Prevalence of work related Musculoskeletal Disorders amongst private dental practitioners in Pune, India- A Questionnaire study.

Dr. Amol Jamkhande - BDS, MDS, Ph.D (Corresponding Author)

Associate Professor – Dept of Public Health Dentistry

Bharati Vidyapeeth Dental College & Hospital Pune. India

Dr. Saurabh Kakade – MDS

Assistant Professor – Dept of Public Health Dentistry

Bharati Vidyapeeth Dental College & Hospital Pune. India

Dr. Darshan Hiremutt - MDS

Assistant Professor – Dept of Oral Medicine & Radiology

Bharati Vidyapeeth Dental College & Hospital Pune. India

Dr. Santosh Jadhav - MDS

Assistant Professor – Dept of Oral Medicine & Radiology

Bharati Vidyapeeth Dental College & Hospital Pune. India

Dr. Abhijeet Jadhav - MDS

Assistant Professor – Dept of Oral Medicine & Radiology

Bharati Vidyapeeth Dental College & Hospital Pune. India

Dr. Prakash Vhatkar – MDS

Associate Professor – Dept of Periodontology

Bharati Vidyapeeth Dental College & Hospital Pune. India.

ABSTRACT-

Background-Occupation related musculoskeletal disorders persist amongst dentists due to prolonged work hours and faulty postural practices.

Aim- To assess the prevalence and clinical practice risk factors leading to MSD among dentists in Pune.

Methods- A cross-sectional study was conducted amongst 200 private dental practitioners of Pune. A prevalidated, structured, self-administered questionnaire was distributed. The four-sectioned questionnaire comprised of questions on demographics, clinical practice pattern and MSD related risk factors, presence of MSD and related questions and lifestyle and awareness questions. The data collected was analysed using descriptive statistics, chi-square test & Spearman's correlation test. p-value of less than 0.05 was considered to be statistically significant.

Results- The prevalence of MSD was found to be 72.2%. Females (59%) were more affected than males (41%). Endodontists (21.7%) followed by oral surgeons (18.1%) majorly reported with MSD. Lower back pain (41%) followed by neck pain (19.3%) were mostly reported.61.5% dentists with MSD took no microbreaks in between patients and 67.5% dentists with MSD had resorted to seek treatment for its cure.

Conclusion- MSD is prevalent among private dental practitioners of Pune and adequate workshops, training and awareness programs on MSD ought to be formulated to combat the growing occupational health hazard.

Key words – Musculosceletal disorders, Dentist in Pune, Dental Occupational Hazard.

INTRODUCTION-

Ergonomics in dental practice is gaining momentum as it deals with the study of relationship of dentists with their occupational environment[1]. Occupational health hazard in the form of musculoskeletal disorders (MSDs) is common amongst dentists.[2] Musculoskeletal disorders (MSDs) are injuries and disorders of the musculoskeletal system affecting the nerves, joints, tendons, muscles and supporting structures like the intervertebral discs.[2] They occur due to overloading of tissues beyond anatomic and physiologic limits without accomplishment of tissue healing due to consistent reinjury by repeated exposure to occupational risk factors.[3,4] MSDs are reported to contribute to about 40% of all costs towards treatment of work related injuries.[3,5] The World Health Organization has attributed MSDs as a disease with multi-factorial etiology becoming increasingly prevalent and thereby included it in World Health Organization-United Nations endorsement of Bone and Joint decade 2000-2010.[6,7]

Dentistry is a conglomeration of art, science, surgery and skill. It has become a very demanding job worldwide due to the increased oral disease burden and awareness.[8] It is a branch requiring extreme concentration, work precision, psychomotor skills, manual dexterity and ability to maintain prolonged static occupational postures making dentists prone to musculoskeletal disorders (MSDs) also termed as occupational overuse syndrome of musculoskeletal system or work related musculoskeletal disorders (MSDs) or cumulative trauma disorders.[4,9] The overall prevalence of MSDs in dentistry ranges from 63- 93% worldwide with its prevalence being higher among dentists compared to physicians and surgeons.[10-12] Hence, this study was undertaken to assess the prevalence and clinical practice risk factors leading to musculoskeletal disorders (MSDs) amongst dentists in Pune.

MATERIALS AND METHODS-

A cross-sectional descriptive study was conducted over a period of two months (Nov-Dec 2017) amongst dental practitioners in Pune city. Ethical clearance for the study was obtained from the Institutional Ethical Committee. A list of dental practitioners was obtained from various local branches of the Indian Dental Association of Pune. Dentists having a minimum of atleast three year clinical experience in dental practice without any history of musculoskeletal pain before joining dental profession were included in the study. Thereafter 412 listed dentists chosen by simple random sampling abiding by the inclusion criteria were telephonically contacted amongst which 187 dentists consented to participate in the study. The purpose of the study was explained to the participants and written informed consent was obtained. A prevalidated, self-administered 14-point structured questionnaire was distributed amongst the consenting dentists via email and in person who briefed in short regarding filling of the questionnaire. 115 responses were received which were completely filled and thus finally included in the study.

Questionnaire Details - After adequate literature search over MSDs, a 18-point structured questionnaire comprising of four sections with questions on demographics (name, age, gender), clinical practice pattern, MSD related risk factors, presence of MSD and related questions, lifestyle and awareness questions was prepared. Thereafter, it was subjected to face and content validation by 5 Subject Matter Experts (S.M.E.). Face validity was done by discussing the questionnaire with the team of S.M.E's. Content validation was done for all the 18 questions whereby content validity ratio (C.V.R) was calculated for each question. The C.V.R value was found to be less than the required value for four questions suggesting their non-essentialness.[12] Thus, the survey-instrument after validation comprised of 14 questions.

Reliability- Reliability of the questionnaire was assessed using test-retest method by distributing it amongst 20 dental practitioners in a pilot study, the results of which were not included in the study. The questionnaire was administered at two intervals with a gap of 12 days to assess the reliability. The Cronbach's alpha value was found to be 0.86 which was considered good.

Pretesting- Pretesting of the questionnaire was conducted prior to the commencement of the study to assess the clarity and comprehensibility of the questionnaire as it was custom made. It enabled to know about the adequate understanding and interpretation of the questionnaire by the participating dentists. A convenience sample of 20 practicing dentists was chosen to distribute the questionnaire. Their responses were recorded and accordingly the changes were made in the pre-validated questionnaire. Thus, a final validated, pretested 14-point structured questionnaire was developed.

STATISTICAL ANALYSIS-

Data obtained was analysed using SPSS version 18 to determine frequency distributions, means and proportions. Also, Chi-square test was used to find the association and Spearman's correlation test to determine the correlation between variables.

p-value of < 0.05 was considered to be statistically significant.

TABLES-

Table 1- Prevalence of MSDs by specialization in dentistry

	MSD Present	MSD Absent
Speciality	n(%)	n(%)
Conservative	18(21.7)	1(3.12)
Oral surgery	15(18.1)	3(9.38)
Orthodontics	12(14.5)	2(6.25)
Public health	10(12.1)	1(3.12)
Oral medicine	8(9.6)	2(6.25)
Oral Pathology	6(7.2)	1(3.12)
Prosthodontics	5(6.1)	7(21.87)
Periodontology	4(4.8)	4(12.50)
Pedodontics	3(3.6)	6(18.75)
General Dentistry	2(2.3)	5(15.64)
Total	83	32

Table 2- Clinical practice patterns and Risk Factor Outcomes-

Parameters			With MSD n (%)	Without MSD n (%)
Years in clinical practice	<10 years		37 (44.5)	21 (65.6)
	>10 years		46 (55.4)	11 (34.4)
Hours of clinical practice per day	<4 hours		12 (14.5)	10 (31.2)
	4 to 6 hours		27 (32.5)	14 (43.7)
	>6 hours		44 (53)	8 (25.0)
Number of patients treated per day	<5		24 (28.9)	25 (78.1)
	5 to 10		27 (32.6)	4 (12.5)
	>10		32 (38.5)	3 (9.4)
Clinical work posture followed	Steady postural practice	Always seated	41 (49.4)	12 (37.5)
	Altered postural practice	Always standing	25 (30.1)	10 (31.2)
		Mostly seated, sometimes standing	11 (13.3)	8 (25)
		Mostly standing, sometimes seated	6 (7.2)	2 (6.2)
Breaks taken in between patients	Yes		32 (38.5)	25 (78.1)
	No		51 (61.5)	7 (21.9)

Table 3- Personal and awareness questions-

3a) Exercise or physical activity done on regular basis-

	MSD Present n(%)	MSD Absent n(%)
Yes	26(31.3)	23(71.9)
No	57(68.7)	9(28.1)

3b) Attended ergonomics in dentistry related awareness workshop or lecture ever-

	MSD Present n(%)	MSD Absent n(%)
Yes	69(83.1)	28(87.50)
No	14(16.9)	4(12.50)

Table 4-Distribution of MSD according to bodysite/ regionwise –

Bodysite	n (%)
Neck	16 (19.3)
Shoulder	9 (10.8)
Upper back	12 (14.5)
Lower back	34 (41)
Elbow	3 (3.6)
Wrist/hand	5 (6.0)
Hips/thigh	4 (4.8)
Other	0 (0)

RESULTS-

The questionnaire was distributed amongst 187 dentists out of which 115 responded to it. The response rate was 61.49%. Demographic outcomes - Prevalence of MSDs was found to be 72.2% out of which 59% were females and 41% were males. Females suffered with MSDs more than males, however, it was not found to be statistically significant.

When corelated with age & MSD cases, 25.3% were aged <30 years, 28.9% had age ranging from 30 to 45 years while 45.8% were more than 45 years of age. Statistically, a significant correlation was found with an increasing age and occurrence of MSDs.

Endodontists were the most affected with MSDs followed by Oral surgeons, Orthodontists and Public Health Dentists respectively. General dentists were found to be least affected in our study (Table 1).

MSDs were more prevalent amongst dentists practicing for more than 10 years as compared to those practicing for less than 10 years (Table 2). MSDs were reported to be more prevalent amongst dentists practicing for more than 6 hours per day (53%). Also dentists treating more than 10 patients per day (38.5%) suffered more with MSDs than those treating lesser patients.

Dentists following a steady postural practice (always seated/always standing) (56.62%) reported more with MSD as compared to those following an altered postural practice (sitting and standing alternately) (43.38%).

61.5% dentists suffering from MSDs took no microbreaks in between patients while 38.5% dentists took breaks after every patient.

Almost 68.7% dentists reporting with musculoskeletal disorders did not exercise or perform any physical activity on regular basis while 31.3% dentists with musculoskeletal disorders exercised regularly (Table 3a). 83.1% dentists with musculoskeletal disorders had attended workshops or lectures related to ergonomics in dental practice as compared to 16.9% dentists who had never attended. (Table 3b)

In body regionwise distribution of MSDs, respondents mostly experienced pain in the lower back (41%) followed by pain in the neck (19.3%) and upper back (14.5%) respectively. (Table 4)

67.5% dentists reporting with MSD undertook treatment for the same while 32.5% never resorted to any kind

of treatment. Statistically, significant associations were found between MSD occurrence and practice of taking microbreaks in between patients and exercising regularly.

Statistically significant positive correlations were found between occurrence of MSD and age of dentists, number of clinical practice hours in a day, number of patients treated per day and years in clinical practice along with breaks taken in between practice hours & exercising regularly.

DISCUSSION-

India is the second most populous country in the world with a population of 1.21 billion with a high oral disease burden.[6,13] The dentist population ratio of India is less than the required ratio of 1:7500 as recommended by WHO resulting in inadequate dental manpower .[6,14] This has led to increased workload over dentists making them work for longer duration with repetitive prolonged static postures.[6] This leads to contraction of more than 50% of body muscles to hold the body static and motionless thereby resisting gravity. These static postural forces are more damaging than dynamic (moving) forces making dentists prone to MSDs.[9] Repetitive prolonged static postural practice also results in an imbalance between muscles that contract chronically and those which stretch leading to MSDs.[15]

MSD was found to be prevalent amongst 72.2% dentists in our study. A similar prevalence of was seen in other Indian studies [5,6,16]. Few other Indian studies have reported a higher prevalence[7, 15, 17] while others have reported a lower prevalence[9, 10]. Hence, it can be concluded that MSDs are prevalent amongst dentists in India and needs to be taken care of.

MSD was found to be more prevalent amongst females than males in our study though not statistically significant. Similar findings were observed in other studies[10, 16]. In a Saudi Arabian study females have been shown to be at a greater risk than males with an odd's ratio of 1.63.[18] However, more male dentists were affected in a study conducted by Chandra et al.[19] Thus it may emphasized that musculoskeletal needs vary in both the genders resulting in females at a higher risk of developing MSD than males. Also, since females may be involved in domestic chores along with professional work it may add up to the musculoskeletal problems.

In our study, MSD was most prevalent amongst Endodontists (21.7%) followed by Oral surgeons (18.1%), Orthodontists (14.5%) and Public health dentists (12.1%). Similar findings were seen in an Indian study conducted by Shankar et al.[15] whereby 30% dentists found endodontic procedures to be most physically stressful followed by Disimpactions & extractions. Contrastingly, orthodontists were found to be most affected by MSD followed by general practitioners respectively in another study conducted in India[6.] The fact that Endodontic work requires prolonged concentration given the working area being difficult to access may lead to more physical and mental stress on the operator thus leading to more MSDs.

MSD cases were found to significantly increase amongst dentists of higher age group strata similar to the findings in other studies [6, 10]. The healing & regeneration capacity of body may decrease with advancement of age making dentists prone to MSD. Our study also showed that dentists practicing for more than 10 years duration reported more with MSD as compared to those with less than 10 years in clinical practice which was found to be significantly correlated. Similar findings were reported in a study conducted by Tamo et al.[16] whereby 70.87% dentists reporting with MSD had a clinical experience of 10-20 years. Also, univariate logistic regression in a Saudi Arabian study significantly relates years of clinical experience to MSD with odd's ratio of 1.06.[20] Contrastingly, a Thai study found a decrease in MSD with increase in clinical experience

justifying it as dentists may get adapted to work postures with experience or they may have left the profession due to MSD or may be taking up less patients due to MSD.[11,21]. But overall the dentists may get more settled in private practice treating more and more patients as compared to their initial days of practice which coupled with advancing age may lead to the above findings. Similar results are observed in our study when the dentist has longer working hours (>6 hours daily) when compared with Shankar et al.(46.8%)[15] in 2015. This suggests that increased work hours or increased patients result in static postures thus increasing risk of MSD.

MSD was recorded more among dentists following static postural practices (56.62%) rather than alternate postural practice (43.38%).Similar findings were recorded by Tamo et al.(39.7%)[16] where MSD was more prevalent amongst dentists working with prolonged sitting postures and only 5% of cases with MSD followed alternating postures in a study conducted by Dabholkar et al.[22] Static postural practice was found to be a risk factor for MSD in a Pakistani study conducted at Karachi.[23] Prolonged sitting results in an imbalance between abdominal and lower back muscles and also increases pressure and decreases nutritional flow to the intervertebral disc making dentists more prone to MSD.[15] Alternation between two muscle groups helps in shifting workload from one muscle group to other thereby preventing MSD.[22]

61.5% dentists with MSD took no breaks in between patients. Similar results were seen in Indian studies[15, 22]. Taking microbreaks in between patients relieves stress over the stretched structures providing nourishment resulting in decrease in MSD occurrence.[22] A correlation between breaks taken and MSD was seen in another Indian study conducted by Bhagwat et al.[10].

68.7% dentists with MSD did not perform any exercise or any other physical activity daily. This suggests lack of exercise as a risk factor for MSD. Regular exercise strengthens the body to resist static and dynamic stresses also thereby relaxing the muscles and helping in rejuvenation thus relieving stress. However, no correlation was found with exercise and MSD in a study conducted by Tamo et al.[16]

83.1% dentists reporting with MSD had attended lectures on MSD. Multivariate regression model of a study conducted by Batham et al.[7] suggested that dentists with lack of awareness were at increased risk with odd's ratio of 1.38. Still 68.7% dentists with MSD did not perform any exercise or any other physical activity daily. This suggests lack of exercise as a risk factor for MSD. Regular exercise strengthens the body to resist static and dynamic stresses also thereby relaxing the muscles and helping in rejuvenation thus relieving stress. However, no correlation was found with exercise and MSD in a study conducted by Tamo et al.[16]

Lower back followed by the neck and upper back were the most common sites affected. Similar findings were reported in few studies[15, 19, 24] with back pain being commonest. However, other studies [7, 22] have reported neck pain followed by back pain to be more common. During dental treatment most of the physical stress is on the neck due to flexion and also on the lower back due to untoward bending for easy accessibility resulting in maximum incidence of pain or discomfort in these areas.

Pharmacological intervention, yoga, exercise, reiki, physiotherapy, posture modifications are some of the treatment forms available in case of MSDs. In our study almost 67% dentists with MSD had resorted to some sort of treatment for its cure. Similar results were seen in an Indian study conducted in North Eastern India[16] while only 35% dentists had taken treatment in studies conducted in Southern India.[15] Our study which was conducted in the Western zone of India suggests that dentists are more cautious towards MSD and aware of treatment options available.

Thus, it can be concluded that MSDs can be said to be an important occupational hazard amongst dentists in Pune, India and measures regarding its prevention, early detection and treatment need to be adopted

judiciously amongst the dental fraternity so as to reduce the morbidity associated with it.

MSD seems to be an emerging health problem affecting dentists widely. Hence, it is time now for a paradigm shift requiring a multifaceted approach to deal with MSD. Theoretical and practical knowledge on MSD should be included in undergraduate curriculum. Workshops should be conducted for dentists, focusing on solutions like practicing four-handed dentistry, posture related habits, good illumination and use of magnification, importance of taking breaks between patients, regular exercise, chair-side stretching and opting alternating postural practice in order to prevent MSDs.

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