

Ergonomics & Dentistry

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Abstract

Dental profession is prone towards Musculo Skeletal Disorders (MSDs) or cumulative trauma disorders (CTD). Risk factors for work related MSDs in dentistry include stress, poor flexibility, improper positioning, infrequent breaks, repetitive movements, weak postural muscles, prolonged awkward postures and improper adjustment of equipment. Proper ergonomic design is necessary to prevent repetitive strain injuries (RSJ), which can develop over time and can lead to long term disability. This article discusses the important issues of postures and offers different methods to ergonomize the dental operator so as to work with comfort, efficiency and ease.

Keywords: ergonomics, MSD, prolonged static postures (PSP)

Introduction

Ergonomics can be defined as 'an applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely'. The term work-related musculoskeletal disorders (MSDs) refers to musculoskeletal disorders to which the work environment contributes significantly or to musculoskeletal disorders that are made worse or longer lasting by work conditions or workplace risk factors. Common examples of such workplace risk factors include jobs requiring repetitive, forceful or prolonged exertions of the hands; frequent or heavy lifting, pushing or pulling, or carrying of heavy objects and prolonged awkward postures. The level of risk depends on the intensity, frequency and duration of the exposure to these conditions. A healthy dentist is one of the most important component in a successful dental practice. It is estimated that more than half of practitioners have some kind of painful musculoskeletal disorder that is work related. Studies by Gorter *et al.* in 2000 show that one out of ten dentist's reports having poor general health and three out of ten dentists report having poor physical state [1]. Studies indicate that back, neck and shoulder or arm pain is present in up to 81% of dental operators [2]. Back pain is the most common complaint followed by neck pain and shoulder pain, though they all are usually mild. Most dentists today work in the sitting position and treat the patient in the supine position. When operators sit, pain occurs not only in their back, but also in their neck, shoulders and arms. While the occasional backache or neck ache is not a cause for alarm, if regularly occurring pain or discomfort is ignored, the cumulative physiological damage can lead to an injury or a career ending disability [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].

Discussions

Musculoskeletal pain, particularly back pain, has been found to be a major health problem for dental practitioners. Early symptoms of MSDs include pain, swelling, tenderness, numbness and loss of strength. Others 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, hypersensitivity in hands and fingers [5].

Mechanisms of MSDs in Dentistry: Prolonged Static Postures (PSPs): 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. **Muscle Ischemia/Necrosis and Imbalances:** During treatment, operators strive to maintain a Neutral balanced posture and find themselves in sustained awkward postures. These postures often lead to stressed and shortened muscles which can become ischemic and painful, exerting Asymmetrical forces that can cause misalignment of the spinal column. **Hypomobile Joints:** During periods of PSPs or when joints are restricted due to muscle Contractions synovial fluid production is reduced and joint hypomobility may result. **Spinal Disc Herniation and Degeneration:** In unsupported sitting, pressure in the lumbar Spinal discs increases. During forward flexion and rotation, the pressure increases further and makes the spine & disc vulnerable to injury. **Neck and Shoulder Injury:** Repetitive neck movements and continuous arm and hand Movements affecting the neck and shoulder demonstrate significant associations with neck MSDs [6].

Carpal-Tunnel Syndrome (CTS): It has been associated with both repetitive work and forceful work. Symptoms can appear from any activity causing prolonged and increased pressure (passive or active) in the carpal canal. **Low Back Pain:** Low back discomfort has been associated with dental work in numerous studies. **Psychosocial Factors:** Dentists with work related MSDs show a significant tendency to be more dissatisfied at work. They are burdened by anxiety, poor psychosomatic health and thus feel less confident [7].

Elements of an Improper Workstation Setup: dentist's or patient's chair is too high/low, dentist's chair has no lumbar, thoracic or arm support, Instrument table is not positioned properly, lighting is inadequate for the task, edges of tables/work surfaces are uncomfortable, ventilation makes workspace cold, work environment is damp and cold. The elements of an improper workstation setup force the dental practitioner to assume many harmful postures when performing various procedures on the patient. These positions put pressure on nerves and blood vessels, cause excessive strain on muscles, decrease circulation and cause wear and tear on the joint structures. Some Improper Postures That Dentists Take: Working with the neck in flexion and tilted to one side, shoulders elevated, side bending to left or right, excessive twisting, forward bending / overreaching at waist, shoulders flexed and abducted, elbows flexed greater than 90°, wrists flexed/deviated in grasping, thumb hyperextension, position maintained for 40 minutes per patient [8, 9] Knowing the risk factors and MSD symptoms dentists will increase prevention, change their habits, select proper ergonomic equipment and posture and have a break after each operation with stretching exercise. In doing so, exercise plays an important role in their career to be healthy, safe and have a longer career. Some tips for working with good posture: maintain an erect posture, use an adjustable chair with lumbar, thoracic and arm support, work close to your body, minimize excessive wrist movements, avoid excessive finger movements, alternate work positions between sitting, standing and side of patient, adjust the height of your chair and the patient's chair to a comfortable level, consider horizontal patient positioning, position the adjustable light to avoid strain on the neck, temperature of workspace should not be too cold because this will decrease the circulation and blood flow of extremities.

Conclusion

Ergonomics along with regular exercises, relaxation techniques (meditation, biofeedback & yoga), proper nutrition helps dentists combat stress, thus conserving the productive energy, thereby increasing comfort, improving the quality of life, ultimately leading to extended careers.

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