

Prevalence of Musculoskeletal Disorders of Neck, Shoulder and Lower Back Region in Dental Professionals

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Abstract: *Locomotor system disorders are frequently seen in dentistry [1]. It is known that the most painful regions are the cervical and lumbar spine. Factors associated with professional work may predispose to back and neck pain [2]. On account of the narrow visual field of the oral cavity, having to work with a limited scope of movement constitutes high risks for lower back, shoulder and neck pain. Purpose of the study: The aim of this study is to assess the Prevalence of Musculoskeletal disorders of Neck, shoulder and lower back region in Dental professionals.*

Keywords: musculoskeletal disorders, dentistry, health of dentists, dental ergonomics, occupational hazard.

1. Introduction

Musculoskeletal disorders are conditions that affect nerves, tendons, muscles and supporting structures such as intervertebral discs with symptoms ranging from mild periodic pain/discomfort to severe chronic pain/discomfort. [1] These disorders commonly affect the neck, shoulder, back, wrist and hand. The common signs of these disorders are decreased range of motion, deformity, decreased grip strength and loss of muscle function and the common symptoms are pain, numbness, tingling, burning, cramping and stiffness [2].

2. Contributing Factors

There are various factors contributing to musculoskeletal disorders in dentistry, primarily related to work posture, work habits and work place ergonomics. The factors include:

- Forceful hand exertions, including grasping small instruments for prolonged periods and forceful squeezing/release of instruments.
- Repetitive movements of the hand and wrist.
- Fixed or awkward postures of the neck, back and shoulders.
- Lack of upper extremity support during work.
- Abnormal positioning of wrist and hand.
- Improper positioning of the operator in relation to patient and the dentist.
- Poor organisation of instruments.
- Frequent/prolonged use of vibrating tools.
- Unassisted or frequent heavy lifting.
- Inadequate work breaks and lack of rest during work.
- Precision required in dental work. [3-6]

3. Prevention and identification

The key in preventing the musculoskeletal disorders is by identifying risk factors in the work place, identifying symptoms as soon as they are apparent and intervene

promptly [7]. The following are the key factors in preventing musculoskeletal disorders:

- Change your behaviour/work habits (e.g. change work hours and take regular breaks).
- Consider ergonomic features when purchasing dental equipment, including patient chair and operator stool.
- Organise work area and modify working conditions to achieve optimal work posture.
- Make sure that you have good access to instruments and ensure good visibility and comfort during work.
- Good working posture.
- Avoid prolonged working hours.
- Increase the opportunity for structured and unstructured breaks (at least once every 30 minutes).
- Stretch every 15 minutes.
- Chair side exercises (e.g. clasp your fingers behind your occiput and slowly extend your upper back and look towards the ceiling).
- General stretching exercises (e.g. stand and extend your arms upward and over head, interlacing fingers with palms turned upward and stretch arms up and slightly back).
- Postural strengthening exercises (e.g. stand against a wall with feet shoulder width apart, press your lower back against wall, place back of elbows, forearms, and wrists against wall and bring arms up and down slowly in a small arc motion while keeping the elbows in contact with the wall). [8]

4. Ideal Operating Posture

The following are factors to be considered for an ideal operating posture. Ideally the spine should be positioned in its normal s-shape when seated.

- Patient height/position: The patient's occiput should be approximately in level with the operator's elbow. Positioning the patients too high can cause elevation and abduction of shoulders. [9,10]
- Neck: The neck should be kept as neutral as possible. About 15° to 20° of bending may be allowed. Neck

postures above 20° of bending were found to be associated with neck pain.[2]

- Upper back: The position of the upper back depends on the position of the neck. If the neck is excessively bent, the upper back also tends to be flexed and may lead to discomfort and pain.[11]
- Shoulders: Shoulders should be kept in a relaxed position and raised shoulders must be avoided. Raised shoulders have been found to increase upper trapezius muscle activity and may lead to discomfort and pain.[12]
- Elbows and wrists: Elbows should be positioned at around 100° to 110° of flexion, and the wrists in neutral or slight extension in order to get a good grip of instruments.[11]
- Lower back: The position of the lower back depends on the position of the neck, upper back and seat angle.4An excessively bent neck and upper back tends to slump the lower back and may lead to back pain.6The lower back should be positioned in slight lumbar lordosis (inward curving).
- Pelvis and hips: The pelvis, when anteriorly tilted with hips around 110° to 120° (obtuse angle), maintains the normal lumbar lordosis and places the spine in its ideal s-shape (usually seen in standing). To achieve this, the operator's seat should be anteriorly tilted to around 15° and hips should be at an angle of 110° to 120°.
- Knees: The position of the knee depends on the height of the seat and angle of hips. If the hips are kept in an ideal position, as described above, the knee rests in a comfortable angle similar to hips. The knees should be positioned under the dental chair where possible.[12]
- Feet: The feet should be kept flat on the floor. This allows body weight to be transferred through the legs and reduces active loading of back muscles. When using the foot switch, make sure that part of the feet is supported on the floor.[13]

There are various factors involved in the development of musculoskeletal disorders in dental professionals, hence the management of these disorders are complex. It is paramount that you identify the risk factors at an earlier stage and intervene promptly to prevent the development of musculoskeletal disorders. Simple chairside exercises taking regular breaks and avoiding prolonged work hours, are very significant and effective in decreasing the incidence of musculoskeletal disorders. Locomotor system disorders are frequently seen in dentistry [14].It is known that the most painful regions are the cervical and lumbar spine. Factors associated with professional work may predispose to back and neck pain[13,14].On account of the narrow visual field of the oral cavity, having to work with a limited scope of movement constitutes high risks for lower back, shoulder and neck pain.

The aim of this study is to assess the Prevalence of Musculoskeletal disorders of Neck, shoulder and lower back region in Dental professionals.

5. Materials and Methods

Using a simple random sampling method, 400 dentists (n=400) were selected and asked to complete a self-administered questionnaire dentists. The questions were about age, gender, job history, work characteristics the occurrence of lower back pain (LBP) and neck pain, place and duration of employment, number of patients visited per month, time and duration of work per day and the posture of body while working,any particular dental procedure causing pain .Data collected were tabulated and statistically analysed



Correct Working position



Compromised Working position

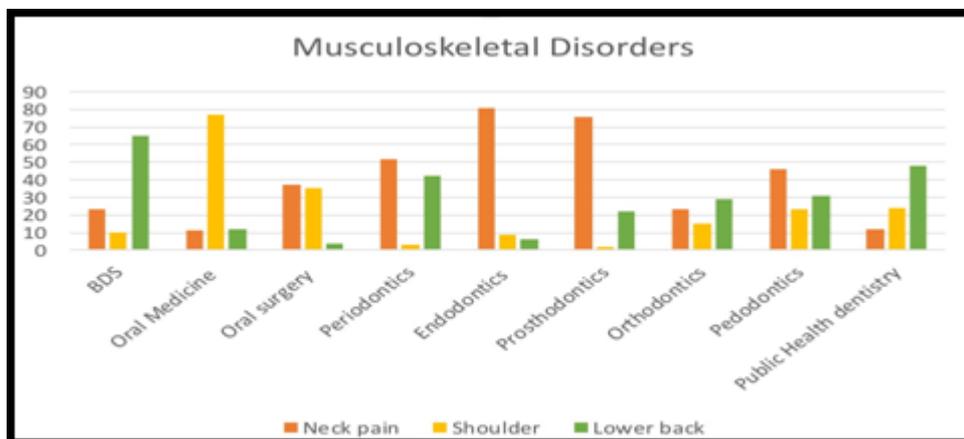
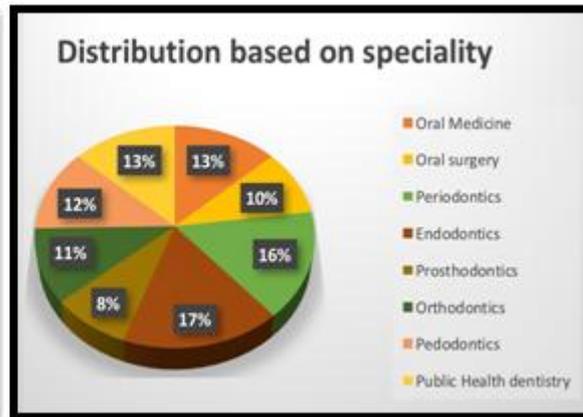
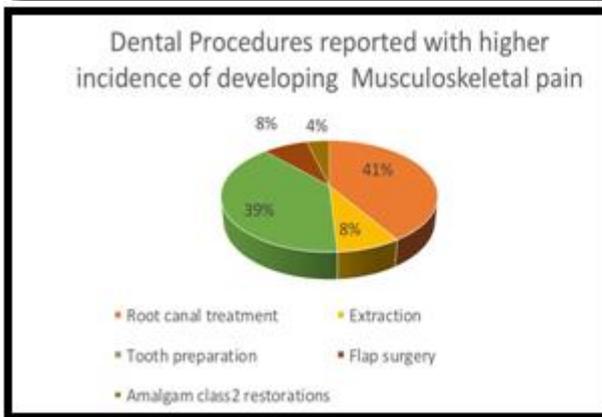
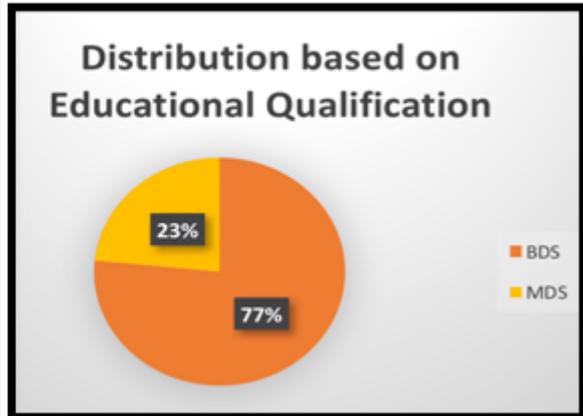
6. Result

Out of 400 questionnaires, three hundred and fifty four questionnaires were returned .Response rate was

calculated to be 88.5%. Of the participants 30.5% were male and 69.5% were female.The age group under the study ranged from 21-62 years. Mean age was 28.4 years (SD = 5.94years). Years of clinical practice ranged from 1-10

years. Mean being 3.440 (SD=4.8453). Average hours of work in a day ranged from 1 -12hours. Mean being 4.765(SD=1.7247). Most dentists (80.3%) reported having at least one MSD symptom in the past 12 months .Neck pain was significantly more likely to be reported by postgraduates of Prosthodontics and Endodontics. Lower back pain, which

interfered with daily activity, was significantly more likely to be reported by younger dentists .Most dentists reported of having Musculoskeletal pain after Root canal treatment (41%) and Tooth preparation for FPD (39%).



7. Discussion

Musculoskeletal disorders are conditions that are concerned with nerve, muscle, tendons and supporting structures' damage. Musculoskeletal disorders occur with symptoms that range from mild, short-lasting pain or discomfort to a more severe chronic one[15].These disorders commonly occur in the neck, shoulders, back, wrist and hand regions. Since all of the dentists' work revolves around the usage of their hands, with long hours in the seated position most of the time, the presence of musculoskeletal disorders/pain will definitely have a negative impact on the productivity of the dentist and the efficiency of his/her work [16]. As a result, a

probable decrease in the income of the dentist will occur, with increasing costs as well to treat the condition[17].With respect to the type and duration of pain, the majority of specialists have shown to experience dull and chronic type of pain. This chronic type of pain may be attributed to posture, repetitious movements, physical loads, psychological stress, and other ergonomic factors.[18]. Plethora of researches supports the idea that ergonomic hazards can be managed or alleviated effectively using a multifaceted approach that includes preventive education, postural and positioning strategies, proper selection and use of ergonomic equipment and frequent breaks with stretching

and postural strengthening techniques. This represents a paradigm shift for daily dental practice [19-21]].

According to the present study results, Most dentists (80.3%) reported having at least one MSD symptom in the past 12 months. Neck pain was significantly more likely to be reported by postgraduates of Prosthodontics and Endodontics. Lower back pain, which interfered with daily activity, was significantly more likely to be reported by younger dentists. The appearance of musculoskeletal symptoms among dental students, even after a relatively short clinical training period, suggests that ergonomics should be covered in the educational system to reduce risks to dental practitioners.

Valachi et al [22] showed that there are deficiencies in operator position, posture, flexibility, strength and ergonomics. Education and additional research are needed to promote an understanding of the complexity of the problem and to address the problem's multifactorial nature. A comprehensive approach to address the problem of MSDs in dentistry represents a paradigm shift in how operators work. New educational models that incorporate a multifactorial approach can be developed to help dental operators manage and prevent MSDs effectively.[21]. Physiological changes that accompany these disorders can be related to practices used by today's operators-primarily being seated for prolonged periods. Studies associated such postures with increased disk pressures and spinal hypomobility, which are factors that may lead to degenerative changes within the lumbar spine and low back pain or injury. There is a relationship shown between prolonged, static (motionless) muscle contractions and muscle ischemia or necrosis. Weak postural muscles of the trunk and shoulder may lead to poor operator posture. As muscles adapt by lengthening or shortening to accommodate these postures, a muscle imbalance may result, leading to structural damage and pain. A significant number of today's dental operators experience musculoskeletal pain and are at risk of developing serious MSDs[23]. A thorough understanding of the underlying physiological mechanisms leading to these problems is necessary to develop and implement a comprehensive approach to minimize the risks of a work-related injury.

8. Conclusion

It is understood that work duration and working postures are root cause of back and neck pain among the dental professionals. This study also highlights, the fact the incidence among dentistry to be higher than general population. The study results states that there is prevalence of musculoskeletal disorders evident in most of the dentists of this generation, hence implementation of proper ergonomics in dental practice should be emphasised from the early dental curriculum and practice.

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