



ORIGINAL RESEARCH PAPER

Dental Science

ERGONOMICS IN GENERAL DENTISTRY- A REVIEW

KEY WORDS:

Musculoskeletal disorders (MSDs), Ergonomics, low back pain.

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ABSTRACT

Practicing the art of dentistry requires a high degree of concentration and precision. But awkward postures, repetitive hand movements, and persistent vibration of the hand and wrist from a high speed handpiece, positioning yourself or the patient, limitations with the tools and equipment used can make practitioners vulnerable to musculoskeletal disorders. Studies show that work related pain in the dental field is ever increasing. Over half of all dental professionals continue to experience work related pain. Ergonomics is an applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely preventing work-related musculoskeletal disorders. The successful application of ergonomics assures high productivity, avoidance of illnesses and injuries, and increased satisfaction among health care professionals.

INTRODUCTION

Take care of your body. It's the handiest area you need to live"- jim rohn. It's miles paramount crucial for each dental practitioner to work in proper posture and form which will keep a properly form, feature & fitness. Dental work require sizeable physical and intellectual awareness and prolonged operating hours make dental practitioners to comply with incorrect working posture [1]

Ergonomics is derived from Greek words: Ergon meaning 'work' & Nomos meaning 'principles or laws [2].It is an approach to work smarter by designing tools, equipments, work stations which can allow practitioners to work with maximum efficiency and safety. Proper ergonomic design leads to enhanced productivity, minimizes injuries & maximize worker satisfaction. Therefore, it is crucial for upcoming dental practitioners to adopt proper ergonomic design while practising dentistry. This article review about various musculoskeletal disorders and its management.

MUSCULOSKELETAL DISORDERS

Msd are "work associated problems of the musculoskeletal muscles having continual gradual onset concerning muscular tissues, tendons, ligaments, joints, nerves, cartilage and spinal discs" [3].They are additionally referred to as cumulative trauma problems (ctds) or repetitive motion accidents (rmi). Msd are an growing healthcare trouble globally, being the second one leading motive of incapacity[4].On the grounds that, dental treatment is achieved in extraordinarily narrow running vicinity with a very inflexible work posture, the superiority of msds exceeds over different issues. A evaluation of the worldwide dental literature states that approximately sixty five% of dentists reviews of musculoskeletal lawsuits of pain, pain, impediment in functioning & elevated operating time [5].In 1998 branson et al located that lower back, neck, shoulder or arm ache is present in as much as 81% of dental operators [6].

Researchers have found symptoms of discomfort for dental workers occurred in the (Anton, 2002)

- Wrists/hands (69.5%)
- Neck (68.5%)
- Upper back (67.4%)

- Low back (56.8%)
- Shoulders (60%)

Classification of MSDs

- (A) Nerve Disorders: Carpal tunnel syndrome, Ulnar neuropathy.
- (B) Disorders of the neck: Tension neck syndrome, Cervical spondylosis, Cervical disc disease, Brachial plexus compression.
- (C) Disorders of the Shoulder: Trapezius myalgia, Rotator cuff tendonitis, Rotator cuff tears, & adhesive capsulitis.
- (D) Disorders of the Elbow, Forearm & Wrist: deQuervains disease, Tendonitis, Tenosynovitis, Epicondylitis.
- (E) Hand-Arm Vibration Syndrome: Raynaud's disease.
- (F) Disorders of the Back: Low back pain (LBP), Upper back pain.

Risk factors for MSDs Based on various studies made, the following are the variety of risk factors for musculoskeletal disorders (MSDs) that are encountered in dental practice [6].

Risk Factors for MSDs	Dental Procedures
Repetitive motions	Scaling, polishing
Awkward postures	Handling of objects with the back bent/twisted than straight
Static postures	Static neck, back & shoulders
Forceful exertions	Tooth extraction
Duration	Grasping small instruments for prolonged periods
Contact stresses	Repeated contact with hard or sharp objects
Vibration	Prolonged use of vibrating hand tools

Other risk factors for MSDs are

- Poorly designed equipment workstation eg-narrow working space
- Improper work habits
- Genetics
- Medical conditions
- Poor fitness level
- Physical/mental stress
- Lack of rest/recovery
- Poor nutrition

Poor lighting
Environmental & psychosocial factors

Mechanisms causing musculoskeletal disorders (MSDs) in dentistry

Prolonged static postures (PSPs)
Muscle imbalances
Muscle ischemia & necrosis
Hypomobile joints
Spinal disc herniation & degeneration
Neck & shoulder injury
Carpal-tunnel syndrome (CTS)
Low back pain

Goals of Ergonomics Reducing the risks of musculoskeletal disorders (MSDs).

Improving worker safety.
Increasing worker comfort.
Minimize worker fatigue.
Improving the quality of work.

For prevention of musculoskeletal disorders following points need to be considered

a) Handling of instruments b) Handling of equipments c) Work postures

Work Posture . Importance of posture Human spine has four natural curves; cervical lordosis, thoracic kyphosis, lumbar lordosis & sacral kyphosis. The lumbar lordosis flattens when sitting in an awkward unsupported posture frequently for a long time. The bony infrastructure provides little support to the spine causing tension, strain & trigger points. Therefore, proper working posture is important in maintaining the cervical lordosis in stable position.

Correct working postures: (Yamalick, 2007)

Maintain an erect position.
Use an adjustable chair with lumbar, thoracic & arm support.
Work close to your body.
Minimize excessive wrist movements.
Avoid excessive finger movements.
Alternate work positions between sitting, standing & side of patient.
Adjust the height of your chair & the patient's chair to a comfortable level.
Consider horizontal patient positioning.
Check the placement of the adjustable light.
Check the temperature in the room.

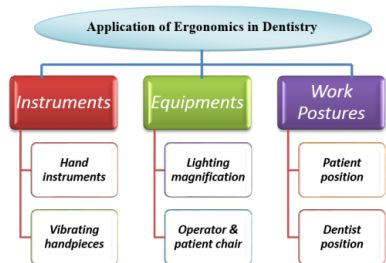


Fig .1

Patient positioning Supine positioning of the patient in the chair is usually the most effective way to help to maintain neutral posture. The patient must lie comfortably without feeling pressure from the back.

Operator position The clinician's access to the oral cavity should be truly unimpeded. The operator should be able to move freely the legs beneath the patient's head & headrest to avoid twisting or forward bending of the torso. 7 to 12:30 o' clock position is preferred for the right handed operator, & 12:30 to 5 o' clock for the left handed operator.

Dental operating light Lighting provides good shadow free,

even, color-corrected illumination to the operating field leading to increased visibility & accessibility to the operator. The light source should be in the patient's mid-sagittal plane. The dental operating light must be able to be positioned around the head of the dentist, before & sideward so that the light beam is running parallel to the viewing direction, with a maximal deviation of approximately 15°, in all positions around the patient chair from which a dentist treats patient.

Magnification Magnification allows to maintain a greater working distance, improve neck posture by helping the clinician prevent leaning forward towards the patient & provides clearer vision. Dental loupes, operating telescopes & microscopes are available for magnification systems. Using such equipments lets the dentist focus the eyes specifically on operating field. There is no need to flex the neck, upper spine, and lower back to improve visibility.

Patient chair The goal is to promote patient comfort; maximize patient access. Look for: 1. Chair with a flat surface. 2. Stability. 3. Pivoting or drop-down arm rests. 4. Headrest & neck support. 5. Wrist/forearm support.

Operator stool The goal is to promote mobility and patient access; accommodate different body sizes. Look for: 1. Adjustable lumbar support. 2. Seat height adjustment. 3. Adjustable foot rests. 4. Wrap around body support 5. Seamless upholstery

Types of operator stool: Saddle stools, Brewer operator stool, Posiflex stool, Kobo chair. Saddle style stools maintains the lumbar curve of the lower back by increasing the hip angle to 130° and placing the pelvis in a more neutral position. It is ideal for confined operatory spaces.

Stretching & exercises

Regular exercises, stretching, relaxation techniques (meditation, biofeedback & yoga) helps prevent injuries & combat stress thereby improving the quality of life. Body Strengthening Exercises (Valachi & Valachi, 2003) [7]

Stretching & strengthening the muscles that support the back & neck and those used in the forearm, wrist, and hand will help them remain strong & healthy.

- B. Periodic stretching throughout the workday.
- C. Resting hands frequently is believed to be one of the most important factors in preventing CTS.
- D. To relieve eyestrain caused by focusing intensely at one depth of vision for long periods, look up from the task & focus eyes at a distance for approximately 20 seconds.
- E. Move the head down slowly & allow the arms & head to fall between the knees; hold for a few seconds; raise slowly by contracting the stomach muscles & rolling up, bringing the head up last.
- F. Try head rotation for neck stiffness. Head rotation involves tilting the head from right to left, as well as forward & backwards without forcing the motion beyond a range of comfort.
- G. Shoulder shrugging can be used to stretch the shoulder muscles that may be stressed from holding oral evacuator, instruments and telephone handset. Pull the shoulders up towards the ears, roll them backward & then forward in a circular motion.



Fig:2



Fig:3

CONCLUSION

The successful application of ergonomics assures excessive productivity & avoidance of contamination & accidents. It's miles crucial to locate the chance factors & put into effect the ergonomic strategies. A balanced musculoskeletal health will enable the dentist for a longer, healthier careers, more secure places of work & prevent msds.

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