

An Insight into Ergonomics

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ABSTRACT

The term **Ergonomics** is used in the profession of dentistry. Ergonomics is an applied science concerned with designing products and procedures for maximum efficiency and safety. It involves many concepts such as the position of the patient and the dentist, utilization of equipments and the work area design all of which will have an impact on the health of dental professionals. It enhances the capability and the working efficiency of the dental professionals in providing care to the patients. The occupational diseases are increasing, and the major reason behind this is the improper ergonomics in dentistry. Repetitive strain injuries can be prevented by the proper ergonomic design. This review gives a bird's eye view about the basics of ergonomics, positioning, handling ourselves away from hazards and musculoskeletal disorders.

KEYWORDS: Musculoskeletal disorders, Ergonomics, Dentistry, Repetitive Strain Injuries

INTRODUCTION

Ergonomics (Human Engineering) is now a well recognized discipline and constitutes an integral part of any advanced occupational health service. *Ergonomics* simply means – “fitting the job to the worker.”

Training in ergonomics involves designing of machines, tools, equipments and manufacturing processing, layout of the places of work, methods of work and environment in order to achieve greater efficiency of both man and machine. The object of ergonomics is to –“Achieve the best mutual adjustment of man and his work, for the improvement of human efficiency and well-being”. The application of ergonomics has made a significant contribution to reducing industrial accidents and to the overall health and efficiency of the workers.¹

The term Ergonomics is used in many professions. Ergonomics is a discipline which involves many concepts. The health of dentists is affected by the improper ergonomics.

Ergonomics is concerned with designing products and procedures for enhancing the efficiency and safety of the dentists. Ergonomics takes account of the workers capabilities and limitations.

Musculoskeletal disorders are common health problems reported among dentists. Studies indicate that back, neck and shoulder or arm pain is present in up to 81% of dental operators (Bramson et al. 1998). The position of dentist and the positioning of the patient is incorrect while performing the dental procedures which leads to the development of MSDs. Musculoskeletal disorders are a group of conditions that involves nerves, tendons, muscles and supporting structures such as inter-vertebral discs.

Causes - Repeated unidirectional twisting of the trunks, working in one position, prolonged static periods and operators flexibility.

Symptoms – Pain and tenderness in the shoulder, neck and arm muscles

- Tingling of fingers
- Pain in the thumb and wrist area when grasping

MSDs in Dentistry: The Prolonged Static Postures (PSPs) can initiate a series of events that may result in pain, injury or a career-ending MSD. During treatment dentists exhibit awkward postures. Al Wazzan et al.2001 stated that 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. When the synovial fluid production is reduced due to prolonged static postures, it may lead to hypo mobility of the joints. Al Wazzan et al.2001 stated that it leads to spinal disc herniation and degeneration. Repetitive movements of neck and continuous arm and hand movements lead to neck and shoulder injury. Repetitive work leads to Carpal-Tunnel Syndrome (CTS). Shugars et al. 1987 stated that symptoms can appear from any activity causing prolonged and increased pressure (passive or active) in the carpal canal. Shugars et al. 1987 stated that dentists are burdened by anxiety, poor psychosomatic health and thus feel less confident with their future.

The set up of dental clinic and the postures exhibited by the dentists affect their health.

Improper workstation setup such as the dentist chair is high or low, inadequate ventilation and lighting. There are various postures that dentists take such as working on

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one side, excessive twisting, forward bending, shoulders flexed and abducted.

ROLE OF ERGONOMICS IN DENTISTRY

The most efficient and effective way to **overcome** “ergonomic hazards” is through engineering improvements in the workstation and this is the Ergonomic Standard mandated by *the Occupational Safety and Health Administration (OSHA)*

In dentistry, there are various factors which contribute greatly to the development of musculoskeletal disorders, stress and loss of productivity. The favourable way to provide dental services which minimizes undesirable movements of the operating team and enhances the effectiveness and efficiency of the dental procedures performed is the four handed dentistry. A multifaceted approach which includes preventive education, postural and positioning strategies, proper selection and use of ergonomic equipment and frequent breaks with stretching and postural strengthening techniques manages ergonomic hazards and the available research supports this.³

In future, further development of dental ergonomics must take place on the basis of a coherent vision of the future. Regular exercises, relaxation techniques such as meditation and yoga, proper nutrition along with proper ergonomics helps us combat stress, thus conserving the productive energy, thereby increasing comfort, improving the quality of life, ultimately leading to extended careers.⁴

The primary objective of Ergonomics is the prevention of MSDs. In dentistry, uncomfortable physical posture (Figure 1) contribute greatly to musculoskeletal disorders, stress and loss of productivity. Ergonomic hazards can be managed by the multifaceted approach.



Figure 1

Maintaining the low back curve when sitting can reduce low back pain (Figure 2). Decreased low back pain is associated with proper selection, adjustment and use of magnification systems that allow operators to maintain healthier postures. To attain maximum ergonomic benefits, dentists need to know how to adjust the features of their chairs. Standing and sitting alternatively can be an effective tool in preventing injuries. To perform dental procedures dentist should take the time to position their patients properly. Dentists should also position instruments within easy reach.

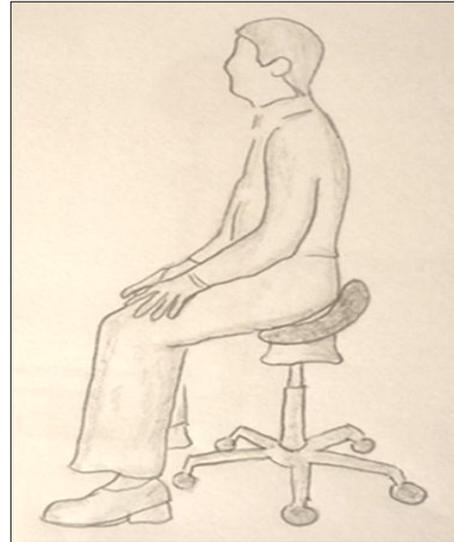


Figure 2

Dentistry incorporates strategies into practice to facilitate musculoskeletal health that will enable to increase productivity and prevent MSDs.

STRATEGIES FOR PREVENTION OF ERGONOMIC PROBLEMS IN DENTISTRY

There are various strategies which can be implanted to reduce ergonomic problems in dentistry. The following are the strategies :

- Postural awareness techniques
- Positioning strategies
- Periodic breaks and stretching
- Body strengthening exercises
- Hand exercises
- Neck exercises
- Back exercises
- Shoulder exercises

FUTURE OF ERGONOMICS IN DENTISTRY

Dentists are aware of ergonomic hazards and hence they are paying more attention to its prevention. The development of dental ergonomics must take place on the basis of a coherent vision of the future. For this, it must

be clear exactly what ergonomics is and what developments have already taken place. Ergonomics is associated with the prevention of occupational diseases, legal responsibility for protecting the health and safety of employees and students, education in dental ergonomics for dental students, the academic development and research of dental ergonomics, using organizational models in daily dental practice and the development of ergonomics at the global level.

CONCLUSION

Many dentists have experienced musculoskeletal pain in their shoulders and neck, hands and wrists, low back, or forearms and elbows. Further studies need to be conducted on the impact of dental work on the development of nerve and muscle pathologies, which would prevent dentists from providing the highest quality of service and could threaten their professional careers. The importance of following proper ergonomic principles should be emphasized so that these problems can be avoided.⁵

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