

Ergonomic Risk Factors

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ABSTRACT

In this modern world our goal should be fitting the job task to the person performing the job. Ergonomics is the study of work including the tasks, technology and environment, in relation to human capabilities which leads to improved productivity, reduced injuries, and greater worker satisfaction. Another meaning of working smarter is ergonomics. The purpose of this article is to spread a general awareness of ergonomic, risk factors as well as to become familiar with the field of ergonomics and also how to identify risk factors and stressful individual behaviors in dentistry which lead to injuries and to learn how to apply preventive strategies, including good posture and positioning.

Key words: Ergonomics, musculoskeletal disorders, Carpal tunnel syndrome.

INTRODUCTION

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. "Ergonomics" has become a popular term nowadays but it is not actually implemented in our day today life completely. "Ergonomics" derived from the Greek..."ergo" meaning work and "Nomos" the study of... Literally the study of work. Ergonomics is the study of workers and their relationship with their occupational environment. How you position yourself, your patient, your dental chair position, how equipment is utilized, how the workplace is designed and how it impacts your health. **ERGONOMICS** is a way to work smarter, more efficiently with less effort and without discomfort to the human body. Proper ergonomic design is necessary to prevent

repetitive strain injuries (RSI), which can develop over time and can lead to long term disability. ^[1]

Why we should care and follow ergonomics?

Literature reviewed that the prevalence of skeletal or muscular pain in dentists, dental hygienists and dental students ranges from 93% to 64%. The most prevalent regions for pain in dentists have been shown to be the neck in 19.5- 80% which commonly leads to cervical pain and back pain which is 36.3% - 60.1%. Dentists and dental hygienists both are at same risk for work related musculoskeletal disorders and it was found that the most frequent injuries occur in the spine, shoulder and neck. ^[1] To work longer with efficient spirit, there is necessary to have awareness about posture and daily exercise which should be followed by both dentist and assistant. ^[2] All these posture related problems can be removed easily by designing the workstation according to unstrained posture,

by following healthy work practices to reduce the stress of dental work, by having in between breaks and stretching exercise. [3]

Ergonomic Design Goals:

1. Improve job process by eliminating the extra effort.
2. Reduce potential for overexertion injury.
3. Minimize fatigue to muscles.
4. Prevent energy and save time by increasing efficiency towards work.
5. To increase their satisfaction towards job, increase the comfort and fulfillment of work.
6. Improves Productivity while maintaining safety and create healthy environment.

Ergonomic in Dentistry affects:

Neck and shoulder
Wrist and hand
Lower back
Psychosocial

Consequences of Poor Ergonomics

- ⊙ Fatigue
- ⊙ Pain/Discomfort
- ⊙ Illness/Injury
- ⊙ Missed days at work
- ⊙ Errors
- ⊙ Lower productivity
- ⊙ Patient dissatisfaction

Consequences of Poor Workstation Design:

Discomfort while working leads to chronic Pain. Accidents may occur due to forceful exertion which placed high load on muscles and sometimes lead to Injuries prolonged practices of by follow the wrong posture lead to fatigue and frequently caused increased errors at work. Work-Related Musculoskeletal Disorders (WMSDs) are most commonly occurs which includes:

- Low back pain is (most common)
- Tendonitis
- Epicondylitis
- Bursitis
- Carpal tunnel syndrome (CTS)

MUSCULOSKELETAL DISORDERS:

The term work-related musculoskeletal disorders (MSDs) refers to musculoskeletal disorders to which the environment of working contributes significantly leads to musculoskeletal disorders that are made worse or longer lasting by working under unsatisfactory conditions leads to health hazards.²The world health organization defines MSD as “a disorder of the muscles, tendons, joints, intervertebral discs, peripheral nerves and vascular system, not directly resulting from an acute or instantaneous event but installing gradually and chronically.¹

Prevalence of MSD'S

Several studies in literature reviewed that 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%). Dentists, assistant and dental hygienists are at a greater risk of work-related MSDs than the general population. Dentists reported with work-related musculoskeletal injuries prevalence with pain and dysfunction most frequently occurring in the neck and back, shoulders, elbows and hands was 54% to 93%. One study reported that the dental hygienists suffered from neck pain associated with working in awkward neck position, and neck symptoms were reported by 72% of a sample of 94 experienced hygienists (mean age: 46 years). [3]

MSDs classification [3]

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

Most common are low back pain and carpal tunnel syndrome. The common signs and symptoms are follows:

Symptoms of MSDs:

- ⊙ Pain and burning sensation in arms
- ⊙ Numbness and tingling sensation in hands
- ⊙ Cramping and fatigue in muscles of hand as well as shoulder
- ⊙ Stiffness and painful movements
- ⊙ Weak grip leads to Clumsiness and dropping of objects.

Signs of MSDs are:

- ⊙ Decreased range of motion
- ⊙ Deformity in severe cases
- ⊙ Weak grip strength
- ⊙ Function loss of muscles

What Factors Contribute to MSDs?

There are three primary ergonomic risk factors:

1. Repetition of tasks
2. Forceful exertions
3. Repetitive /sustained awkward postures

Repetition of task:

There are many works and jobs for which a worker have to do repetitive tasks, and are frequently controlled by hourly or daily production targets and work processes. Prolonged use of repetitive movements when combined with other risks factors such high force and/or awkward postures, can contribute to the formation of MSD. These include:

- Prolonged use of vibrating hand tools
- Repetitive movements

Forceful exertions:

For some particular task more force is required. To fulfill these requirements to

high force, muscle effort increases associated with fatigue which can lead to MSD. Grasping instruments with force for prolonged periods is a good example of this factor.

Repetitive /sustained awkward postures:

Awkward neck and back posture caused excessive force on joints and overload the muscles and tendons around the effected joint. Body joints are most efficient when they operate closest to the mid-range motion of the joint. Risk of MSD is increased without adequate recovery time when joints are worked outside of this mid-range repetitively. These includes: Awkward postures, Static postures.

Mechanism of MSDs ^[1]

STATIC POSTURE, Muscle Fatigue:

Performing tasks in prolonged static posture cause muscle fatigue. This will initiate a series of events that may lead to even muscle imbalance.

Muscle Ischemia, Trigger Points: Dentist while working for long hours try to maintain a neutral, balanced posture and that sometimes ultimately leads to in sustained awkward postures. These awkward postures often lead to muscle spasm and tenderness which can become ischemic and painful, exerting asymmetrical forces that can cause misalignment of the spinal column. ^[1] As a result, if this condition persists for a long duration, it often exceeds the rate of repair due to insufficient rest periods, which cause necrosis in future.

Joint Hypomobility, Nerve Compression, Spinal Degeneration/Herniation:

Synovial fluid production is reduced dramatically as the joints are restricted due to muscle contraction, which may results in joint hypomobility. Dentist often used a forward flexion and rotation, which increases the pressure on spinal disc by making the structure more vulnerable to injury. ^[3]

Prevention of MSDs

Fatigue can be reduced by eliminating excessive force and awkward posture and by reducing high repetition tasks. MSD risk can be reduced by providing safe and proper posture. [4] In between rotation of head and neck by avoiding prolonged periods of performing a single task, thereby reducing fatigue and prevents MSD. Consider ergonomic features for dental equipment (e.g., patient chairs, operator stools, hand/foot controls, instruments) when purchasing new equipment. Modify working conditions to achieve optimal body posture. For recovery of the muscles there should be implementation of rest or stretch breaking exercise to provide an opportunity for increased circulation needed. Eliminating excessive force requirements will reduce worker these conditions.

CONCLUSION

In this modern world, further development of ergonomics must take place. Considering the impact of ergonomically designed and chosen equipment on the efficiency, one must modify the workplace

to reduce the possibility of injuries. Adopting newer techniques, armamentarium and work strategies can definitely prevent detrimental changes in the future. Incorporation of regular exercise, breaks in between long appointments, by using ergonomically designs stools. [4] Individual effort as part of a workshop team is the greatest means of identifying / improving workplace ergonomic issues.

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