Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/17112
DOI URL: http://dx.doi.org/10.21474/IJAR01/17112

REVIEW ARTICLE

ERGONOMICS IN ENDODONTICS-A REVIEW

Dr. Krishna Prasada L.[1], Dr. Naveen Kumar K.[2] and Dr. Sayoojya M.[3]

1. Headof Department, Department of Conservative Dentistry and Endodontics, KVG Dental College and Hospital Sullia, D.K.
2. Professor, Department of Conservative Dentistry and Endodontics KVG Dental College, Sullia D.K.
3. Post Graduate Student, Department of Conservative Dentistry and Endodontics KVG Dental College, Sullia D.K.

Manuscript Info

Manuscript History
Received: 20 April 2023
Final Accepted: 24 May 2023
Published: June 2023

Key words:-
Ergonomics, Endodontist, Musculoskeletal Disorders

Abstract

Ergonomics is a prime area which is often neglected and goes unnoticed always. Dentist are always prone to musculoskeletal disorders due to their improper working postures and indirect vision.Among dentist itself Endodontistface a great difficulty.Ergonomics if applied properly prevent majority of occupational disorders.This article provide light into risk factors faced by dentist and the role of ergonomics to solve it which provides better health to clinician which in turn leads to better treatment and both clinician and patient satisfaction.

Introduction:-

"GOOD HEALTH IS NOT SOMETHING WE CAN BUY. HOWEVER, IT CAN BE AN EXTREMELY VALUABLE SAVINGS ACCOUNT." – ANNE WILSON SCHAEF. "

Every dental professional must operate in the proper posture and form in order to maintain appropriate form, function, and health[1].Dentists work in positions that expose them to long-term static muscle stresses, with more than half of the body's muscles being contracted statically (Morse et al. 2003; Valachi & Valachi 2003a). Additionally, most dentists assume uncomfortable postures while performing dental procedures (Al Wazzan et al. 2001), which puts undue strain on their muscles and joints (Kerosuo et al. 2000; Marklin & Cherney 2005).These positions, either by themselves or in combination with strong prehension (grasping/holding) pressures, instrumentation, vibration from ultrasonic instruments and dental hand pieces as well as limited time for recovery predispose to the development of MSDs (Finsen et al. 1998)2

According to research injuries occurs frequently to wrists, elbows, shoulders, neck, and back and spine. In modern era dental professionals and dentists are frequently linked to complex illnesses like Carpel tunnel syndrome, sciatica, tendinitis, and tension neck syndrome [3–4].A comprehensive study found that general musculoskeletal pain can affect 64–93% of dentists, beginning subtly in new dentists and progressing over time[5,6,7.]

Ergonomics can be defined as an applied science concerned with structuring and organizing things commonly utilized by individuals with the goal that both people and things connect most efficiently and securely.[8.]Dentistry is a job that requires a lot of physical work and repeated motions, both of which increase the risk of acquiring musculoskeletal disorders (MSDs).[9]

Corresponding Author:-Dr. Sayoojya M
Post Graduate Student, Department of Conservative Dentistry and Endodontics KVG Dental College, Sullia D.K

This article reviews several musculoskeletal conditions affecting Endodontist.

Objectives of Ergonomics [19]
Lowering the dangers of MSDs (musculoskeletal disorders).
Increasing worker security.
Improving worker comfort.
Cut down on worker tiredness.
enhancing the calibre of the work.

Definition - Musculoskeletal disorders (MSDs)
MSDs are "work related disorders of the musculoskeletal system having chronic gradual onset involving muscles, tendons, ligaments, joints, nerves, cartilage and spinal discs" [7]

They are also referred to as repetitive motion injuries (RMI) or cumulative trauma disorders (CTDs). Being the second-leading cause of disability, MSDs are a growing healthcare issue worldwide.

MSD Affecting Endodontists
Various musculoskeletal conditions can take different shapes. The primary MSDs that endodontists must deal with are briefly described in this article. According to the research conducted by Mathangi Kumar, Endodontists experienced the most musculoskeletal discomfort among dental specialties (88.02%), followed by oral surgeons.[17] Similar findings were made in China by Kierklo et al., who found that endodontists (92.6%) and periodontists (90.76%) were the two specialties most frequently afflicted by musculoskeletal problems. [18]

Back Issues
A lower back ache
One third of patients continue to experience persistent, recurrent, or intermittent pain after their first episode, and between 70 and 90% of persons experience recurrent episodes of pain. Although the causes of LBP are frequently complex, lumbar flexion and rotation together raise the danger to the lumbar disc. This is made worse by rigidity in the hips and pelvis area as well as the relative lumbar spine stabiliser's weakness, which includes the gluteal and abdominal muscles. Additionally, back pain exist as a result of improper postures, relative weakness, and decreased endurance, which are subsequently made worse by a "specific" injury.

Middle Back Pain
Although it is less often than lower back pain, some people have severe pain in their mid- and upper back. The thoracic spine is quite sturdy and made to support the body while standing as well as house the critical organs. Given its extreme stability and lack of movement, degenerative signs only occasionally manifest in this organ. Muscular ache from the scapular and postural muscles is likely a more common source of midback discomfort.[11]

The Normalistic Spinal Curves
Standing positions have four natural curves in the spine. Features that may be seen from the side include the sacral kyphosis, lumbar lordosis, thoracic kyphosis, and cervical lordosis.

Due to years of bad posture that involved keeping the neck and head in an imbalanced forward position to improve visibility during treatment, forward-head postures are widespread among endodontists [12].The muscles of the cervical and upper thoracic spine must constantly contract to maintain the weight of the head in the forward position since the vertebrae can no longer support the spine effectively in this position.[13] This may lead to a discomfort pattern known as tension neck syndrome as a result.

Muscle imbalances brought on by a forward-head posture might also result in rounded shoulders.[14].The lumbar lordosis flattens when seated unsupported, a posture that is frequently used in dentistry. The skeletal infrastructure offers little. support to the spine, which is now dangling and straining the muscles, ligaments, and connective tissue at the rear of the spine. Ischemia may result, resulting in trigger points and low back discomfort. [15]

Wrist and Hand Issues
Constant wrist and finger flexion and extension movements are a major contributor to repetitive motion hand diseases. The most harmful movements appear to be long-term, repeated ones of the hand and wrist, particularly

when the hand is in the "pinch" position. Other major risk factors for hand and wrist injuries include motions that cause the wrist to move out of its neutral position and into an aberrant or awkward position, working without breaks for extended periods of time, and mechanical stresses or alternating the use of the hand and forearm muscles, and mechanical stresses to the digital nerves from prolonged grasps of sharp edges on instrument handles, forceful work, and prolonged use of vibratory instruments. The following are a few of the prevalent hand and wrist ailments: [16]

- Tenosynovitis/tendinitis
- DeQuervain's illness
- Carpal Tunnel Disorder
- Guyon's disease.

Risk factors for endodontists to develop MSDs [2]

1.**Incorrect postures**

During dentists' attempts to gain direct view to the treated teeth, awkward postures are frequently adopted, for example flexion and/or inclination of the neck and spine. These postures are associated with an elevated incidence of headaches (Rundcrantz et al. 1990) and MSDs in the upper extremities (Diaz-Caballero et al. 2010).2

2.**Studies on gender** have shown that women are more likely than men to experience these things.

3.**Number of patients treated each day**-As the number of patients grew, so did mental stress, physical exhaustion, and the risk of MSD.

4.**Lack of four-handed dentistry**: Kilpatrick (1971) discovered that when a dentist worked without a dental assistant, their level of physical stress increased and their productivity dropped by 16–70%.

5.**Improper lighting**

It is thought to affect work posture negatively and is connected to the prevalence of headaches.

Prevention

1. Operator - patient positioning: Operator positioned with feet flat on the floor and thighs parallel to the floor. Making dental assistants sit with the footrest on the stool, 10-15 cm (4-6 inches) higher than the operator;

-When operating on the maxillary arch, the patient is fully reclined, with the mouth at the operator's elbow level and at a 20-degree angle when working on the mandibular teeth. [20]

-The most common position used during endodontic operations was 12 clock position.

-The 12 o'clock position is optimal when using a microscope.

2.Use of saddle seats

Use of ergonomic saddle seat is beneficial in correcting the dental workers posture by facilitating a neutral lumbar spine posture. Such a neutral posture is obtained through positioning the lower lumbar spine to slight anterior tilt and slight lumbar lordosis, while relaxation of the thoracic spine is maintained.

When operating on the maxillary arch, the patient is fully reclined, with the mouth at the operator's elbow level and at a 20-degree angle when working on the mandibular teeth. [20]

The most common position used during endodontic operations was 12 0'clock position.

The 12 o'clock position is optimal when using a microscope.

The use of an ergonomic saddle seat helps to promote a neutral lumbar spine posture, which is helpful in improving the posture of dental professionals. This neutral posture is achieved by maintaining thoracic spine relaxation while slightly anterior tilting and slightly lordoticing the lower lumbar spine. This position is said to promote musculoskeletal health and reduce back pain.

3.Use of Loupes

Loupes appear to lessen shoulder strain and enhance working posture. It has been hypothesized that using a saddle seat and magnifying glasses combined has an additive impact.Adding fibre optic lighting to a headpiece or a pair of loupes boost your visual acuity. These headlamps can intensify the light up to four times as much as the conventional dental overhead lighting. Shadowing is less likely since the light is situated in the middle of the forehead, where it is closely aligned with the optical path. Improved vision will lessen the need for prolonged neck flexion or shoulder erecting. Additionally, it enhances the cavity preparation and dental care quality.[21]

4.Utilising a microscope

A clinician's capacity to see even the smallest features inside a patient's tooth is significantly improved by the operating microscope. The dental microscope can magnify images up to 25 times larger than those seen with the unaided eye, making it useful for both diagnosis and therapy.22Amongst the magnification systems, the operating microscope allows for the highest magnification and promotes the most neutral postures by design (Valachi & Valachi 2003b) 2

5.Proper size & fit of gloves

Gloves must be of proper size, lightweight, and adaptable. A probable cause of carpal tunnel syndrome, ill-fitting gloves can hurt the hands, especially the base of the thumb. [19]

6.Micro breaks

The operator can take a break to avoid straining their muscles and to enable recovery time for the affected structures. A 30-second microbreak could improve the dentist's productivity and efficiency.

7.Scheduling

Scheduling allows enough downtime to prevent long-term muscle tiredness. Potential tactics include varying the procedures during the same appointment and shortening the patient's recollection interval.

8.Exercises & stretching

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)

A. Stretching & strengthening the muscles

They will help muscles stay strong & healthy by using muscles in the back & neck, as well as the forearm, wrist, and hand.

B. Periodic stretching throughout the workday.

C. One of the most crucial elements in preventing CTS is constantly resting the hands.

D. Look up from the task and focus your eyes for about 20 seconds at a distance to relieve eyestrain brought on by prolonged, intense focus at one depth of vision.

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. To treat stiff necks, try rotating your head. The head may rotate by tilting both forward and from right to left.
& in the opposite direction without pushing the motion past what is comfortable.

G. Shoulder shrugging is a technique for stretching shoulder muscles that may be tight from holding an oral syringe, equipment, or a phone. Roll the shoulders in a circular motion backward, then forward, pulling them up towards the ears.

Conclusion:-

The effective use of ergonomics in dentistry, particularly in endodontics, aids in the prevention of musculoskeletal problems and promotes operator health, which ensures high productivity and greater patient satisfaction. Ergonomics should be included as a part of dental curriculum as the budding dentists should be aware about the proper sitting postures and the consequences if they don't follow it .

References:-

1.Gupta A, Bhat M, Mohammed T, Bansal N, Gupta G. Ergonomics in dentistry. Int. J Clin. Pediatr. Dent. 2014; 7:30-34.

2. Zarra, T., & Lambrianidis, T. (2014). Musculoskeletal disorders amongst Greek endodontists: a national questionnaire survey. International Endodontic Journal, 47(8), 791–801.

3.Lindfors P, von Thiele U, Lundberg U. Work characteristics and upper extremity disorders in female dental health workers. J Occup. Health. 2006; 48:192197.

4. Bernard BP, Putz-Anderson V. Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back; U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health: Cincinnati, OH, USA, 1997.

5. Hayes M, Cockrell D, Smith DR: A systematic review of musculoskeletal disorders among dental professionals. International journal of dental hygiene 2009, 7 3:159–165.
6. Abduljabbar A: Musculoskeletal Disorders among Dentists in Saudi Arabia. In: 2008; 2008. 61.
7. Rising DW, Bennett B, Hursh K, Plesh O: Reports of body pain in a dental student population. Journal of the American Dental Association 2005, 136 1:81–87
8.Sachdeva A, Bhateja S, Arora G. Ergonomics in dentistry: A comprehensive review. Journal of Dental Research and Review. 2020 Jan 1;7(1):32.
9 .Das H, Motghare V, Singh M. Ergonomics in dentistry: Narrative review. Int J Appl Dent Sci. 2018;4(4):104-.
10.Nordander C, Ohlsson K, Åkesson I, Arvidsson I, Balogh I, Hansson GÅ, et al. Risk of musculoskeletal disorders among females and males in repetitive/constrained work. Ergonomics. 2009; 52:1226-1239.
11 Ergonomics in Dentistry Anshul Gupta, Manohar Bhat, Tahir Mohammed, Nikita Bansal, Gaurav Gupta
12. Saunders H, Saunders R. Evaluations, treatment and prevention of musculoskeletal disorders. Vol. 1. Chaska, Minn.: Educational Opportunities; 1995:7.
13. . Hertling D, Kessler R. Management of common musculoskeletal disorders: Physical therapy principles and methods. 3rd ed. Philadelphia: Lippincott; 1996:551-2.
14. Valachi K, Valachi B. Mechanisms leading to musculosketetal disorders in dentistry. JADA 200
15. VALACHI, B., & VALACHI, K. (2003). Preventing musculoskeletal disorders in clinical dentistry. The Journal of the American Dental Association, 134(12), 1604–1612
16.Ergonomics in Dentistry 1 Anshul Gupta, 2 Manohar Bhat, 3 Tahir Mohammed, 4 Nikita Bansal, 5 Gaurav Gupta
17.Occupation-related musculoskeletal disorders among dental professionals
Mathangi Kumar, Keerthilatha M Pai, Ravindranath Vineetha
18. Kierklo A, Kobus A, Jaworska M, Botuliński B. Work-related muculoskeletal disorders among dentists - a questionnaire survey. Ann Agric Environ Med. 2011;18:79-84.
19. Ergonomics in dentistry: Narrative review
20.Chopra A. Musculoskeletal disorders in dentistry - a review. JSM Dent. 2014;2:1032.
21.The role of ergonomic saddle seats and magnification loupes in the prevention of musculoskeletal disorders.A systematic review
22.Microscopes in Endodontics.