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WORK RELATED MUSCULO-SKELETAL DISORDERS AMONGST ORTHODONTISTS IN INDIA: A QUESTIONNAIRE BASED CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: Work related Musculo-skeletal disorders (WRMSDs) are injuries or pain in the human musculoskeletal system, including the joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck and back and are seen due to repetitive kind of work over longer periods. In this study, the authors have determined the prevalence of WRMSD's amongst orthodontists.

Materials and methods: This study was carried among 70 orthodontists in India. The pain intensity in neck, shoulder and back was recorded on 'Musculoskeletal Disorders Rating Scale 'along with pain frequency and stiffness.

Results: Pain in the neck, shoulder and back region was 71%, 63% and 65% respectively. A significant association between excessive bending while working on patients to WRMSD's was also seen.

Conclusion: WRMSD's are present among orthodontists and appropriate steps should be followed to avoid or reduce their occurrence.

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INTRODUCTION

According to the National Institute for Occupational Safety and Health (NIOSH), Musculo Skeletal disorders (MSDs) are injuries or pain in the human musculo skeletal system, including the joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck and back. The term Work Related Musculo Skeletal Disorder refers to the musculo skeletal disordersin which the disorder has been worsened due to prolonged, long lasting and repetitive kind of work or work load. Dental professionals often develop musculo skeletal problems, which are related to suboptimal work-environment ergonomics that might be responsible for improper sitting postures and movements causing unnecessary musculo skeletal loading, discomfort, and fatigue. Insufficient or inappropriate equipment, inappropriate work-area design, direct injuries, repetitive movements from working with dental instruments, or sitting for extended times with a flexed and twisted back are contributing factors to neck and low-back ailments. The limited research in the orthodontic literature showed increased risks for developing these types of pathologies (Pandis et al., 2007). According to the U.S. Occupational Safety and Health Administration, work-related musculo skeletal disorders (WRMSDs) occur when there is a mismatch between the physical requirements of the job and the physical capacity of the human body. It clearly signifies that if a person works for a longer and extended time he is susceptible for MSD's. (Yousef MK, Al-Zain, 2009). Orthodontists are prone to shoulder, neck and back pain and stiffness due to improper posture during

work and also due to extensive travelling for consultation appointments. The prevalence of neck and shoulder disorder among dentists is well-documented. The prevalence of same among orthodontists has not been documented till date and hence this study was carried out with the aim to assess the work related musculo-skeletal disorders amongst Orthodontists in India.

MATERIALS AND METHODS

A prevalidated close ended questionnaire specifically designed for the study used to obtain information that included age, sex, working hours, number of patients treated daily and exercise. The self-administered questionnaires were mailed to 138the orthodontists after obtaining consent for their participation.70 orthodontists responded with filled up forms which were considered for the study. Musculo skeletal Disorders Rating Scale (Alghadir, 2015), was used for grading response for pain, frequency and stiffness in neck, shoulder and back region experienced in the last 6 months. It consisted of rating from 0-10 from 'no pain' to 'worst pain possible.' Rating scale was divided into mild (1-3), Moderate (4-6), Severe (7-10) category. Frequency analysis was done for the proportion of responses. Chi square test square was used to determine the relationship of 'WRMSDs' with bending excessively for accessibility and vision.

All statistical test was done using SPSS 21.0. The statistical significance was kept at 95% CI ($p < 0.05$).

RESULTS

Data from questionnaire wascollected from 70 orthodontists who responded and formulated into tabular form. 51.4% were males and 48.6% were females. Out of 70 orthodontists, 42 suffered from mild neck pain, 8 experienced moderate pain. Shoulder pain was mild in 40, moderate in 4 orthodontists. Back pain was mild in 34, moderate in 12 orthodontists. (Table 1). Neck pain frequency was 'Sometimes' in 50 orthodontists. Shoulder pain frequency was 'Sometimes' in 44 of them. Back pain frequency was 'Sometimes' in 46 of them (Table 1). Neck stiffness was 'Sometimes' in 52 of orthodontists. Shoulder pain frequency and stiffness was 'Sometimes' in 44 of them. Back stiffness was 'Sometimes' in 46 of them (Table 1). It was found that neck pain was more prominent among the other MSD's with mild to moderate incidence. Stiffness and pain frequency in all the parts was present occasionally in most of the orthodontist. Only 37.1% of orthodontist'sexercise on daily basis. It was observed that 77.1 % bend excessively for proper access and visibility while working on patients. Association between bending and neck pain was found to be significant (p value = 0.003). Also, association of bending with back pain was significant (p value< 0.05). (Table 2).

Table 1. Prevalence of WRMSDs amongst orthodontists in terms of perception of pain intensity, pain frequency and stiffness (In percentage)

Region	Pain							Stiffness		
	Intensity				Frequency					
	Mild	Moderate	Severe	None	Sometimes	Always	None	Sometimes	Always	None
Neck	60	11.4	0	28.6	71.4	5.7	22.9	74.3	0	25.7
Shoulder	57.1	5.7	0	37.1	62.9	0	37.1	62.9	0	37.1
Back	48.6	17.1	0	34.3	65.7	0	34.3	65.7	0	34.3

Table 2 - Association of neck, shoulder and back disorder with bending for accessibility and vision

		Yes	NO	p value
Neck Pain	None	10	10	0.002*
	Mild	36	6	
	Moderate	8	0	
	Severe	0	0	
Neck pain Frequency	Never	8	8	0.003*
	Always	2	2	
	Sometimes	44	6	
Neck Stiffness	Never	8	10	<0.05
	Always	0	0	
	Sometimes	46	6	
Shoulder Pain	None	20	6	0.525
	Mild	30	10	
	Moderate	4	0	
	Severe	0	0	
Shoulder pain Frequency	Never	20	6	0.973
	Always	0	0	
	Sometimes	34	10	
Shoulder Stiffness	Never	20	6	0.973
	Always	0	0	
	Sometimes	34	10	
Back Pain	None	12	12	<0.05
	Mild	32	1	
	Moderate	10	2	
	Severe	0	0	
Back pain Frequency	Never	12	12	<0.05
	Always	0	0	
	Sometimes	42	4	
Back Stiffness	Never	12	12	<0.05
	Always	0	0	
	Sometimes	24	46	

(*p<0.05 = statistically significant)

DISCUSSION

The posture of orthodontist is supposed to be in relaxed position with head in upright position, legs parallel to the floor and with upright back position while working on a patient. Due to prolonged and continuous working time, the muscles of the hand start to get strained. This causes the proximal muscles which are the shoulder musclesto take the load while working which leads to strain on the shoulder tendons leading to tendinopathies and tendonitis. Also, longer work duration and excessive bending for better vision disturbs the body's equilibrium position. Thus, the prolonged static position along with excessive bending leads to shoulder and Back pain among orthodontists. Neck problems are related to awkward body and head posture, which are often required for direct vision into the mouth. The introduction of magnifying loupes is probably the only development over the years that helps dentists keep a more neutral or balanced posture.

The symptoms include intermittent neck pain, often radiating to the shoulders (with stiffness), headaches, tingling, or pins and needles down the arms and fingers, resulting in weakness and clumsiness. In more severe situations, disc prolapse, degeneration (cervical spondylosis) precipitates. Because the shoulder muscles are innervated by the brachial plexus, there is also strain on the shoulder muscles (pain, weakness) that will complicate the situation further if there is coexisting rotator cuff pathology (Arpit Gupta, 2013). The rotator cuff of the shoulder consists of the supraspinatus, infraspinatus, subscapularis, and teres minor muscles, which are responsible for abduction, rotation of the shoulder, and stabilization of the humerus head on the glenoid during movement. The most common tendon to be affected is the supraspinatus (tendonitis, partial tear, complete tear, and degeneration). Tendonitis usually causes pain and discomfort that worsens with movements. Tears also cause weakness in abduction; old and degenerative tears cause impingement in the sub acromial region (arc pain in abduction, eased beyond 90°-100°). Although direct injuries are rare in dentistry, eccentric loading of the tendon or the muscle and working with the arm in an abducted position for a long time is common (http://www.sosmed.org/specialties/shoulder-elbow/rotator-cuff-tendinosis).

A comprehensive review of published studies, conducted by the Hazard Evaluations andTechnical Assistance Branch NIOSH, found that repetitive neck movements and continuous arm and hand movements affecting the neck and shoulder demonstrate significant associations with musculo skeletal disorders. Researchers have also found a strong relationship between neck musculo skeletal disorders and high levels of static contraction, prolonged static loads, and extreme working postures involving neck and shoulder muscles. Reporting on the experience of Greek dentists, Alexopoulos, Stathi and Charizani also found a high prevalence of MSDs that required medical attention or leave (Alexopoulos, 2004). Low-back problems were the most common (46%). As many as 30% of the subjects experienced disability due to MSDs.Moen et al reported the most common locations of MSD pain among dentists were back, shoulder and neck and hence considered in this study (Moen, 1996). Pargali and Jowkar (Pargali, 2010), in 2010 reported that 73% of dentists complained of back and neck pain whereas in our study we found out to be 65% and 71% respectively. Among the wide range of musculo skeletal disorders, back pain was the most common among dentists (Morse, 2010), followed by neck pain, whereas in our study neck pain was most common followed by back pain among orthodontists. Reports of general musculo skeletal or neurological symptoms in dentists have been as high as 82% in one study (Marshall, 1997), with most studies recording around a 60% prevalence of MSD pain (Shugars, 1984), with similar results in this study too. Orthodontists are prone to these WRMSDs due to multifactorial etiology. Extensive travelling for consultation appointments do contribute to exertion. Increased workload and working hours leads to repetitive form of micro-injury among muscles of neck, shoulder and back muscles and may leadto severe form of disorders such as rotator cuff tendinosis, neuralgias and spondylitis among orthodontists. Lastly stress is an integral part of an orthodontist's work and practice. Suitable measures must be undertaken to avoid or stop these WRMSDs even before they precipitate. Standard sitting protocols must be followed while working on patients. Also, the position of operator's chair and the angulation of patient's chair must be followed to avoid excessive bending for proper vision and accessibility.

These WRMSDs though not documented till date in orthodontistsare well prevalent and thus cannot be ignored. We all as orthodontists are well aware of the protocols to be followed, but in everyday practice often fail to follow them. Simple stretching exercises for arms, neck, shoulder and back can be done before switching to next patient. Daily exercise in any form should be a routine part of orthodontists' life to relieve off the physical and mental stress. Meditation and Yoga may also help in relieving of mental stress. WRMSD's amongst orthodontists is thus prevalent and still in its initial stages. Appropriate steps to prevent its further worsening is thus important. Awareness among orthodontists about ergonomics and following it will help in reducing the prevalence of WRMSD's among orthodontist. A study on a large scale must be performed for better insight.

Risk factors:

Many authors have concluded that MSD risk factors are multifactorial:

- Static and awkward postures (particularly in relation to neck and shoulder conditions)
- Repetition and force (more commonly related to hand and arm conditions)
- Poor lighting (both intensity and positioning)
- Improper positioning of both patient and orthodontist
- Individual characteristics (physical conditioning, height, weight, general health, gender, age)
- Stress

Orthodontists usually face these disorders due to increased workload, psychological stress, extensive travelling, etc. Orthodontists unknowingly move to an awkward position outside the neutral position in following procedures to improve vision and accessibility:

- Usual bonding procedure
- Banding or bonding of buccal teeth
- Bonding a lingual appliance or retainer
- Cutting ligature ties from inaccessible areas

- Placing an appliance in palatal region (TPA, Nance palatal button, Hyrax Expanders)
- Placement of temporary anchorage devices.

Following considerations are important from point of view of an orthodontist:

- An adjustable ergonomic stoolwith lumbar support and capability to rotate to be used.
- Sitting with feet flat on the floor andthighs parallel to the floor.
- Patient fully reclined,with the patient mouth at operator's elbow height formaxillary arch tasks, and lowered with a 20° incline for mandibular arch
- Sufficient and optimum lighting
- Using indirect vision when possible
- Regular resting from static postures of 10‑15 min every 2‑3 hours
- Orthodontic procedures to be split into two small appointment rather than a single longer appointment. (e.g. bonding single arch in 1st and the other arch in next appointment)

Simple exercises recommended during breaks or before switching to next patient includes:

- Relaxing the neck by moving in up down and sideways for relaxing neck muscles
- Rotating the hands around the wrist joint
- Raising and drooping movements of shoulder to free the shoulders from prolonged static position
- Flexing of elbow joints
- Using shoulder blade repositioning andchin tuck exercises for neck pain
- Hip bridge exercise , wrist and neck strengthening exercise are also advised (Sachan, 2013).

Conclusion

Ergonomics, exercise and amount of excessive bending while working do play a crucial part in dental practice and the field of orthodontics is no exception. Essential care and conscious effort to avoid the work related musculo-skeletal disordersis needed to be taken by an orthodontist.

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