collected compiled and analysed using SPSS software version 20. Descriptive statistics was done. Comparative assessment of subjects was done using Chi square test and Spearman correlation.

Results: Majority of the subjects was females (69.7%). 75.4 % were in the age group of 26-30 years, 56.6% belonged to the normal BMI range. In relation to the working characteristics, majority (77.9%) worked for 5-8 hours a day, 63.1 % took break and 25.4 % did stretching during breaks 77.9 %. 76.2% of the study participants suffered from musculoskeletal problem. Among the study participants majority 44.3% suffered from lower back pain followed by upper back region (42.6%). 40.2% suffered from neck pain, 32.8% had pain in hand/wrist region.

Conclusions: The study found overall high prevalence of musculoskeletal symptoms (76.2%) among dental postgraduates of state of Uttar Pradesh.

Keywords: Back Pain; Musculoskeletal Diseases; Prevalence

Abbreviation: VAS: Visual Analog Scale.

Introduction

Musculoskeletal Disorder, occur in high frequency amongst the dentists than other professions [1]. Whole musculoskeletal system comprises of muscles, nerves, tendons, joints, cartilage, ligaments and blood vessels, functioning in a dynamic way, supporting the body by absorbing and distributing load evenly [2-4]. Dentistry as a profession, is challenging both physically as well as mentally [5]. The contributing factors, mainly includes

asymmetric static posture maintained for longer duration and small working field allowing limited range of motion [6]. Hence the present study was conducted to know the working characteristics, ergonomic awareness and prevalence of MSDs among dental post graduates of Uttar Pradesh Population.

Subjects and Methods

For assessing the prevalence of musculoskeletal disorders, a cross-sectional study was conducted upon the post graduate dental students of Uttar Pradesh population. Ethical Approval of the present study was obtained from institutional ethical committee with reference number TMDCRC/IEC/SS/21-22/PHD 04. Data was collected between a period of two months October to November 2021, using a self-administered questionnaire. The inclusion criteria were all postgraduates who gave consent and those students with any history of orthopaedic or neurologic illness or fractures were excluded from the study. Informed consent from all the participants was obtained verbally, disclosing the fact that data obtained will be used for the research purpose. Assurance of confidentiality was given to all the participating subjects.

The questionnaire used for the present study was obtained from a previous study. It was developed based on a prevalence study done by Kurs S, et al. [7]. The questionnaire was designed in the preferred language English. The questionnaire was first pilot-tested on a group of 10 subjects to ensure its clarity and validity and Cronbach's coefficient determined was 0.85. No modifications in the questionnaire were done as 94 % of the subjects found the questionnaire to be easy.

Sample size was derived using the formula:

$$N = \frac{(Z\alpha)^2 (Pq)}{(e^2)}$$

Where, P (Prevalence) = 81% (based on prevalence of musculoskeletal pain collected from a previous study); Z = 2.58; q = 19 and allowable error (e) = 10%.

On substituting the values into the formula mentioned above, the sample size obtained was 103 however as we got maximum responses of 122 students, all were included in the study. Convenient sampling method was used for sample selection.

Description of the Questionnaire

The proforma contained both open and close ended questions. The questionnaire consists of demographic characteristics as such – age, gender, department, marital status, weight and height and other items included duration of employment, daily working hours and working positions. Data regarding absence or presence of pain in context to various anatomical regions as well as its severity was obtained based on a Visual Analog Scale [VAS]. The scale ranged from 0 to 10, with 0 indicating no pain and 10 indicating worst possible pain. Remaining items were for obtaining data regarding ergonomic awareness among the postgraduates.

All 122 postgraduates meeting the eligibility criteria were distributed with the questionnaire. The study was conducted during the college working hours. After visiting every department and then taking permission from the respective faculty in charge, the students were explained about how to fill the questionnaire and then were provided with the questionnaire and asked to fill whenever they got time during their working hours. Then filled questionnaire was then collected during the end of the college timing. Those who were not able to fill the same day due to busy schedule were asked to give filled questionnaire the very next day. Data collection from all departments was done through one department at a time.

Statistical Analysis

The data collected was compiled and tabulated on a excel sheet and analysis was done using SPSS Version 20. For descriptive statistics mean and standard deviation was used. All analysis was done by adjusting confidence interval at 95%. $p < 0.05$ was considered as statistically significant. For checking the homogeneity Chi-square test was used and spearman correlation was used to correlate the prevalence of musculoskeletal pain and type of work.

Results

The study was conducted upon 122 post graduate dental students of Uttar Pradesh state. Response rate was found to be 90.3%.

Majority of the subjects were females (69.7%). 75.4 % were in the age group of 26-30 years, 56.6% belonged to the normal BMI range (Table 1).

		n%	p
Gender	Male	37 (30.3)	0
	Female	85(69.7)	
	Total	122 (100)	
Age Category (Years)	20 – 25	22 (18)	0
	26 – 30	92 (75.4)	
	31 – 35	6 (4.9)	
	36 – 40	2 (1.6)	
	TOTAL	122 (100)	
BMI	18.5 – 24.9 (Normal)	69 (56.6)	0
	25 – 29.9 (Pre-Obese)	33 (27.0)	
	30 – 34.9 (Obese Class I)	11 (9.0)	
	35 – 39.9 (Obese Class II)	NIL	
	40 – 45 (Obese Class Iii)	2 (1.6)	
	15 – 18.49 (Underweight)	7 (5.7)	
	Total	122 (100)	
Speciality	Endodontics	15 (12.3)	0.32
	Oral Medicine	11 (9.0)	
	Oral Pathology	6 (4.9)	
	Orthodontics	19 (15.6)	
	Oral Surgery	10 (8.2)	
	Pedodontics	13 (10.7)	
	Periodontics	16 (13.1)	
	Public Health Dentistry	16 (13.1)	
	Prosthodontics	16 (13.1)	
	Total	122 (100)	

Table 1: Distribution of study subjects based on demographic characteristics.

In relation to the working characteristics, majority (77.9%) worked for 5-8 hours a day, 63.1 % took break and 25.4 % did stretching during breaks. 77.9 % changed their positions frequently during practice (Table 2).

		n %	p
Hours of work per day	04-Jan	22 (18.0)	0
	08-May	95 (77.9)	
	16-Aug	5 (4.1)	
	Total	122 (100)	
Breaks While Working	Yes	45 (36.9)	0
	No	77 (63.1)	
	Total	122(100)	

Stretching Exercises During Breaks	Yes	31 (25.4)	0
	No	91 (74.6)	
	Total	122 (100)	
Change Positions During Practice	Yes	27 (22.1)	0
	No	95 (77.9)	
	Total	122 (100)	
Sufficient Light at Work Place	Yes	108 (88.5)	0
	No	14 (11.5)	
	Total	122 (100)	
Working Posture	Mainly Sitting	52 (42.6)	0
	Mainly Standing	22 (18.0)	
	Both	48 (39.3)	
	Total	122 (100)	
Dental Mirror for Indirect Vision	Yes	118 (96.7)	0
	No	4 (3.3)	
	Total	122	

Table 2: Distribution of Study Subjects in Relation to their Work Characteristics.

76.2% of the study participants suffered from musculoskeletal problem. Among the study participants majority 44.3% suffered from lower back pain followed by upper back region (42.6%). 40.2% suffered from neck pain, 32.8% had pain in hand/wrist region (Table 3).

Musculoskeletal Pain	**N%**	**P**
Yes	93 (76.2)	0
No	29 (23.8)	
Total	122 (100)	
Neck	49 (40.2)	0.04
Lower Back	54 (44.3)	0.24
Arm	28 (23.0)	0
Hand/Wrist	40 (32.8)	0
Leg	43 (35.2)	0
Shoulder	46 (37.7)	0.01
Upper Back	52 (42.6)	0.12
Total	122 (100)	

Table 3: Prevalence of Musculoskeletal Pain upon Different Anatomical Sites.

Regarding severity of the pain felt in different anatomical sites it was observed that severe pain was usually more common in lower back region and leg (13.9%) followed by upper back (9.8%) (Table 4).

Site	Severity	n%
Neck	Mild	21 (17.2)
	Moderate	14 (11.5)
	Severe	10 (8.2)
	Worst	4 (3.3)
Lower Back	Mild	16 (13.1)
	Moderate	21 (17.2)
	Severe	17 (13.9)
	Worst	NIL
Arm	Mild	12 (9.8)
	Moderate	12 (9.8)
	Severe	2 (1.6)
	Worst	2 (1.6)
Hand/Wrist	Mild	19 (15.6)
	Moderate	1.3 (10.7)
	Severe	6 (4.9)
	Worst	2 (1.6)
Leg	Mild	17 (13.9)
	Moderate	9 (7.4)
	Severe	17 (13.9)
	Worst	NIL
Shoulder	Mild	16 (13.1)
	Moderate	20 (16.4)
	Severe	8 (6.6)
	Worst	2 (1.6)
Upper Back	Mild	17 (13.9)
	Moderate	23 (18.9)
	Severe	12 (9.8)
	Worst	NIL

Table 4: Severity of Musculoskeletal Pain upon Different Anatomical Sites.

58.2% of the participants who had pain belonged to 26-30 years of age, 64.8 % female subjects suffered from pain to the male counterpart (Table 5).

Parameters		Musculoskeletal Pain N (%)		P
		Yes	No	
Age	20 -25	16 (13.1)	6 (4.9)	0.772
	26 – 30	71 (58.2)	21 (17.2)	
	31 – 35	4 (3.3)	2 (1.6)	
	36 -40	2 (1.6)	Nil	

Gender	Male	23 (28.20)	14 (8.80)	0.016*
	Female	70 (64.80)	15 (20.2)	
BMI	18.5 – 24.9	51 (44.3)	18 (15.7)	0.228
	25 – 29.9	25 (21.7)	8 (7.0)	
	30 – 34.9	11 (9.6)	0	
	40 – 45	2 (1.7)	0	

Table 5: Cross-Tabulation between Age, Gender and BMI.

Statistically significant correlation was found between subjects who did not took break (58.70%) and prevalence for musculoskeletal pain. 39.64 % who preferred mainly sitting as a working posture reported of have higher prevalence of musculoskeletal pain (Table 6).

Working Characteristics		**Musculoskeletal Pain**		**P**
		Yes	No	
Frequent Breaks	Yes	28 (34.30)	17 (10.70)	0.005*
	No	65 (58.70)	12 (18.30)	
Stretching During Breaks	Yes	23 (18.9)	8 (6.6)	0.809
	No	70 (57.4)	21 (17.2)	
Working Posture	Mainly Sitting	46 (39.64)	6 (12.36)	0.021*
	Mainly Standing	14 (16.77)	8 (5.23)	
	Both	33 (36.59)	15 (11.41)	
Frequently Change Positions	Yes	16 (20.58)	11 (6.42)	0.018*
	No	77 (72.42)	18 (22.58)	
Sufficient Light	Yes	82 (67.2)	26 (21.3)	1
	No	11 (9.0)	3 (2.5)	
Use Of Dental Mirror	Yes	89 (73.3)	29 (23.8)	0.572
	No	4 (3.3)	0	

Table 6: Correlation between Work Characteristics and Prevalence of Musculoskeletal Pain.

Discussion

In this study 93 (76.2%) subjects reported of suffering from one or the more form of musculoskeletal pain due to dental practice, the result is comparable to a study conducted on dental students of MGM dental college and hospital, Mumbai by Madaan V, et al. [8] where the prevalence was 81%. One more study by Pisulkar S, et al. [9] conducted upon post graduate students reported a prevalence rate of 85.6%.

Female subjects reported higher prevalence of musculoskeletal pain than their male counterpart and the results were statistically significant. The results were similar to a study conducted by Lindfors P, et al. [10]. The reason being as women populace is more concerned about their health and are thought to report the same more often as compared to the male populace. However, according to a study conducted by Madaan V, et al. [8] there is no significant difference among female and male study participants. Majority of the study subjects belonged to the normal BMI category (18.5-24.9), reported of suffering with musculoskeletal disorder, however results were not statistically significant. A study conducted by Viester L, et al. [11] reported increased preponderance of musculoskeletal disorder among high BMI (overweight and obesity) individuals.

The result obtained, on further exploration for identifying the anatomical sites affected, the most prevalent was lower back 44.3% followed by upper back 42.6%. The neck (40.2%) and shoulder (37.7%) further being subsequently the common sites affected after the back region. Results are similar to a study conducted by Saxena P, et al. [12] on dentists of Madhya Pradesh where low back pain was most frequent (57.75%) followed by neck pain (31.17%). One more study conducted

on subjects from north east India by Tamo T, et al. [13] was in accord with the present findings with lower back region (48%) frequently involved followed by the neck region (24%). Chandra S, et al. [14] also reported 38.1% of study subjects complained of the lumbar pain, 13.02% had pain in the cervical area, and 24.04% of the dentists had pain in both the areas. However according to a national cross sectional survey conducted by Kumar V, et al. [15] in India, the regions noted in the descending order of their symptoms were neck, wrist/ hand, lower back, shoulder, hip, upper back, ankle and elbow. Also according to a systematic review and meta-analysis done for western countries revealed neck pain to be more prevalent 58.5% than back pain 56.4% [16]. The differences in the results may be attributed to the dissimilar methodologies employed for different surveys. Upper back pain was more likely to occur among the young practitioners and as the study subjects for the present survey were post graduates, hence the result can be justified [17]. Moreover some studies have reported neck and upper back collectively, the most affected site [18]. However, very few studies have been conducted regarding the severity of pain felt upon the affected site. Result from this study reveals that worst kind of pain is felt in the neck region followed by lower back and leg region with severe pain. More studies are advocated to find out the anatomical sites which can be affected till debilitating extent.

More than half (58.70 %) of subjects were not habitual of taking frequent breaks, suffered with MSD, the result was statistically significant. The subjects in this study with no stretching habits during breaks had high occurrence of MSD but the differences were not statistically significant. According to a study, the residents having stretching habits between patients as a precautionary measure for combatting pain reported lower occurrence of MSD in respect to lower back [10]. The result shows the importance of appropriate relaxation and stretching during breaks of working period, hence it is necessary on the part of ergonomist and physical therapist to take necessary steps needed for reducing the prevalence of MSD among dentists [19].

42.6% of subjects preferred sitting as their working posture while working out of which 39.64% suffered with MSD and the result was statistically significant. Though sitting is the recommended posture by ISO11226 – Ergonomics-Evaluation of static working postures, there is still high risk for developing MSD. According to a study conducted by Anghel M, et al. [20] showed that though adopting sitting as prime posture, practiced it in a wrong and incorrect manner. The study made following recommendations to be kept in mind; symmetrical posture, horizontal axes must be parallel, legs should be 30°- 45° angle apart, upper body part should be perpendicular on the chair and forward movement when needed to be done without curving spine, head should bend

at 20°- 25°, arms be close to the body, forearms be nearly horizontal or approx. 25% raised and soles should be on the floor. While sitting chair is supposed to support the back and seat of the dentist. Active and passive sitting postures should be altered frequently.

In the present study, majority of the subjects did not frequently changed positions while working, resulting in high prevalence of MSD among those and the results were significant. A study done by Partido BB, et al. [21] to assess the impact of alternating seated standing protocol on perceived pain, though reported an overall reduction in pain and helped improving postures, however the results were not significant.

Based on the findings of this study, only few subjects (36.9%) took break, (25.4%) did stretching and (22.1%) changed positions during practice, showing lack of ergonomic awareness among the majority of subjects. Though 52 subjects preferred working in sitting posture out of which 46 subjects suffered from MSD, clearly indicating lack of proper techniques.

Recommendations

Correct working posture should be inculcated into practice from the very beginning of a student's professional carrier. Ergonomics and its importance should be incorporated into dental syllabus. Continuing Dental Programmes and workshops should be organised from time to time for reinforcement of good ergonomic practices to ensures minimal impact of occupational hazards.

Conclusion

The study suggests that occupation related hazards does affect postgraduates too. The study discovered relatively high prevalence of musculoskeletal disorders (76.2%) among postgraduates. The back, neck, and hand/wrist pain were more frequently involved sites as compared to others. Hence, awareness regarding maintaining proper posture during working hours and also emphasis on importance of early diagnosis and treatment should be considered.

References

1. Finsen L, Christensen H, Bakke M (1998) Musculoskeletal disorders among dentists and variation in dental work. Appl Ergon 29(2): 119-125.

2. Fitting the Job to the Worker. An Ergonomics Program Guideline: State of Washington Department of Labor, Division of Labor and Industries, Division of Consultation and Compliance Services, Workplace Consultation

Program.

3. Montgomery K (2020) Preventing Carpal tunnel syndrome and other upper body musculoskeletal injuries.

4. Furlow B (2002) Ergonomics in the healthcare environment. Radiol Techno 74: 137- 150.

5. Ayers KM, Thomson WM, Newton J, Morgaine KC, Rich AM (2009) Self-reported occupational health of general dental practitioners. Occup Med (Lond) 59(3): 142-148.

6. Kapitán M, Hodačová L, Čermáková E (2021) The Development of Musculoskeletal Disorders during Undergraduate Dentistry Studies—A Long-Term Prospective Study. Int J Environ Res Public Health 18(14): 7662.

7. Kurs S, Evirgen S, Akbulut N (2014) Work Characteristics and Musculoskeletal Disorders among Postgraduate Dental Students: A Pilot Study. Journal of Musculoskeletal Pain 22(1): 62-67.

8. Madaan V, Chaudhari A (2012) Prevalence and Risk Factor associated with Musculoskeletal Pain among Students of MGM Dental College: A Cross-Sectional Survey. J Contemp Dent 2(2): 22-27.

9. Piluskar S, Purohit H, Godbole S, Sathe S, Avhale A, et al. (2019) Prevalence of Musculoskeletal Pain among Postgraduate Residents in Sharad Pawar Dental College of Datta Meghe Institute of Medical Sciences. Journal of Dental Research 3(3).

10. Lindfors P, Thiele U, Lundberg U (2006) work characteristics and upper extremity disorders in female dental health workers. Journal of Occupational Health 48(3): 192-197.

11. Viester L (2013) The relation between body mass index and musculoskeletal symptoms in the working population. BMC Musculoskelet Disord 12(14): 238.

12. Saxena P, Gupta S, Jain S, Jain D (2013) Work-Related Musculoskeletal Pain Among Dentists in Madhya Pradesh, India: Prevalence, Associated Risk Factors, and Preventive Measures. Asia-Pacific Journal of Public Health 26(3): 304-309.

13. Tamo T, Kalita C, Bhuyan A (2015) Evaluation of occupational musculoskeletal disorders and related risk factors among dentists working in North East India. Dentistry and Medical Research 3(2): 43.

14. Chandra S, Shahi AK, Bhargava R (2015) Prevalence of Neck and Lower Back Pain among Dentists from Three Dental Colleges in Patna City: A Questionnaire Study. International Journal of Scientific Study 3(8).

15. Kumar VK, Kumar SP, Baliga MR (2013) Prevalence of work-related musculoskeletal complaints among dentists in India: a national cross-sectional survey. Indian J Dent Res 24(4): 428-38.

16. Lietz J, kozak A, Nienhaus A (2018) Prevalence and occupational risk factors of musculoskeletal diseases and pain among dental professionals in western countries: A systematic literature review and meta-analysis. Plos one 13(12): e0208628.

17. Kumar RP, Saraswathi S, Thangavelu L (2019) Prevalence of Musculoskeletal Disorder and experience among dental practitioners in Chennai- A cross sectional survey. Drug Invention Today 12(1): 69-73.

18. Nagarajappa R, Thakur P (2015) Prevalence of Work-Related Musculoskeletal Disorders Among Dental Practitioners In Kanpur, India; National journal of Integrated Research in Medicine 6(3): 67-73.

19. Gaowgzeh RA, Chevidikunnan F, Saif A, El Gendy S, Karrouf G, et al. (2015) Prevalence of and risk factors for low back pain among dentists. J Phys Ther Sci 27(9): 2803-2806.

20. Anghel M, Argesanu V, Talpos Niculescu C, Lungeanu D (2014) Musculoskeletal Disorders (MSDs)- Consequences of Prolonged Static Postures. Journal of experimental medical & research 4: 167-172.

21. Partido BB, Henderson, Lally M (2021) Impact of a seated standing protocol on postures and pain among undergraduate dental hygiene students: A pilot study. J Dent Hyg 95(4): 70-77.