

Importance of Ergonomics in Dentistry

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ABSTRACT:

Occupation related problems can be prevented by increasing awareness about the posture, by workstation redesigning to promote neutral positions and following health work practices to decrease the dental work stress. In Greek, “Ergo” means work and “Nomos” means natural laws or systems. Ergonomics considers capabilities and limitations of the workers to ensure that information, environment and equipment suit each other. Hand instruments with round handle when compared to hard edged hexagonal handle, reduced the muscular stress and compression of digital nerve. Good quality mouth mirrors when used appropriately will be able to prevent awkward body positioning and maintain a neutral working posture. Use of dull, scratched mirror surface can cause strain to the eyes. Gloves of proper size and fit should be selected for each dental healthcare worker, as it is a potential contributor to Carpal Tunnel syndrome. Practice of four handed dentistry maintains a position around the operating field with limited hand, arm and body movements. They move the fulcrum to the elbow, hence moving the workload to the smaller motor muscles for precision work. Dental professionals are prone to unique muscle imbalances and require special exercise and ergonomic interventions to maintain optimum health during the course of their career.

Keywords: Dentistry, Ergonomics, Musculoskeletal disorders, Occupation, Working posture.

INTRODUCTION:

Every profession has an occupational environment which has certain risk and hazards associated with it. Studies showed that dentists report worst health problems when compared to other medical professionals.¹ Occupation related problems can be prevented by increasing

awareness about the posture, by workstation redesigning to promote neutral positions and following health work practices to decrease the dental work stress.² In Greek, “Ergo” means work and “Nomos” means natural laws or systems. Ergonomics considers capabilities and limitations of the workers to ensure that

information, environment and equipment suit each other.³ The scope of ergonomics in dentistry is large, it includes chemistry between dental team to lighting, noise, odour conditions and software using. Ergonomics can be defined simply as the study of work. More specifically, ergonomics is the science of designing the job to fit the worker, rather than physically forcing the worker's body to fit the job.⁴ Ergonomic hazards which cause musculoskeletal strain can be reduced efficiently and effectively through improvements in workstation engineering. In dentistry, scaling, root planning and endodontic procedures contribute greatly to musculoskeletal disorders.⁵ The most favourable way to provide dental service ergonomically is the four handed dentistry, since it minimizes the undesirable movement of the operating team.⁶

Advantages of following Ergonomic Principles in Workplace⁷

Providing a workplace free of ergonomic hazards helps to:

1. Lower injury rates as MSD incidences go down
2. Increase productivity by making jobs easier and more comfortable for workers
3. Improve product quality because fewer errors will be made when using automated processes that demand less physical effort
4. Reduce absence because workers will be less likely to take time off to recover from muscle soreness, fatigue, and MSD-related problems
5. Reduce turnover as new hires are more likely to find an ergonomically designed job within their physical capacity
6. Lower costs as workers' compensation and other payments for illness and replacement workers go down

7. Improve worker safety, increase worker comfort, reduce worker fatigue and improve worker morale

Ergonomic Guidelines for a Dental workstation

Hand Instruments⁸

There is no ergonomic standard currently existing for instruments. Hand instruments with round handle when compared to hard edged hexagonal handle, reduced the muscular stress and compression of digital nerve. The shallow circumferential grooves and knurling in the instrument handles provides better friction with the fingers, so that less force is required for the secure grasp without compromising on tactile sensation. Instruments with sharp edges perform better work with less effort during instrumentation. Instrument handles with large diameter and with lighter weight diminish the load on muscles. Instruments manufactured from carbon steel with tungsten carbide cutting edges could be more efficient. Overused burs and files should be discarded timely. Preferably, lightweight, cordless hand pieces with inbuilt light sources should be used.

Automatic Instruments⁸

Instead of manual hand instruments, practitioners should consider the use of automatic instruments like high speed hand pieces, slow speed hand pieces, belt driven drills, lasers, ultrasonic scalers and endodontic hand pieces.

Dental Mirrors⁸

Good quality mouth mirrors when used appropriately will be able to prevent awkward body positioning and maintain a neutral working posture. Use of dull, scratched mirror surface can cause strain to the eyes. So it is recommended to use scratch resistant, antifogging double sided mouth mirrors and compressed air to improve the clarity of operating field

which enhances the ability to appreciate colour and to differentiate texture of tooth coloured restoration. Mirror to handle angle is set at 45° and held in a vertical manner. Handle of the mirror is made lighter with slight ribbing parallel to the long axis of handle to facilitate rotational movements.

Gloves⁹

Gloves of proper size and fit should be selected for each dental healthcare worker, as it is a potential contributor to Carpal Tunnel syndrome.

Magnification⁹

Surgical magnification by using fixed microscopes mounted in ceiling or surgical loupes with lower magnification attached to a head band or mounted on operator's glass can drastically augment the visual competence.

Delivery System^{10,11}

Practice of four handed dentistry maintains a position around the operating field with limited hand, arm and body movements. From an ergonomic viewpoint, over the head and over the patient delivery system better allow the dental assistant to access the hand pieces for bur changes and other operations.

Operator chair ergonomic guidelines¹²

Goal: promote mobility and patient access, accommodate different body sizes.

Look for:

1. Stability (5 legged base w/casters)
2. Lumbar support
3. Hands-free seat height adjustment
4. Adjustable foot rests
5. Adjustable, wrap-around body support
6. Seamless upholstery
7. Hydraulic controls
8. Cylinder height
9. Adjustable backrest
10. Tilting seat pan
11. Textured seat material

12. Correct wheel type

13. Armrests (optional)

Patient chair ergonomic guidelines¹²

Goal: Promote patient comfort, maximize patient access

Look for:

1. Stability
2. Pivoting or drop-down arm rests (for patient ingress/egress)
3. Supplemental wrist/forearm support (for operator)
4. Articulating head rests
5. Hands-free operation
6. Small, thin headrest: Allows for greater leg room

Dental chair requirements¹³

1) Sitting with an angle of 110° or a little higher between lower and upper legs.

2) The seat is divided in 2 parts:

- A horizontal part at the rear for supporting the buttocks with a minimal length of 15 cm

- An oblique front part declining 20° *for an equal support of the thighs*

- Movable front part, an angle of more than 110° between lower and upper legs

3) The maximum depth of the seat shall be 40 cm and the width 40cm with a maximum of 43 cm.

4) A lumbar or pelvic support of 10 to 12 cm high that is adjustable vertically from 17-22 cm and for very tall dentists to 24 cm.

5) The pelvic support can rotate around a horizontal axis with an angle of 25° upwards and downwards.

6) The upholstery of the seat has to be sufficiently hard with a roughened surface. It has to be firm, depressing only slightly.

7) Support has to be given up to a point just before the elbow to maintain the agility of the underarm and hands.

8) Width of 10-12 cm and it being not too long.

Arm rests

Another key to reducing lumbar disc pressure is the use of armrests which decreases stress on low back, neck and shoulder.¹³ They move the fulcrum to the elbow, hence moving the workload to the smaller motor muscles for precision work. Armrest needs to be adjustable in height to assure that shoulders are not over stressed.¹³

CONCLUSION

Dental professionals are prone to unique muscle imbalances and require special exercise and ergonomic interventions to maintain optimum health during the course of their career. It is important to not only know what are effective interventions, but also in what sequence to implement them.

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