



Ergonomics in Dentistry: A Review

Rachana Negi, PuneetaVohra, Astha Chaudhry, Monika Singh, Shruti Vijay and Priyanka

Oral Medicine and Radiology, Faculty of Dental Sciences, SGT university

ABSTRACT

To increase working potential of dental practitioners for long time and avoiding early retirement from this profession ,it is necessary to maintain a safe and favourable working condition to increase the efficiency and productivity without deteriorating health of the dentists. Ergonomics mainly deals with arranging and adjusting work environment and things according to people to make them work more safely and efficiently rather than making them to adjust in present conditions. Present review discuss about implementation of ergonomics in dentistry and how it helps to avoid muscle related disorders faced by dental practitioners that leave them with long term disability.

Keywords : *Ergonomics , Dentists , Musculoskeletal disorders*

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INTRODUCTION

The dental profession demands special skills to perform various procedures with great precision and control over the muscles making it tiresome and discomforting for the dentist. Due to limited work area and need to maintain a particular posture for long time, dentists are more prone to muscle and joint related disorders. To increase the efficacy and working potential of practitioners for long time , it is necessary to maintain a safe and favourable working conditions that will ultimately raise the productivity bar. Here the scope of ergonomics comes into play that mainly aims to establish a secure and comfortable ambience for dental practitioners to work that will increase their productivity and prevent development of muscle related disorders .(1) deals with arranging and adjusting work environment and things according to people to make them work more safely and efficiently rather than making them to adjust in present conditions.(2,3) The International Ergonomics Association defines ergonomics as scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. The term ergonomics is derived from the Greek words- ergon means work and nomos means natural laws.(4)Jobs requiring continuous forceful exertion of hands and body like pulling ,lifting heavy objects ,sitting in awkward posture for long put workers at risk of developing work related muscle disorders .The most common reason among dental professionals to retire

early was found to be musculoskeletal disorders that bring their working capability down making them leave practice before they actually wanted to.(3)

Ergonomic Injuries

The continuous biomechanical stress to muscles and joints of hand ,wrist, elbow ,shoulder ,neck and back give rise to group of health disorder called cumulative trauma disorder (CTD). Most common CTD affecting dental practitioners are carpal tunnel syndrome (CTS) , low back pain and cervical spondylitis .CTS is mainly due to compression of median nerve due to excessive pressure in carpal canal for long duration. (4,5)

Musculoskeletal disorders (MSDs): Musculoskeletal disorders involves a group of inflammatory and degenerative disease of muscles ,nerves and tendons that causes pain and dysfunction of affected part of body with neck ,back, shoulder and hands being mostly involved. Individuals with MSDs shows pain ,swelling ,numbness, fatigue of muscles along with hypersensitivity in hands and fingers.(2) Dental practitioners commonly face lower back pain and pain in hand and wrist. Lower back pain is generally aggravated because of excessive flexion of lumbar which is further deteriorated by weak abdominal muscles and inflexibility around pelvis region. Detrimental effects on hand and wrist is due to long, repetitive ,forceful work without rest in between that put wrist in unbalanced position.(3)

Cardinal Sign and symptoms of MSDs;

- Dextral motion is decreased .
- Numbness and tingling sensation in hands and fingers.
- Decreased strength in hands causing lose grip on instruments and clumsiness.
- Uncoordinated movements .
- Shoulder and neck muscle fatigue .(3,5)

Why Dentists Are At Higher Risk For MSDs ??

Factors attributed to development of musculoskeletal disorders among dentists ranges from wrong posture ,increased and repetitive motions for long duration, use of power driven instruments to psychological pressure of doing meticulous work without rest. Following factors are categorized as risk for higher incidence of MSDs among dentists:

1. To coordinate between having optimum view of patient while operating, to have proper access to instruments ,dealing with assistant without causing discomforting to patient ,dentist often bend or twist around knees, and hips putting spinal disc under stress compared to when they sit with back straight (3)Inadequate lightning may lead to wrong back and neck positions causing pain due to deviated balance of body causing muscle strain. Continuous motion of dexterity for long time without rest causing muscle fatigue.(2).
2. Task requiring more force place excess load on muscles and joints making them strained. This force is increased if instruments are more slippery or with small handles that make it difficult to grasp them .(3)
3. Performing same task repeatedly for long duration causes both localized and generalized muscle weakness and requires more recovery time.(3)
4. Prolonged contact with hard or sharp objects put pressure in particular area causing decreased blood flow in that area and interfere with nerve function leading to contact stress specially in fingers and forearm . Power driven tools causing continuous vibratory motions has similar effects.(3)
5. The psychological pressure and stress to perform surgeries diligently with no or minimum rest has significant effect on musculoskeletal system .(3)

Role Of Ergonomics In Enhancing Working Life Span Of Dentists

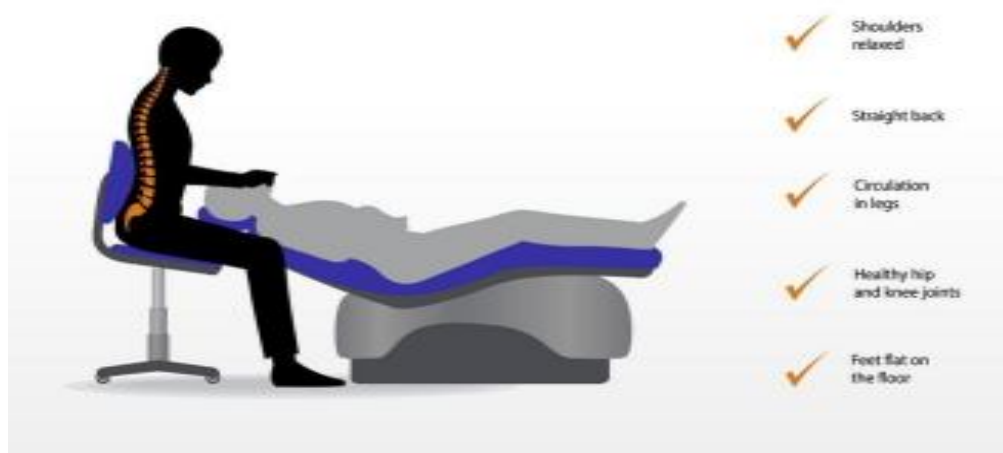
Ergonomics should be implemented clinically by designing proper work field ,instrument selection and maintaining flexibility around hand and lower body joints that will prevent early onset of MSDs among dental professionals . Ergonomics aims at smooth work flow with better productivity and improved health and quality of life of practitioners.(6) Following strategies will help to achieve ergonomic principles in dental operatory :

1. Body posture should be kept erect and symmetrical to avoid undue pressure on nerves , blood vessels and muscles that put them under strain. Thighs should be kept sloping rather than parallel to floor as it helps to maintain normal low back posture decreasing muscle strain. Proper height of dental chair and its distance from the operator chair should be maintained to avoid excessive forward inclination allowing free movement of legs below it .(2) Try to change positions in between by alternate sitting and standing to prevent ischemic conditions in localized muscles.(3)
Correct working posture includes (7)
 - Sitting upright
 - Shoulders sloping down and relaxed
 - Slightly raised forearm and arm placed close to body
 - Legs slightly separated with Upper and lower leg having 105-110 degree angulation. • Foot parallel on floor
 - Upper half of body at right angle to seat and forward bending with spine inclination. (Figure 1: Dental Ergonomic Posture)
2. Prefer supine position of patient while working on maxilla and semi-supine for mandible as it maintains balanced posture. Dental chair should be above operator's thigh to allow free movement below it. Area around patient's head should be clear to allow easy access to oral cavity without straining back or neck muscles. (3)
3. Working table should include adjustable Operator's chair with lumbar ,thoracic and arm support, proper light , comfortable and smooth surface edges and easy accessible instrument table. Operator's chair should have backward inclination of 120 degree with lumbar support of 5cm to reduce pressure on lower back .(4)armrest with adjustable height ensure distribution of stress on back, neck and shoulders without making any single of it overstressed.(4)
4. Instrument selected should be light in weight and preferably automatic rather than manual with cutting instruments being sharp rather than dull or blunt so as to avoid placement of additional

force.(2) Round handles with rough edges preferred than smooth edges as they provide better friction and less nerve compression .Handpiece with short hose length and rotatory barrel system allows minimal efforts while operating them (3)

5. Proper illumination should be shadow free , sufficient and directed towards midline of patient above and little behind the oral cavity. It improves work quality without putting operator's body under strain when used along with dental loupes and microscope that facilitate magnification of area of interest.(2)
6. Appointments should be scheduled to avoid continuous muscle fatigue by alternating between short and long duration procedures with minibreaks in between hectic work period allows body muscles to rejuvenate and transfer loads from one group of muscles to other.
7. Proper utilization of four -handed dentistry with ergonomically designed chair ,instruments and well planned treatment helps in rendering ideal dental service to patients.(2)

Figure 1: Dental Ergonomic Posture



CONCLUSION

Principles of ergonomics needs to be inculcated in dental practice to ensure high productivity , decreased health problems and better patient satisfaction. Every aspect of workplace starting from dental chair , operator's chair , instruments ,short breaks between appointments , work schedule should follow the ergonomic principles .Awareness regarding sitting postures , correct patient positioning ,stretching excercises and to evaluate any signs of muscle related disorders should be provided to dental professionals to avoid early withdrawal from practice.Aim of ergonomics in dentistry is to make practioners work smarter and not harder to enhance their working life in this profession.

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