



THE PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISORDERS AMONG INDIAN ORTHODONTISTS-AN ERGONOMIC STUDY

Dental Science

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ABSTRACT

Background: Orthodontics is a dental profession is highly rewarding but not without consequences. Orthodontists are exposed to number of occupational hazards of which the most common is musculoskeletal disorder (MSD). The study is to determine the prevalence of musculoskeletal disorders i.e pain in different anatomic locations among Indian orthodontists .

Methods: A cross sectional survey was conducted . 150 orthodontists aged between (31 – 60) years were the sampling frame. A structured, close – ended questionnaire had been developed , modifying the Standardized Nordic Questionnaire. Dental Workstation Observation Check List, was developed specifically for the study purpose by modifying the Ergonomics Recommendations for Dental Programs from Indian Health Service to determine the work posture of the orthodontists. Rapid upper limb assessment was also done to determine the risk zone of the professional.

Results: Orthodontists reported a high prevalence of various types of work-related musculoskeletal symptoms and most of them perceived symptoms from the lower back, neck and shoulders. The present study revealed that maximum orthodontists felt pain occasionally in the region of upper back (86.7%) followed by neck and low back (53.3% each) then comes the shoulder pain which consists of 46.7% occasionally. Maximum pain felt (often) in the region of low back which consists of 26.7%.

Conclusion: Various socio-demographic and clinical variables contributed to the develop musculoskeletal disorders among orthodontists. The present study reveals low back pain, followed by neck and shoulder pain are common complaint of the orthodontists. It is also important to be aware of the warning signs of musculoskeletal disorders (MSDs) and to seek medical intervention as early as possible. Regular exercises, frequent breaks, correct posture can increase efficiency and prolong the professional careers.

KEYWORDS

Orthodontists, Musculoskeletal disorders, Questionnaire study, Work station evaluation

INTRODUCTION:

Occupational health hazards are common in dentistry and are on the rise. Work-related musculoskeletal disorders (WMSDs), which are problems of musculoskeletal system, are significant in the aspect that they affect occupational health and the careers of the working population leading to abstention from work, loss of productivity with financial and economical implications. The term 'musculoskeletal disorders 'MSD' refers to conditions that involve the nerves, tendons, muscles and supporting structures of the body. When a specific job plays the main causative factor, the term becomes work-related musculoskeletal disorders (WMSDs). MSDs, including pain, weakness and paresthesia, are reported to be caused by repetitive, awkward or stressful motions. Dental personnel have an increased risk of developing such disorders. The common sites of musculoskeletal complaints among the dental personnel are neck, shoulder and lower back region with diverse prevalence reported in different studies.

A review of literature revealed that there is scarcity of data regarding the prevalence of MSDs among Indian dentists in general and orthodontists in particular. Very few studies were conducted regarding the prevalence of WMSDs in orthodontists in other countries. The working conditions of orthodontists in India differ much more from their counterparts in other parts of the world. There is a recent upsurge in the number of dental colleges affording orthodontic education in India. The orthodontists are not limited to private practice now. They are finding more number of opportunities in the academic field. Many of the orthodontists work in the educational institutions in the morning session and continue their private practice and consultation in the evening hours. As a result, the number of working hours per day is increased. Another aspect is that most of the Indian orthodontists work on sun days too. It is a common practice for many orthodontists in this part of the world to have consultation on weekends. Another feature is that most of the orthodontists do general practice without restricting to orthodontics. The working characteristics of orthodontist include high demands on vision, precision and fine manipulative hand movements and work with unsupported, elevated arms. In the above context, this study was aimed to look deeper into WMSDs among the orthodontists

and provide a starting point to direct ergonomic intervention.

Aim of the study is to determine the prevalence of musculoskeletal disorders i.e pain in different anatomic locations among orthodontists in India, to investigate the association between musculoskeletal disorders with demographic and clinical details. Few interventions were also given as a preventive measures so that in future the occurrence of the musculoskeletal diseases would be reduced.

MATERIALS AND METHOD-

This study was a cross sectional survey. Ethical clearance for the conduction of the study was obtained from the Institutional Human Ethical Committee, Department of Physiology of University of Calcutta. Written, voluntary informed consent, obtained from the study participants prior to the start of the study. 150 orthodontists aged between 31 years to 60 years were the sampling frame of the study. A structured, close – ended, self- designed questionnaire had been developed by modifying the Standardized Nordic Questionnaire. Age group I(31 years -40 years)

Consisted of 22 female participants and 36 male participants , age group II(41 years -50 years) consisted of 17 female orthodontists and 37 male orthodontists, age group III (51 years -60 years) consisted of 9 female orthodontists and 29 male orthodontists.

The questionnaire was divided into three sections. The first section included the informed consent and demographic details such as age, height and weight of the study participant. The second section included the work experience of the orthodontists, duration of the working hours, the patients examined in a day, hand dominance and type of dentistry. The third section contains the details regarding the location and the frequency of pain in each anatomic location. The locations of pain includes neck, low back, shoulder, forearm, hand and wrist, elbow, upper back, hips, ankle and knees. For frequency of pain , the options given here are often, occasionally and never. The data has been collected from 01.12.2018 to 30.03.2019. 150 orthodontists were approached personally and the data were collected.

The tools (Dental Workstation Observation Check List- Closed-ended questionnaire), was developed specifically for the study purpose by modifying the Ergonomics Recommendations for Dental Programs from Indian Health Service. The check list was validated by statistician and the modifications suggested were implemented. The developed tools contained the following variables.

Dental Workstation Observation Check List

- Manual material handling
- Physical energy demands
- Instruments
- Environment
- Other musculoskeletal demands

Along with that photographs of those orthodontists were taken when they were working on their patients with their due permission to get the most prevalent and sustained posture they were using in their work station. After that rapid upper limb assessment was done to get an idea in which risk zone that particular orthodontist belongs to. Series of photographs were taken of the prevalent postures used by the orthodontist with mentioning the time duration. Tracing for the rapid upper limb assessment was done for the most prevalent and sustained posture. After assessing the risk zone of that particular orthodontist the interventions were given like short break, change of posture, hip Bridge exercise, neck muscles exercises, wrist strengthening exercises and fingers and thumbs strengthening exercises.

Exclusion criteria:

Exclusion criteria were individuals with some congenital or acquired physical disability involving upper or lower limbs, joints or spine; pregnant and breastfeeding women. People not agreeing to participate in the research had not been included in the study.

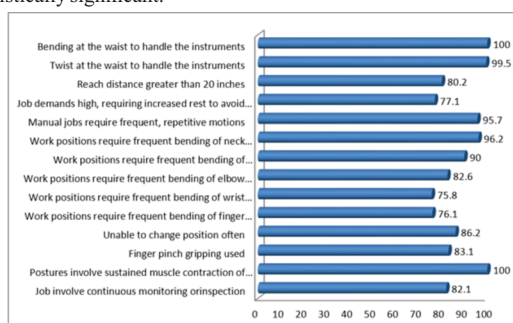
Inclusion criteria:

31 years to 60 years old orthodontists who had completed their post-graduation and practicing in hospital set up or private dental clinics doing only speciality job.

RESULT:

Statistical Methods-

For statistical analysis data were entered into a Microsoft excel spread sheet and then analysed by SPSS 20.0.1. Data have been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. The median and the interquartile range have been stated for numerical variables that are not normally distributed. Student's independent sample's t-test was applied to compare normally distributed numerical variables between two groups; Unpaired proportions were compared by Chi-square test or Fischer's exact test, as appropriate. One-way analysis of variance (one-way ANOVA) was a technique used to compare means of three or more samples for numerical data. p-value ≤ 0.05 was considered for statistically significant.



Along with the work station evaluation risk zone for the particular female orthodontist was done with the help of work sheet of rapid upper limb assessment. Tracing for the rapid upper limb assessment was done for the most prevalent and sustained posture. After taking the series of photographs of the most prevalent postures mentioning the time duration of the particular orthodontist in her work station and it has been observed that most of the female orthodontists are at high risk zone where ergonomic interventions are required for healthy professional carrier.

DISCUSSION-

Dental surgeons are normally included within the group of

professionals at risk of suffering from MSDs due to prolonged awkward or forced postures at work and failure to adopt preventive measures. The present study found that most of the orthodontists had some kind of musculoskeletal pain while performing their professional work in the last 6 months.

Karwaski *et al.*¹ reported that the symptoms are a product of many risk factors including prolonged static postures, repetitive movements, and poor positioning. Ratzen,² on the other hand, linked musculoskeletal pain occurrence in the dentists to the frequent assumption of static postures, which usually requires more than 50% of the body's muscles to contract to hold the body motion less, while resisting gravity. The static forces resulting from these postures have been shown to be much more tasking than dynamic forces. Repeated prolonged static postures are thought to initiate a series of events that could account for pain, injuries, or career-ending problems seen in MSDs. Lalumandir *et al.*^{3,4} reported that all dental specialties show a high occurrence of MSDs, but with variations in frequency and locations. In this study, we found that frequency of pain varies with the age of the orthodontists, height, weight, years of practice, hours of practice and number of patients seen per day by the orthodontists in the different anatomic locations.

According to some studies, the frequency of pain remains stable with age.⁵ In the present study, we found that the frequency of pain varies with the age in case of neck, while it varies with working hours per day in case of neck and shoulder, and with number of patients treated with the neck pain and low back pain.

Repetitive movements and prolonged body postures can be expected to cause muscle damage as well as ligament and joint injuries.^{6,7} In our study, we observed that majority of the dental surgeons had bad postures while performing their professional work.

Bernard⁸ found that 48% of workers had work-related neck disorders, 42% had work-related back disorders and 37% had work-related shoulder disorders. Contrary to this, our study showed that 66.66% had work-related neck disorders, 89% had work-related low back disorders, and 66.7% had work-related shoulder disorders. To sum up, dentists report a high prevalence of various types of work-related musculoskeletal symptoms and most are perceived symptoms from the lower back neck and shoulders. The present study reveals low back pain as the most common complaint of the dental surgeons under study, followed by neck pain and shoulder pain. The study conducted by Alexopoulos *et al.*⁹ gave similar results. Most studies consistently report that back pain is the most common musculoskeletal complaint among the dental surgeons.^{10,11,12,13,14}

CONCLUSION:

Within the limitations of the study, MSD is a significant occupational health problem among the dental surgeons. The study revealed that various socio-demographic variables contributed to the MSDs experienced by the dental surgeons. However, the number of patients attended per day by the dental surgeons *vis-à-vis* pain experienced in the back, wrist, and hip/thigh was significant. Many factors influence the risk of MSDs among Orthodontists. A comprehensive approach for prevention includes education, assessment of risk factors, proper equipment and instruments, posture, and personal habits such as exercises. In the dental office, a team approach including the use of four-handed techniques can help both the dentist and the assistant work more comfortably. It is also important to be aware of the warning signs of MSDs and to seek medical intervention as early as possible. Regular exercises, frequent breaks during the day and assuming correct posture can increase efficiency and prolong the professional careers of the practitioners.

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