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RESEARCH ARTICLE

ASSESSMENT OF MUSCULOSKELETAL PAIN AMONG DENTISTS IN HAZARIBAG CITY, JHARKHAND: A CROSS-SECTIONAL STUDY

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Abstract

Introduction: Work-related musculoskeletal disorders are problems of the musculoskeletal system that significantly cost workplace problems thus affecting occupational health, productivity, and career of the working population. Dentists are prone to many work related occupational hazards.

Aim: To assess the prevalence and distribution of symptoms of MSD among postgraduates, internees and faculties attached to dental college and dental practitioners in Hazaribag city.

Materials and Methods: A cross-sectional study was conducted among all the postgraduate students and faculties working in dental college and dental practitioners of Hazaribag city, Jharkhand. A self-administered questionnaire was used for recording demographic data and to collect information related to musculoskeletal symptoms and the location of musculoskeletal pain among dentists in Hazaribag city. The data were collected compiled and analyzed using SPSS software version 23. Descriptive statistics was done. The findings were compared across study subjects using Chi-square test and Spearman correlation.

Results: The prevalence of MSD among males was 40.25% and females were 59.75% and this difference was statistically significant ($P = 0.03$). The symptoms were higher in dentists practicing for more than 10 years. Lower back pain and shoulder pain were the most commonly reported complaints by dentists. The prevalence of musculoskeletal pain was 41.35% for dentists in the age group of 26–30 years. The frequency of musculoskeletal pain among female dentists was nearly double that of males ($P = 0.009$).

Conclusion: This study suggests that dentists in Hazaribag do experience a certain amount of occupation-related health problems.

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The study found overall high prevalence of musculoskeletal symptoms (64%) among dentists in Hazaribag city.

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Introduction:-

Occupational health hazards are common among workers.[1] With the promotion of industrial life, the prevalence of musculoskeletal disorders (MSD) has increased markedly during the past decades.[2] Many factors at work could predispose people to develop MSD that can lead to workplace problems thus affecting occupational health, productivity and career of the

working population. Lifting or carrying loads, whole-body vibration, having a static posture for a long time, frequent bending and twisting have been proved to be the physical load risk factors consistently associated with work-related MSD (WRMSD). Like all other professionals, dentists are exposed to occupational health hazards that predispose them to develop a multitude of health problems. A wide variety of deleterious work environmental factors are proved to affect the physical health of dentists or even aggravate their preexisting disorders.[3]

A dentist working for more than 8 hours a day without 15 mins break between patients is found to increase the chance of MSD. The dentists are at high risk of neck and back problems due to the limited work area and impaired vision associated with the oral cavity. These working restrictions frequently cause a clinician to assume stressful body positions to achieve good access and visibility inside the oral cavity. Furthermore, dental procedures are usually long and require much more concentration during work. Back pain is one of the most common and troublesome of complaints; its exact causes are unknown, and an exact diagnosis is often difficult.[4]

Investigations have shown that the prevalence and location of pain and other symptoms may be influenced by posture and work habits, as well as other demographic factors.[4] Several dental procedures require the dentist to assume and maintain positions that may have potential disadvantages for their musculoskeletal system.[5] Their work with patients is often performed with their arms abducted and unsupported and the cervical spine flexed forward and rotated leading to high prevalence of pain in the back, neck, and shoulder region.[5,6] According to the World Health Organization technical report, the management of WRMSD determine to a largest possible extent the global productivity and work performance of working age adults.[7] Little is known about the prevalence, symptoms, work characteristics, and distribution of MSD among postgraduates and faculties attached to dental colleges, particularly those in Hazaribag city. Hence, this study was conducted with an aim to study the prevalence and distribution of symptoms of MSD among postgraduates and faculties attached to the dental college and the dental practitioners in Hazaribag city.

Materials And Methods :-

A cross-sectional study was conducted to assess the prevalence and distribution of symptoms of MSD among postgraduates and faculties of the dental institution and the dental practitioners of Hazaribag city. The study proposal was submitted for approval and clearance was obtained from the Institutional Ethical Review Board. Permission to conduct the study was obtained from the principal of the respective dental college and the dental practitioners individually. Verbal informed consent was obtained from the post graduate students by disclosing that the data collected were for research purpose. Dentists, who agreed to participate in the survey, were assured of confidentiality.

Pretested, standardized questionnaire used in the study was adopted from the previous literature[6] designed in English. The addition of the questions and modifications were then made by subject experts relevant to the study setting. A total of 42 questions were structured which was tested for its validity and reliability. Thirty experts in the field of dentistry were given the questions to check for its reliability and validity. The purpose was to depict those items with a high degree of agreement among experts. The panel of experts recommended modifying the wording of the questions and addition of options in others. Only 38 questions were considered for the study. Cronbach's alpha value of 0.84 was obtained.

A pilot study was conducted among 30 postgraduates and faculties to test the clarity and meaning of questions and to calculate the sample size.

Sample was estimated from the formula: $N = Z^2 \times P(1 - P) \times D/e^2$

Where, P (Prevalence) = 80% (based on prevalence of MSD collected from pilot study); Z = 1.96; P = 0.8; e = 0.05; D = 1

When the above values were substituted in the formula, a sample size of 253 was obtained.

A total of 1 dental college is present in Hazaribag city, where 60 postgraduates and faculties are present. To meet the sample size of 253, post graduate students and faculties of dental college were randomly selected by simple random sampling. Postgraduate students and faculties of all specializations who have been active in dental practice from the past 12 months who gave informed consent to participate were included in the study. Dentists with congenital MSD and non-practitioners, pure academicians were excluded from the study. The data collection was done for 3 months (Jan 1st–March 30th 2020).

Description of the questionnaire The questionnaire consisted of four parts:

Part one consisted of demographic data such as name, age, gender, specialization, designation, number of years of experience, body weight, and height were collected

Part two consisted of 11 questions related to the dentist's work characteristics

Part three consisted of 11 questions related to site, intensity of pain using a modified form of standardized Nordic questionnaire given by Kuorinka et al.[5]

Part four entails the triggering factors during the dental practice.

The proforma consisted of both open and closed-ended questions.

The questionnaire was distributed to 253 postgraduates, faculties and dental practitioners who met the eligibility criteria. The survey was held during college hours. The dentists were explained about the questionnaire before distributing it and were given 15 minutes time to fill the questionnaire. Those dental practitioners for whom questionnaire was not covered in the same day, they were being visited next day and completed. Majority of the filled questionnaires were collected back immediately on the day of data collection.

Statistical analysis The data were compiled and analyzed using (SPSS Inc. Released 2016. SPSS for Windows, Version 23.0. Chicago, SPSS Inc.,). The collected data was summarized by calculating frequency and percentage for discrete variables and mean, standard deviation for continuous variables. All analyses were done at 95% confidence interval. Statistical significance was set at $P < 0.05$. Descriptive statistics, Chi-square test was done to check the homogeneity of the sample and Spearman correlation was done to correlate type of work and prevalence of musculoskeletal pain.

Results:-

The study was carried out on 253 dental practitioners, post graduates and faculties in dental college of Hazaribag city. The response rate was 90.50%. The mean age of the study subjects was (31.01 ± 6.4) years.

Majority of the study subjects were females (57.7%), 43.4% were in the age group of 26–30 years and 53.3% were Master of dental surgery (M.D.S) faculties. Among the specialties, majority were orthodontists (14.6%), 38.3% of study subjects had 3–5 years of experience [Table 1].

In relation to their work characteristics, majority of the subjects (41.10%) were working for 6–8 h, 51% treated 1–5 patients a day, 95.25% of the subjects adjusted their chair before treatment, 11.07% of the study subjects did not practice four-handed dentistry [Table 2].

Majority of the study subjects, 64.83% complained of musculoskeletal pain, 58.90% had low back pain, 38.70% of subjects had shoulder pain and 35.96% of study subjects had wrist pain. The prevalence of low back, shoulder, and wrist pain were 58.9%, 38.7%, and 35.96%, respectively [Table 3]. Thirty-nine percentage of the study subjects did not take any treatment, 17.39% of dentists underwent physiotherapy and 20.94% did exercise for musculoskeletal pain [Table 4].

More than half (59.75%) of female dentists experienced musculoskeletal pain compared to 40.25% of male dentists. M.D.S faculties reported greater prevalence of MSD as compared to B.D.S faculties and this difference was

statistically significant (0.0001*) [Table 5]. With respect to duration/clinical experience, dentists having 3–5 years of experience had higher musculoskeletal pain (40.24%), low back pain (40.93%), shoulder pain (41.83%), and wrist pain (38.46%).

A statistically significant difference was obtained in relation to the time taken for treatment and prevalence of musculoskeletal pain with dentists taking more than 30 minutes per treatment. It was found that increasing the length of the working time without a 10 min break was associated with increased musculoskeletal pain (39.74%). Positive and statistically significant correlation was found for prevalence of musculoskeletal pain and time taken for treatment ($P = 0.039^*$). Positive and statistically significant correlation was found for prevalence of low back pain and time taken for treatment ($P = 0.004^*$) [Table 5].

Strikingly 72.72% of the participants belonging to age group of <25 years reported that they have musculoskeletal pain, 66.66% low back pain, 45.45% shoulder pain and 21.21% wrist pain. With regard to treatment, root canal treatment was found to be precipitating factor for pain (32.8%) followed by crown preparation (16.6%). For 64.8% of dentists, pain began after joining dentistry.

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

GENDER	NUMBER (%)	CHI-SQUARE VALUE	p VALUE		
Male	107 (42.30)	6.400	0.114		
Female	146 (57.70)				
Total	253 (100)				
AGE CATEGORY					
<25 YEARS	33 (13.2)	21.904	0.003*		
26-30 YEARS	110 (43.4)				
31-35 YEARS	56 (22.1)				
36-40 YEARS	38 (15.0)				
>41 YEARS	16 (6.3)				
Total	253 (100)				
QUALIFICATION					
M.D.S faculties	135 (53.3)	104.50	0.003*		
Postgraduate students	107 (42.2)				
B.D.S faculties	11 (4.3)				
Total	253 (100)				
SPECIALTY					
B.D.S faculties	4 (1.5)	49.440	0.0002*		
Endodontist	26 (10.2)				
Oral & maxillofacial surgeons	34 (13.4)				
Orthodontists	37 (14.6)				
Periodontists	26 (10.2)				
Pedodontist	31 (12.2)				
Public health dentists	35 (14)				
Oral medicine	33 (13.8)				
Prosthodontists	20 (7.9)				
Oral pathologists	7 (2.7)				
Total	253(100)				
NO. OF YEARS OF EXPERIENCE					
1-2 YEARS	44 (17.3)			179.45	0.00041*
3-5 YEARS	97 (38.3)				
6-10 YEARS	78 (30.8)				
11-15 YEARS	21 (8.3)				
16-20 YEARS	6 (2.3)				
21-25 YEARS	7 (2.8)				
Total	253 (100)				

Table 2:- Distribution Of Study Subjects In Relation To Different Variables.

HOURS OF WORK PER DAY	NUMBER (%)
1-3 hours	21 (8.30)
4-5 hours	72 (28.46)
6-8 hours	104 (41.10)
More than 8 hours	56 (22.13)
Total	253 (100)
PATIENTS TREATED PER DAY	
1-5 patients	129 (51)
6-10 patients	62 (24.50)
More than 10 patients	62 (24.50)
Total	253 (100)
ADJUSTMENT OF CHAIR POSTURE PRIOR TO TREATMENT	
Yes	241 (95.25)
No	12 (4.75)
Total	253 (100)
FOUR HANDED DENTISTRY	
Yes	225 (88.93)
No	28(11.07)
Total	253 (100)
TYPE OF DENTISTRY PRACTICED	
Sitting	123 (48.62)
Standing	34 (13.43)
Both methods	96 (37.95)
Total	253 (100)

Table 3:- Distribution Based On The Prevalence Of Musculoskeletal, Low Back, Shoulder And Wrist Pain.

PREVALENCE OF MUSCULOSKELETAL PAIN	NUMBER (%)
Yes	164 (64.82)
No	89 (35.17)
Total	253 (100)
PREVALENCE OF LOW BACK PAIN	
Yes	149 (58.90)
No	104 (41.10)
Total	253 (100)
PREVALENCE OF SHOULDER PAIN	
Yes	98 (38.70)
No	155 (61.30)
Total	253 (100)
PREVALENCE OF WRIST PAIN	
Yes	91 (35.96)
No	162 (64.04)
Total	253 (100)

Table 4:- Distribution Of Study Subjects Based On Self-Adopted Management Strategies For Work-Related Musculoskeletal Symptoms.

TREATMENT FOR PAIN	
No treatment	99 (39.13)
Drug use	48 (18.97)
Exercise	53 (20.94)
Physiotherapy	44 (17.39)
Others	9 (3.55)
Total	253 (100)

Table 5:-Correlation Between Work Characteristics And Prevalence Of Musculoskeletal Pain.

Prevalence of musculoskeletal pain	r	0.40	0.112	0.029	0.048	-0.011	0.048	0.064
	p	0.531	0.076*	0.649	0.454	0.858	0.039*	0.316
Prevalence of low back pain	r	-0.72	0.044	-0.011	0.006	0.048	0.183	0.017
	p	0.254	0.485	0.865	0.928	0.453	0.004*	0.794
Prevalence of shoulder pain	r	0.61	0.059	0.0031	0.082	0.045	0.042	-0.098
	p	0.405	0.424	0.673	0.264	0.541	0.568	0.180
Prevalence of wrist pain	r	-0.090	-0.092	-0.094	-0.028	0.038	-0.044	-0.047
	p	0.233	0.219	0.211	0.706	0.614	0.562	0.528

Discussion:-

Dental professionals are commonly exposed to a variety of occupational hazards such as chemical, biological and MSD. Because of the MSD, dentists often have to limit or even abandon their professional activities, and as a result, MSD has a negative impact on either their finance and/or their healthy life.

In this study, 42% were males and 58% were females which are similar to a study by Pargali and Jowkar[6] where 49% were males and 51% were females. Majority of dentists were in the age group of 26–30 years (43.4%) and least were in the age group of >41 years (6.3%) which is in line with the study by Moradia and Patel[7] where 71.4% of dentists were in the age group of <30 years.

In the present study, 59.75% of the female dentists reported musculoskeletal pain that is similar to a study by Leggat and Smith[8] in which (61.95%) reported musculoskeletal pain which is contradictory to a study done by Madaan and Chaudari where 34% of males had musculoskeletal pain.[9] Low back, shoulder, and wrist pain were the most common sites of pain in our study (58.9%, 38.7%, and 35.96%, respectively) which is similar to a study by Finsen et al.[10] where 65% had neck/shoulder pain and 59% had low back pain, whereas shoulder pain was most commonly reported in a study done by Milerad and Ekenvall.[11]

Among all the treatments in the present study, endodontic treatments were the most precipitating factor for pain followed by crown preparation which was in line with the study conducted by Shrestha et al.[12]

In the present study, 62.88% of dentists with a clinical experience of 3–5 years had low back pain, 61.53% with experience of 6–10 years had low back pain similar to the findings of Marshall et al.[13] where 65% of the dentists with clinical experience of <5 years had musculoskeletal pain. A possible explanation is that experienced dentists are probably better at adjusting their working position and techniques to avoid musculoskeletal problems compared to their less experienced counterparts. In agreement with other studies,[14,15] this study found that a number of patients treated per day was a significant factor for greater prevalence of musculoskeletal symptoms.

In the present study, 17.39% of dentists underwent physiotherapy and 20.94% did exercise that is in line to a study done by Hamann et al.[15] in which 33.8% of respondents claimed to perform some preventive activity (sports 52%, physiotherapy 16%). In the present study, chronic conditions, back pain, and fatigue were the most affected by constant strain. In the present study, 66% of dentists had the knowledge about ergonomically designed dental instruments, which is similar to a study by Kantheshwari et al.[16] who concluded that 50% of respondents indicated awareness regarding ergonomic instruments and postures of which 70% had musculoskeletal pain.

The high prevalence of musculoskeletal symptoms in dentists is a common feature of visually dependent occupations in which the visual demands require the adoption of fixed postures for extended periods of time.[17-19] Prevention of chronic pain requires that dentists have more knowledge, change their postures, select proper ergonomic equipment, and have a break after each operation with stretching exercise. In doing so, exercise plays an important role in their career to be healthy, safe and have a longer career.[20] The high number of physical disorders should make dentists actively concerned about their early diagnosis and treatment. Further research is therefore needed to elucidate the causes of physical health problems among dental practitioners, as this will be a major step towards finding the solutions of this occupational health problem. This study cannot be generalized to the whole of India as the data only represent the dentists working in Hazaribag city.

Recommendations Dentists should avoid working in a bent position for a long time. Education of correct posture should be part of undergraduate dental education. Dentists should be encouraged to take regular breaks. The dentist should perform regular exercise, especially relaxation exercise during their practice. The role of physical activity among the dentists and factors that will reduce the prevalence of musculoskeletal symptoms among dentists needs to be further investigated. Continued dental education programs on ergonomics should be organized to create awareness and practice of correct postures while treating patients.

Conclusion:-

This study suggests that dentists in Hazaribag do experience a certain amount of occupation-related health problems. The study found overall high prevalence of musculoskeletal symptoms (64%) among dentists in Hazaribag city. The prevalence of low back, shoulder, and wrist pain were 58.9%, 38.7%, and 35.96%, respectively. It is, therefore, important to increase the knowledge of occupational hazards and also to emphasize the importance of early diagnosis and treatment for these disorders.

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Conflicts of interest There are no conflicts of interest.

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