ERGONOMICS IN PERIODONTOLOGY: AN OVERVIEW

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ABSTRACT

Ergonomics plays a crucial role in maintaining the health, efficiency, and productivity of dental professionals, particularly periodontists who perform repetitive and precision-based procedures in confined oral environments. Prolonged static postures, improper seating, and inadequate instrument design often contribute to musculoskeletal disorders, fatigue, and reduced clinical performance. This paper provides an overview of ergonomics in periodontology, emphasizing its importance in preventing occupational injuries and enhancing operator comfort. Key aspects discussed include optimal operator–patient positioning, the use of ergonomically designed dental instruments, proper lighting, and the integration of magnification aids such as loupes and microscopes. Attention is also given to the psychological and environmental components of ergonomics, including stress management, workflow design, and clinic layout optimization. By adopting evidence-based ergonomic principles, periodontists can improve posture, increase efficiency, and extend the longevity of their professional careers while ensuring better patient outcomes. Understanding and applying ergonomic concepts in daily periodontal practice is therefore essential for sustaining both clinician well-being and the quality of dental care.

Keywords: Ergonomics, Periodontology, Musculoskeletal disorders, Dental ergonomics.

INTRODUCTION

Modern dentistry is associated with and exposed to new dental materialsand infectious diseases, such as Hepatitis B and C, and human immunodeficiency virus.

Previous studies suggest that a wide variety of workplace hazards arefound in dental practice. A survey conducted in Norway found that public healthdentists complained dermatoses (40 percent), eye, respiratory system complaints (13 percent) and musculoskeletal problems (3 percent).

It also showed that a significant percentage of practicing dentistscommonly experience substantial musculoskeletal pain associated with thedaily performance of dental procedures. The discomfort described most oftenoccurred in the lower back followed by the neck, upper back, shoulders andlegs. The percentage of dentists experiencing lower back pain was reported torange from one-third to one-half of the dental population. Fixed prosthodonticprocedures were cited as the dental activity most likely to produce musculoskeletal pain.

Musculoskeletal pain can affect the dentists performance in severalimportant ways, including limiting the number of patients seen per day decreasingfine motor dexterity and hampering dentists - patient rapport. It is proposedthat modification in the dentist's stool design might reduce lower back, neck andshoulder pain and therefore improve several facets of dentistry.

The traditional approach for prevention and management of dentalrelated musculoskeletal pain is to adopt a proper sitting posture, reduce largescale movements and engage in periodic stretching. The recommended sittingposition is one with feet flat on the floor, torso vertical and a 90° angle between thecalf and the thigh. It is suggested that the patients mouth should be only slightlyabove the dentist's elbow height. As evidenced by pain survey data, the concept ofproper sitting posture (whether utilized or not) has not eliminated pain in thedental community. This most likely results from the preference of many dentistsfor direct viewing during certain portions of procedures because of increasedspeed and/or accuracy. The unwillingness of many dentists to tilt the patients head oradjust the patients sitting angle also may contribute to strained musculoskeletal positions for the dentist.

Several ergonomic investigations conclude that the least strained sittingposition features an inclined backrest (130°), lumbar support and arm rests.

However, others claim a detrimental effect from arm support due to stain on the shoulder joint. Although an inclined backrest results in minimal muscleactivity and disc pressure, a significant problem arises when this position is used bythe dentist. It is unlikely that adequate viewing of the oral cavity could beobtainable from the inclined position without excessive neck strain.

THE PREVALENCE OF BACK PAIN AMONG DENTISTS

A study done by the British Dental Association in 1963, revealed that in asample of 2,288 dentists, 49% suffered from low back pain as compared to 10% ofthe valuable control group (RAF educational officers), of those dentists in

thestudy whose work was affected by low back pain. Thirty percent said that theirworking ours were reduced because of the symptoms, 62% said that their workwas affected and 77% said that mental irritability was created. Morris alsoclaims that one out of every two dentists has back pain.

In a study by Bassett, dentists in Toronto area were surveyed todetermine the lifetime incidence of back problem, it was found that 62.2% hadsuffered back and neck pain at sometime during their lives.

Hope-Ross and Corcornaninvestigated the incidence of pain and discomfort in 650 dentists of the Irish Dental Association. The incidence ofsymptoms experienced in various body locations was determined, it was found thatthe highest figure of incidence of symptoms was related to basic pain (in both upperand lower back), which 65% of respondent experienced.

In one particular study pain and discomfort among dentists in the PublicDental Service in Malmohus District and the municipality of Malmo wasfollowed prospectively. The number of dentists participated was. In thestudy, the prevalence of musculoskeletal pain and discomfort hadincreased. Excluding L.B.P. and headache. The only significant difference was\ found in respect to shoulders pain. In 1987 and 1990 female dentists have had ahigher prevalence of pain in the neck and shoulders area than their malecolleagues. In 1987, 49% were free of symptoms, while 24% of them reportedsymptoms in locomotor system later in 1990. In 1987 and 1990, 262 out of 311dentists have had symptoms. In 1987,24% were without symptoms at the follow upin 1990. Further in this study the influence of some ergonomic variablesshowed alone predictive value for recovery or for the development of pain anddiscomfort in the locomotor system.

After reviewing the prevalence of musculoskeletal problems in dentalprofessionals, it is important to look into the details of working environmentaland postural problem related with routine practice of dentistry.

"*Ergonomic is defined as a systematic approach to study the relationship between the individuals, their tools and the environment at work.*"

1 The Room (office, clinic):

Room should have a suitable area to allow free movement of the dentistduring work. Small dental area will minimize the movement of the dentistthrough out the treatment period.

2 Instruments:

The instruments should be close enough to the dentist hand reachable.

So it will minimize extreme flexion.

3 The Dentist Chair:

Should be movable, with back support and hand support. The chair cango up and down.

4 The Patient Chair:

Should be electronic, easy to be adjusted and comfortable to patient.

5 Time Period of Seeing the Patient:

The time period should be suitably distributed between work andrest. Dentist should have resting period during treatment and between eachpatient.

6 Assistant:

Dental assistant should be available if there is increase demand inthe work and if there are a large number of patients to be seen in short period oftime.

Faulty postures (extreme posture):

The following postures are related with musculoskeletal pain.

1 Kyphotic back

2 Hyper flexion

3 Hyper lateral flexion

4 Hyper rotation

Management

There are various approaches to treat musculoskeletal problems.Thefollowing are general guidelines observed successful in treating the abovementioned problems.

1 Health Care Consultation

If dentists have developed low back pain for the first time they shouldconsult:

A health care professional (family doctor)

A specialist physiotherapist

You should also seek advice if there are complications to your back pain:

a) If you have constant pain, which is referred into your leg all the way toyour feet.

b) If you have numbness or weak muscle.

c) If, in addition to the back pain, you feel unwell.

All these circumstances indicate the need to consult a health professional.

2 Relief Exercises

The exercises programme consists of seven exercisers:

The first four exercises are extension exercises; the last three are flexionexercises.

Extension means bending backwards and flexion means bendingforwards.

Exercise No. (1) Lying face down; (2) Remain face down; (3) Extension inlying; (4) Extension in standing; (5) Flexion in lying; (6) Flexion in sitting; (7)Flexion in standing.

The exercises manual can be seen with physiotherapist forpractice.

3 Medicine and Drugs

Most of the common back pains are mechanical in origin, drugs and medications are not capable or removing the causes of back pains.

Therefore, medication should be taken when pains are severe. The most common medications used are nonsteroidal anti-inflammatory drugs (NSAIDS), e.g., aspirin has been recommended by the US Federal Government Agency for health care policy andresearch.

4 Bed rest

When back pain is so severe that bed rest is required, you should restrict this period of rest, to two or three days.

5 Acupuncture

Acupuncture is capable to relieve pain. You should be aware, that youcan obtain relief from acupuncture but it does not correct the underlyingmechanical problem.

6 Electro-therapy: e.g., diathermy, ultrasound

These treatments provide no long term benefit and do nothing to threatthe underlying problem.

Despite decades of ergonomics research, work related musculoskeletal disorders, the singlemost expensive category of occupational health problems, remain a major problem for afflicted individuals, companies and societies.

Assessment of MSDs

MSDs are generally assessed by pain symptoms expressed by the worker. In most cases it is not possible to demonstrate any pathological changes in the tissues.

Thus, the doctor/physiotherapist must mainly rely on statements made by the worker.

Occupational MSD may be caused by mechanical (physical) exposure at work.

In addition, psychosocial factors at work may in themselves cause pain or modify the perceived pain level caused by the mechanical exposure.

However, it is often difficult to assess whether such work-related factors have actually caused the pain.

MSD may be due to an underlying disease not related to work, exposure occurring during leisure time, or advanced age which in itself increases the risk of experiencing pain in the musculoskeletal system.

General Recommendations:

1. When sitting for prolonged periods you must sit correctly with the low back in moderate lordosis. Whenever the seat has back rest you must usea lumbar roll to support the low back.

2. When sitting for prolonged periods, regular interuption of the sittingposture is essential to prevent the onset of pain. This can be achieved bystanding upright, bending backward five or six times and walking aboutfor few minutes.

3. When working in a stooped position, regular interuption of the bentposture is essential to prevent the onset of pain, this can be achieved byupright and bending backward five or six times.

4. When lifting, you should apply the correct lifting technique. In addition,you should stand upright and bend backwards five or six times immediately before and after each heavy single lift and also at regular intervalsrepeated lifting.

5. After vigorous activity you should restore and accentuate the lordosis bystanding upright and bending backward five or six times. When you sitdown to rest, you should maintain the lordosis and use a lumber roll toavoid slouching.

6. When standing for prolonged periods, you must stand correctly. Stand tall. Do not allow your back to sag into extreme lordosis. Frequentlystand tall.

Specific Recommendations

1 Patient chair should be placed at mid-sternal level.

2 Sitting position can be more appropriate for dental practice provided

that minimizes the time period.

3 The relationship between the knee to the patient chair should be at 90°.

4 Inclination angle should be minimized.

5 Using back support during treatment.

By practicising withcorrect postures the working capacity and productivity of dental professionalswill be enhanced. They can work in pain-free environment for quality dental care to their patients.

CONCLUSION:

In conclusion, ergonomics emphasizes that it is essential for preventing musculoskeletal disorders (MSDs), reducing fatigue, and improving overall well-being for practitioners, leading to enhanced precision, efficiency, and patient care. Key elements for a successful ergonomic approach include proper workstation setup with adjustable equipment, maintaining neutral postures, regular use of magnification, incorporating breaks, and integrating ergonomic training into dental education. Ultimately, ergonomics transforms dentistry from a potentially detrimental practice into a sustainable and healthier profession.

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