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# Musculoskeletal Disorders and -An Evil Eye

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## Abstract

Musculoskeletal disorders (MSDs) are the one of the most dominant occupational health problems particularly faced by majority of dental practitioners. They are identified as injuries or pain in the human musculoskeletal system, including the bones & joints, muscles & ligaments, nerves, tendons, and structures that support limbs, neck and back. A complete knowledge of patients and operator's position in dental practice is of great significance in context to both health and comfort of patient and dental operator. The causes of musculoskeletal disorders in dentistry are multi factorial, ranging from non-ergonomic loupes and improper selection of delivery systems, to generic exercise that worsens muscle imbalances. Even after technological upgrading in the field of dental materials and equipments, they have not been able to put an end to the musculoskeletal problems in dentists.

**Keywords:** Calcifications, Fibroma, Gingiva, Peripheral ossifying fibroma, Reactive lesion.

## Introduction

A dentist plays a key role in the diagnosis, prevention and treatment of numerous diseases and disorders affecting the oral and Para-oral structures. [1] Musculoskeletal pain is one of the most noteworthy occupational health hazards for healthcare professionals.[2]

Dental professionals often develop musculoskeletal problems, which are related to sub-optimal work-environment ergonomics that might be accountable for inappropriate sitting postures and movements causing unneeded musculoskeletal loading, discomfort, and fatigue. [3, 4]

The World Health Organization defines, MSD as "a disorder of the muscles, tendons, peripheral nerves or vascular system not directly resulting from an acute or instantaneous event (e.g., slips or falls). MSDs are considered to be work-related when the work environment and the performance of work contribute significantly, but are only one of a number of factors contributing to the causation of a multi factorial disease". [5]

Inadequate availability or unsuitable equipment, inappropriate work area design, direct injuries, tedious movements from working with dental instruments, or sitting for longer time duration with a flexed and twisted back are some of the precipitating factors to neck and low back ailments.[6]

There are various disorders categorized in MSDs these include: upper and lower back pain, herniated disc, neck pain with or without cervical root problems, carpal tunnel syndrome, tendinopathies, shoulder pain, rotator cuff tendinopathies, and repetitive strain injuries. [7]

Young and less knowledgeable dentists experience more musculoskeletal disorders compared to older and experienced one. [7]

This review article highlights the various musculoskeletal disorders and also the related complications and effect on working of the dental practitioners

## Mechanism of musculoskeletal disorder

Dentists frequently assume static postures, which require more than 50 percent of the body's muscles to contract to hold the body motionless while resisting gravity. Over prolonged static postures may result in initiation of a series of events that may result in pain, injury or a career-ending MSD. This prolonged static postures (PSPs) may further result in number of physiological consequences including muscle imbalances, ischemia, trigger points, joint hypo mobility and spinal disk degeneration. This mechanism of musculoskeletal disorder is further explained by means of flowchart (Figure 1)

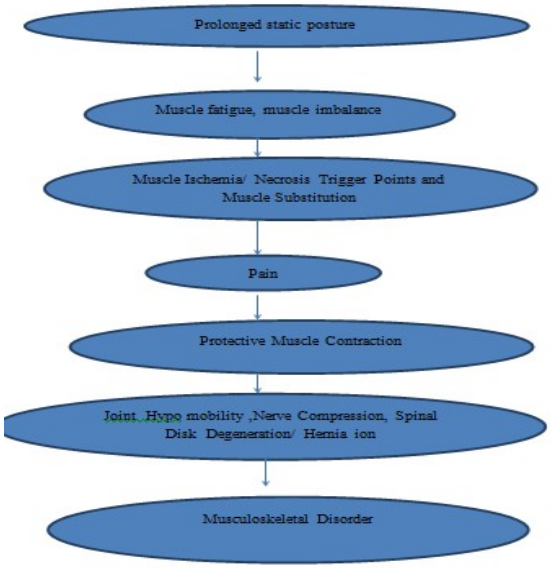


**Figure 1:** Flowchart explaining MSDs disorder mechanism

Dentists must understand the mechanisms that contribute to MSDs so they can make informed choices regarding ergonomic equipment, exercise and lifestyle. Having this knowledge is key in preventing and managing work-related musculoskeletal problems in clinical dentistry. [8, 9]

## Classification of musculoskeletal disorders [3, 10]

According to RundcrantzBL (1991) musculoskeletal disorders among dental practitioners can be classified as-

**Table 1: Classification of MSDs**

| S.No. | Type of musculoskeletal disorders | Symptoms |
|---|---|---|
| 1. | Neck and Shoulder disorders<br>a) Myofascial Pain Disorder<br>b) Cervical spondylosis<br>c) Thoracic outlet syndrome<br>d) Rotatary cuff tendinitis/ tears | Pain and tenderness in the neck, shoulder and arm muscle. Painful trigger points upon touch. Intermittent/ chronic neck and shoulder pain or stiffness, headache, hand and arm pain, numbness, tingling and clumsiness. Pain in shoulder, arm or hand, numbness, tingling of fingers, muscle weakness/ fatigue, cold arm or hand. Pain and stiffness in shoulders associated with backward and upward arm movements. Weakness of rotator cuff muscle |
| 2. | Hand and wrist disorders<br>a) DeQuervain's Disease<br>b) Carpal Tunnel Syndrome<br>c) Guyon's Syndrome | Pain in thumb and wrist area when grasping, pinching, twisting. Hand or finger numbness, pain, tingling, burning, clumsiness. Eventual muscle weakness and atrophy. Symptoms often worse with increased activity. Symptoms begin with feeling of pins and needles in ring and index fingers. |
| 3. | Back Disorders<br>a) Herniated spinal disk<br>b) Lower Back Pain<br>c) Sciatica | Back and leg numbness, tingling pain, weakness. Worsens with coughing, sneezing, sitting, driving, bending forward Pain, Stiffness in lower spine and surrounding tissues Pain from lower back or hip radiating to the buttocks and legs. Leg weakness, numbness or tingling. Possible causes are prolapsed intervertebral disc pressuring the sciatic nerve, worsened with prolonged sitting or excessive bending/ lifting |

## Measures to reduce Musculoskeletal Disorders

Musculoskeletal problems can be managed or alleviated effectively using a multifaceted approach that includes–

1. Postural Awareness Techniques
2. Positioning Strategies
3. Periodic Breaks and Stretching
4. Strengthening Exercises
5. Education

Postural Awareness Techniques

Postural awareness techniques include:

## Maintain the low back curve

Maintaining the low back curve when sitting can reduce or prevent low back pain. [11, 12]

The following practices can help maintain the low back curve-

1. Tilt the seat angle slightly forward five to 15 degrees to increase the low back curve.
2. Sit close to the patient and position knees under the patient's chair if possible. This can be facilitated by tilting the seat and using patient chairs that have thin upper backs and headrests.
3. Consider using a saddle-style operator stool that promotes the natural low back curve by increasing the hip angle to approximately 130 degrees.
4. Adjust the chair so your hips are slightly higher than your knees and distribute your weight evenly by placing your feet firmly on the floor.
5. Use the lumbar support of the chair as much as possible by adjusting the lumbar support forward to contact your back.
6. Stabilize the low back curve by contracting the transverse abdominal muscles.
7. Pivot forward from your hips, not your waist .[13]

**Use magnification:** Proper selection, adjustment and use of magnification systems have been associated with decreased neck and low back pain, as they allow operators to maintain healthier postures. [14]

**Adjust operator chair properly**: The dental practitioners need to know how to adjust the features of their chairs to obtain maximal ergonomic benefits which includes-

1. Adjust your chair first then adjusting patient chairs to accommodate the patients. Allowances can be made when working with patients who are elderly or disabled.
2. Position the buttocks snugly against the back of the chair.
3. Place feet flat on the floor and adjust the seat height up until thighs gently slope downward while the feet remain flat on floor.
4. Move backrest up or down until the lumbar support nestles in the natural lumbar curve of the low back. Then angle the lumbar support forward to facilitate contact with the low back.
5. Tilt the seat forward about five to 15 degrees.
6. Adjust armrests, which are designed to decrease neck and shoulder fatigue and strain, to support elbows in the neutral shoulder position.[13]

## Positioning strategies

The various positioning strategies includes-

**Avoid static postures:** The dental workers should vary their work positions as often as possible to shift the workload from one group of muscles to another. [12, 15]

**Alternate between standing and sitting:** Standing uses different muscle groups than does sitting; therefore, alternating between the two positions let one group of muscles rest, while the workload is shifted to another group of muscles. Alternating between standing and sitting also can be an effective tool in preventing injuries. [16]

**Reposition the feet:** Subtle changes in foot position can shift the workload from one group of low back muscles to another, allowing the overworked tissues to be replenished with nutrients.

**Position patients at the proper height:** Operators should take the time to position their patients properly for mandibular and maxillary procedures. Generally, patients should be placed in a semi supine position for mandibular procedures and a supine position for maxillary procedures. [13]

**Avoid twisting:** When possible, dentists should position instruments within easy reach. Operators should try to retrieve items with the closest hand, especially with rear delivery systems, to avoid twisting or reaching across the body. Repeated unilateral twisting in one direction may result in muscle imbalances or structural tissue damage, leading to low back pain. [17]

Periodic breaks and stretching

**Chair side directional stretching:** Stretches performed in the reverse direction of awkward PSPs may prevent muscle imbalances that can lead to pain

and MSDs. Directional stretches can be performed in or out of the operatory and can be incorporated into a daily routine that facilitates balanced musculoskeletal health. Directional stretching involves a rotation, side bending or extension component that generally is in the opposite direction of that in which the operator frequently works.

Frequent stretching breaks address the detrimental physiological changes that can develop while working in optimal or awkward PSPs: ischemia, trigger points, muscle imbalances, joint hypo mobility, nerve compression and disk degeneration. Furthermore, stretching increases blood flow to muscles; increases production of joint synovial fluid; reduces formation of trigger points; maintains normal joint range of motion; increases nutrient supply to vertebral disks; creates a relaxation response in the central nervous system; warms up the muscle before beginning to work; identifies tight structures that may be predisposed to injury. [13]

## Treating Trigger points

Sometimes, operators may experience pain that is not relieved with stretching but instead worsened by it. This pain may be caused by a sustained contraction inside a tight band of muscle known as a trigger point, which feels like a small hard knot. When firm pressure is applied, trigger points are painful and may refer pain to another area. They do not allow the muscle fibers to contract or relax; therefore, they effectively decrease flexibility and reduce blood flow to the muscle. It is important that operators release trigger points as soon as possible.

Various people can help treat trigger points:

1. Physical therapist trained in trigger point therapy, contract and relax technique or muscle energy technique.
2. Neuromuscular therapist.
3. Massage therapist trained in trigger point therapy.
4. Physicians trained in spray and stretch technique or trigger point injection.
5. The dentist self-administering trigger point therapy using a tennis ball or other small ball between the back and a wall or using a trigger point self-massage tool.

## Strengthening Exercises

MSDs in dentistry often begin with fatigue of the postural stabilizing muscles of the trunk and shoulders. As these muscles fatigue, operators tend to slump into poor posture, setting the stage for injuries. Dentists should perform specific strengthening exercises for the trunk and shoulder girdle to enhance the health and integrity of the spinal column, maintain good overworking posture, optimize the function of the arms and hands and prevent injuries.

## Aerobic exercise

One major contributing factor to MSDs is decreased flow of nutrients and oxygen to muscles. Aerobic exercise increases blood flow to all of the tissues in the body and improves their ability to use oxygen. In addition, aerobic exercise improves cardiovascular and cardio respiratory function lowers heart rate and blood pressure, increases high-density lipoprotein (good) cholesterol, decreases blood triglycerides, reduces body fat, improves stress tolerance, increases mental acuity improves sleep quality and may increase longevity. Thus aerobic exercise should be performed three to four times a week for at least 20 minutes.

## Stress management

Stress can elicit muscular contraction and pain, especially in the trapeziums muscle. Operators may use various stress-reduction techniques to decrease stress-related muscular tension. They include breathing techniques, progressive relaxation, visualization, massage, aerobic exercise, meditation or yoga. [18]

## Education

To protect their own health, dentists should seek out and receive education about musculoskeletal health, injury prevention and dental ergonomics. Ideally, this education should begin during dental school and continue through the dentist's professional life.

Dental operators can be taught to manage and prevent injuries effectively. They can educate themselves and their staff members using a multi factorial approach that includes preventive education, postural and positioning strategies, proper selection and use of ergonomic equipment, and frequent breaks with stretching and strengthening techniques before painful episodes occur. Prevention strategies should be easy to use to ensure long-term compliance. [13, 19, 20]

## Conclusion

This review article clearly demonstrates, musculoskeletal disorders represent a significant burden for dental profession. It is essential to all members of dental profession are aware of the importance of taking steps to avoid musculoskeletal problems. Adopting adequate postures during clinical practice and having a favourable work environment

could reduce the musculoskeletal disorders. Therefore, it is of vital importance to promote the occupational health and prevention programs regarding ergonomic postures which must be acquired by the dentists during their clinical practices.

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