Ergonomics for Dental Professionals

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ABSTRACT

Occupation related diseases are increasing day by day and one amongst them is musculoskeletal disorders due to improper ergonomics in dentistry. These disorders can result in pain and dysfunction of the neck, back, legs and hands and fingers. Ergonomics is an applied science concerned with designing products and procedures for maximum efficiency and safety. These conditions provide easiest way to work improving the delivery of dental services. So, dental surgeons need to update themselves regarding the occupational hazards in dentistry so that they can overcome these disorders. This article sets forth broad important background information on ergonomics so that the dental practitioner can have a general awareness of ergonomic risk factors as well as some basis for understanding the ongoing dialogue about ergonomics, its diagnosis, treatment, and regulation.

INTRODUCTION

Recently, "Ergonomics" has become a popular term. The term has been used with most professions but increasingly in the dental profession. In Greek, "Ergo," means work and, "Nomos," means natural laws or systems. Ergonomics is a way to work smarter—not harder—by designing tools, equipment, work areas and tasks to fit the individual worker. It leads to improved productivity, reduced injuries, and greater worker satisfaction.(1) It takes account of the worker's capabilities and limitations to ensure that tasks, equipment, information and the environment suit each worker(2).

Dental professionals are commonly exposed to a variety of occupational hazards such as chemical, biological and ergonomic which create musculoskeletal disorders. Dentists and dental hygienists are at a greater risk of work-related musculoskeletal disorders than the general population. 54% to 93% of dental professionals have been reported with work-related musculoskeletal injuries with pain and dysfunction most frequently occurring in the spine (neck and back), shoulders, elbows and hands. Dental hygienists in one study reported neck pain associated with working in a bent neck position, and neck symptoms were reported by 72% of a sample of 94 experienced hygienists (mean age: 46 years).(3)

These problems can be avoided by increasing awareness of the postures used during the work, redesigning the work station to promote neutral positions, examining the impact of instrument use on upper extremity pain, and following healthy work practices to reduce the stress of dental work on the practitioner's body.(4)

MUSCULOSKELETAL DISORDERS (MSDs)

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). These disorders are considered to be work-related when the working environment and the performance of work contribute significantly, but are only one of a number of factors contributing to the causation of a multifactorial disease."[5]

Prevalence of MSD'S

Several studies have shown prevalence of lower back pain among dentists (53.7%) while prevalence of neck-related pain was (57.5%) and the prevalence of shoulder pain among dentists was (53.3%) in Queensland. This finding is similar to an investigation of dental workers in the United States military (53%), as well as another study of Danish dentists (65%). Study from Sweden found that dentists were exposed to a high load on the trapezius muscles bilaterally, as well as prolonged forward bending of the head [6].

MSDs classification[7]

1. **Nerve Entrapment Disorders:** carpal tunnel syndrome, ulnar neuropathy.
2. **Occupational Disorders of the Neck and Brachial Plexus:** tension neck syndrome, cervical spondylosis, cervical disc disease, brachial plexus compression.
3. **Shoulder disorders:** trapezius myalgia, rotator cuff tendonitis, rotator cuff tears, and adhesive capsulitis.
4. **Tendonitis of the Elbow, Forearm and Wrist:** deQuervain´s disease, tendonitis, tenosynovitis, epicondylitis
5. **Hand-Arm Vibration Syndrome:** Raynaud's disease.
6. **Low Back Disorders:** chronic low back pain

- Numbness in fingers and hands
- Clumsiness and dropping of objects
- Hypersensitivity in hands and fingers

Some Symptoms of Musculoskeletal disorders (MSDs): (8)

- Excessive fatigue in the shoulders and neck
- Tingling, burning, or other pain in arms
- Weak grip, cramping of hand



Some Signs of MSDs (9)

- Decreased range of motion
- Loss of normal sensation
- Decreased grip strength
- Loss of normal movement
- Loss of co-ordination

- Improper work habits
- Genetics
- Medical conditions
- Poor fitness level
- Physical/mental stress
- Lack of rest/recovery
- Poor nutrition

Some Risk Factors for MSDs (9)

- Repetition
- Forceful exertions
- Awkward postures
- Contact stress
- Vibration
- Poorly designed equipment workstation
- Environmental factors
- Poor lighting

Mechanisms leading to musculoskeletal disorders (MSDs) in dentistry

1. **Prolonged Static Postures (PSPs):** 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. When the human body is subjected repeatedly to PSPs, it can initiate a series of events that may result in pain, injury or a career-ending MSD[10].
2. **Muscle Imbalances:** During treatment, operators should strive to maintain a neutral, balanced posture. Even with best ergonomic postures can find themselves in sustained awkward postures. With forward bending and repeated rotation of the head, neck and trunk to one side causing ischemia and pain, exerting asymmetrical forces that can cause misalignment of the spinal column and decreased range of motion[10].
3. **Muscle ischemia and necrosis:** With the best working postures, dental operators still maintain static contractions of the trunk muscles. Any deviation from neutral position, the muscles contract harder to maintain a working posture. As muscles become fatigued, this prolonged contraction can cause muscle ischemia. Under normal conditions, damaged tissue is repaired during rest periods. In dentistry, however, the

damage often exceeds the rate of repair due to insufficient rest periods. Muscle necrosis can occur[10].

4. **Hypomobile Joints:** During periods of PSPs or when joints are restricted due to muscle contractions, synovial fluid production is reduced dramatically and joint hypomobility may result[10].
5. **Spinal Disk herniation and degeneration:** In unsupported sitting, pressure in the lumbar spinal disks increases 40% above the pressure from standing. During forward flexion and rotation, a position often assumed by dental operators, the pressure increases 400% making the structure vulnerable to injury[10].

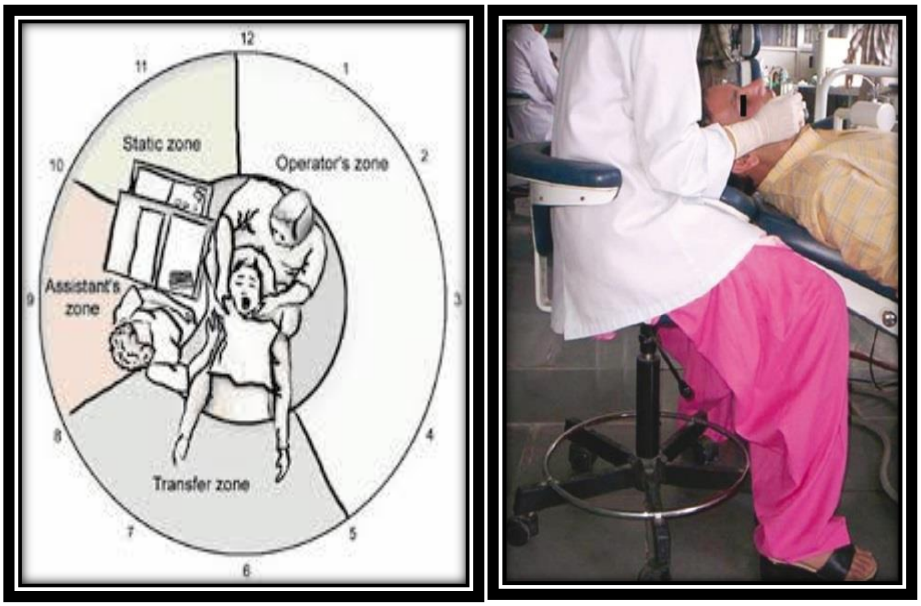
INTERVENTION

Following interventions should be considered in the dental practice:

Dental mirror

Dental chair requirements[11]

Dental operating light



The sitting postures

Prevention of MSDs

Ergonomics problems in dentistry can be reduced by implementing various strategies. Dentists should also perform specific exercises for the trunk and shoulder girdle to enhance the health and integrity of the spinal column, stretching exercises for the hands and head and neck, maintain good working posture, optimize the function of the arms and hands and prevent injuries[13].

CONCLUSION

Ergonomics have come into the profession ina big way. Further development of dental ergonomics must take place on the basis of a coherent vision of the future. Right Ergonomics along with regular exercises, relaxation techniques (meditation, biofeedback & yoga), proper nutrition helps us combat stress, thus conserving the productive energy, thereby increasing comfort, improving the quality of life, ultimately leading to extended careers.

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