

Work-Related Musculoskeletal Disorders in Dentistry: A Narrative Review

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ABSTRACT

Work-related musculoskeletal disorders (WRMSDs) is very prevalent in dentistry. Physically and mentally, dentistry is a demanding job due to its time-consuming treatment procedures and mental pressure of the patients. Moreover, this Sars-Cov2 pandemic has brought a more risk to the dentist, thereby using more additional devices such as personal protection kits for their prevention which further limits the freedom of movements, increases mental stress, and imbalanced postures, and hence contributes more towards WRMSDs. These WRMSDs among dentists can be prevented or minimized by the use of ergonomic principles. The present review article discusses the various risk factors and methods of prevention of these WRMSDs.

Keywords: Dental students, Ergonomics, Health hazard, Musculoskeletal disorders

Musculoskeletal disorders (MSDs) are the injuries of the musculoskeletal system of the body which includes bones, ligaments, muscles, tendons, joints, and nerves. The painful disorders of the musculoskeletal apparatus occurring due to the movements in work activities are known as work-related musculoskeletal disorders (WRMSDs). According to previous studies, the problem of WRMSDs is widely prevalent in dentistry [1]. Dental professionals are affected by WRMSDs once in a lifetime with the prevalence ranging from 54% to as high as 93% [2]. One Australian study found that one in every ten dentists has taken sick leave due to the MSDs within the previous year [3]. In the United Kingdom, MSDs was found to be the most common cause for the early retirement of dentist [4].

Physically and mentally, dentistry is a demanding job due to its time-consuming treatment procedures and mental pressure of the patients. Prolonged inconvenient static work postures requiring high static isometric muscle activity results in pain, muscle spasms, joints rigidity, shivers disturbing the daily life of dentists, and contribute to the development of WRMSDs among dentists. Also, dental care professionals have to operate in a very small and

uncomfortable environment of the mouth. Due to this, they have to maintain muscular imbalance and asymmetrical positions such as neck inclination/rotation, forward bending, rotating the head sideways and raised arms for a long period of time [5]. Apart from the position of the dentist, the regular use of high-frequency vibration tools has led to the occurrence of neuropathy disease in the dentist's hands [6]. Moreover, this Sars-Cov2 pandemic has brought a more risk to the dentist, thereby using more additional devices such as personal protection kits for their prevention which further limits the freedom of movements, increases mental stress, and imbalanced postures, and hence contributes more towards WRMSDs [7].

These WRMSDs among dentists can be prevented or minimized by the use of ergonomic principles. The word "Ergonomics" is derived from the Greek "nomos" meaning rule and "ergon" meaning work. It is a scientific discipline that deals with the interactions between the worker and its working environment. It is also concerned with designing equipment and techniques for the maximum efficiency and safety of the worker and proposes various principles to reduce the physical, visual, and psychological strains on the body occurring due to the work environment. It makes

several recommendations for the work organization to allow the development of the best abilities of the person, makes rules, and precautions within the ergonomics guidelines to avoid the onset of WRMSDs among dental professionals [8]. Ergonomics in the dental field aims to improve the working environment to make it healthier, safer, and more comfortable, in order to help prevent health problems and increase productivity. The concepts of sit-down and four-handed dentistry perceptions were implemented to enhance the dentists to work more efficiently with less physical wear and tear to the patient and to the dentist [9].

The present review gives a gist of the prevalence of WRMSDs and their prevention.

Classification of WRMSDs [10]

- a) Nerve Disorders: Carpal tunnel syndrome, ulnar neuropathy.
- b) Disorders of the neck: Tension neck syndrome, cervical spondylosis, cervical disc disease, Brachial plexus compression.
- c) Disorders of the Shoulder: Trapezius myalgia, Rotator cuff tendonitis, Rotator cuff tears, & adhesive capsulitis.
- d) Disorders of the Elbow, Forearm & Wrist: deQuervains disease, Tendonitis, Tenosynovitis, Epicondylitis.
- e) Hand-Arm Vibration Syndrome: Raynaud's disease.
- f) Disorders of the Back: Low back pain (LBP), Upper back pain

Risk factors for WRMSDs [10]

The risk factors for MSDs among dental professionals include: Prolonged awkward postures: dental personnel undertake awkward positions.

Repetitive motions: fatigue and muscle strain can be caused if motions are repeated and that too for a prolonged period of time. The longer the period of continuous work, the longer is the rest time period required

Inadequate lightning: compromised lightning in the dental operatory can unintentionally lead to unnatural postures.

Apart from the above-mentioned risk factors, few others such as stress, poor flexibility, infrequent breaks, and improper equipment adjustment contribute significantly to MSDs. A study conducted in 2016 found that nearly 44% of dentists were at very high risk of developing MSDs [11]. The most common syndromes that are associated with WRMSDs among dentists are Carpal Tunnel Syndrome, Trigger finger, Sciatica, Low back pain, Raynaud's

phenomenon, Tendonitis, Rotator cuff tendonitis, and De Quervains' disease. Of these, Carpal Tunnel Syndrome has the highest prevalence [10].

Symptoms and organs affected in WRMSDs

The most common symptoms are: excessive fatigue in the shoulders and neck; tingling, burning or other pain in arms; weak grip, cramping of hands; numbness in fingers and hands; clumsiness and dropping of objects, and hypersensitivity in hands and fingers.

The most common organs that are commonly involved due to WRMSDs among dentists are mainly the neck, lumbar region, shoulders, followed by the hand and wrists (carpal tunnel syndrome, Guyon's canal syndrome, de Quervain's disease, and trigger finger [12]. Gandolfi MG et al also found the neck (60%) as the most affected organ followed by the lumbar region (52.1%), shoulder (43.3%), dorsal region (37.7%), and wrist (30.6%) [13]. Neck pain was found among 76.5% of dental students of which 67.9% experienced pain at least once per month [14]. Oviya VJ et al found that the neck and back (73%) were the common sites for MSDs [15]. Leggat et al in their study found the neck as the most prevalent site (87.2%) for MSDs followed by the lower back and shoulder (53.3%) [2]. Cervical pain was observed in 72% of the study participants in Yadav et al study followed by the shoulder (47%) and the wrists (28%) [16]. This region is more prone to develop WRMSDs due to the position of the operator while working in the dental chair with the head tilted forward for more than 15–20° which results in the overload of the muscles of the neck and the cervical spine. This position of the dentist also affects the cervical lordosis curve. Apart from this, the muscles of the cervical and upper thoracic spine are in constant contraction to support the weight of the head. Because of these reasons, the neck is the most affected region in WRMSDs.

Interventions of WRMSDs

Work-related musculoskeletal disorders have been documented for a number of occupations including dentistry. Dentistry is a high-risk profession that requires fine motor control, high visual demands, and good manual dexterity of the hands, and wrists to perform the lengthy and repetitive static dental procedures which increase their risk of developing WRMSDs. Healthy ergonomic practices should be adopted by dental professionals early during their undergraduate clinical training.

The risk associated with WRMSDs can be prevented or reduced by applying ergonomic principles. A recent

Cochrane study highlighted the need for ergonomic interventions with respect to physical, cognitive, and organizational domains in order to prevent the WRMSDs among dental practitioners [17]. Maintaining good magnification, proper posture are some of the examples of ergonomic principles which can be applied in the dental workstation. Study conducted by Longridge NN et al study found that 62.7% were aware of the correct sitting position when undertaking dental treatment [14]. As per the results of Yadav N et al, the number of dentists familiar with the ergonomic posture was 77% [16]. Incorrect posture during dental treatment leads to the loss of cervical and lumbar lordosis, forward head, weak postural muscles, and tension in spine extensor muscles.

According to the various previous studies, stretching exercises, relaxation exercises, meditation, or yoga can do wonders with respect to MSDs and should be performed in between or during the microbreaks of the prolonged static postures as a preventive action for WRMSDs [18]. Anu V et al found that about 60% of dental students were not aware of the stretching exercises [19]. Maintaining appropriate chair and patient positions is one of the several principles of ergonomics that is often neglected by dentists. The instrument performs the majority of the work when the working edges are sharp thus reducing the excessive force application. Parallel positioning of the light beam in the observational direction provides shadow-free lighting thus improving the work quality.

The use of magnification systems like operating telescopes or loupes during clinical work help to maintain healthier posture and also reduces the incidence of neck and back pain. Frequent breaks should be taken to relax the body parts. Work positions should be constantly changed for moving the muscle workload from one area to another. The appointment schedules should be planned to provide sufficient recovery time and to avoid muscle fatigue. Training is essential for any health-care setup. It ensures that the employees are well versed about the occupational hazards, and they can self-volunteer in identifying and controlling the possible risks [18, 20]

CONCLUSION

Dental graduates should have proper knowledge about the principles of dental ergonomics and how to apply them in their clinical practice in the future in order to protect themselves from WRMSDs. The information should be made available to the dental students from the very beginning of their clinical training and undergraduate training should be conducted regarding WRMSDs prevention. The clinical practitioners should be encouraged

to apply these principles in their dental practice as these healthy approaches will help the dentists in long run to achieve a pleasing and long dental profession.

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