

## Current Considerations in Dental Ergonomics: Standards and Guidelines, Teaching and Prevention

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### Introduction

The dentist profession is related to the scientific literature as one of the most susceptible to occupational diseases. For having the peculiarity to deal in the oral cavity, to restrict access and limited view, this professional exerts postural invariabilities which can create inadequate conditions to work, making them vulnerable to occupational risks [1].

Studies indicate a prevalence of 60-93% of dentists which reports discomfort, pain or suffering some kind of musculoskeletal disease, being neck, shoulder, upper limbs and, mainly lumbar region the anatomical parts most affected. Those problems are arising from the posture inadequate in the exercise of the profession, because the professionals remain seated for hours performing repetitive movements forcing muscular and joint structures. Such situations expose the professional to significant risks not only biological, but also psychic and social [2,3].

Great efforts have been made in recent years to improve ergonomics on dentistry. As an example, the implementation of standards and guidelines ergonomics in clinical care and manufacturing of dental equipment's, as well as changes in the dynamics of dental ergonomics teaching in the universities and multi professional integration aimed at implementing of corporal practices in order to prevent possible physical or psychic injuries due to ergonomic conditions of the dentist work. The objective of this Short Commentary is to present current considerations on this theme, highlighting the main actions that have been developed.

### Standards and Guidelines in Dental Ergonomics: The Way to Adopt a Healthy Working Posture

It is indisputable that professional diseases may cause by mechanical agents and they are very important in dentistry. The proper ergonomics is the best method for eliminating them. The FDI (Fédération Dentaire Internationale) in partnership with ISO (International Standard Organization) are organizations that have promoted a restructuring to standardize dental work routines and also the manufacturing of dental equipments by the standards for the optimization of work e consequently promote health, comfort and safety for the worker [4].

With the purpose of explaining the way in different dental procedures can be performed in the oral cavity while maintaining a healthy posture, Hokwerda et al. prepared a reasoned review "Adopting a healthy sitting working posture during patient treatment" by considering the following documents "Ergonomic principles in the design of work systems", "Ergonomics-Evaluation of static working

postures", "Working postures and Movements". His study defines the requirements which must be respected to adopt a healthy posture while seated during the dental clinical care. This study is also an integral part of the draft "Ergonomic Requirements for dental equipment.

### Guidelines and recommendations for designing, constructing and selecting dental equipment

Among the requirements describes, we can highlight as fundamental to correct posture during the work the following items [5-7]:

- The angle between thigh back and calf, with the leg slightly stretched should be around 110°, or a little bit more.
- Sit on, symmetrically upright on the rolling stool seat, as far back as possible tilting the trunk to the front 10° to 20°, avoiding rotations and lateral inclinations.
- The head of the dentist may be tilted forward at maximum 25°.
- The activation pedal should be positioned close to the feet, so that it does not have to be set up laterally during the actuation.
- Upper limbs are at the side of the upper body remaining in front of the trunk with raised forearms about 10° up to maximum 25°.
- The workspace (client mouth) remains aligned from the front to the upper body, and the distance between the client mouth and dentist's eyes, or glasses, should be 35 or 40 cm.
- The work tools are positioned as far as possible within the professional's field of vision, at a distance of 20-25 cm.
- The light beam should be kept parallel to the direction of observation in order to reach the desired point near the dentist head and avoid positioning the light rectangle obliquely in the face of the patient.

To the dental practitioner, we suggest a thorough examination of these documents, because the show important points of proper posture during the clinical care to the patient and also fundamental ergonomic requirements which the equipment should have. Since this is a direct relation, that is, to adopt a proper posture, it is necessary that the equipment provide this condition, which is often neglected by manufacturers.

### Advances in the teaching of ergonomics in dentistry: promoting active learning methodologies

There is no doubt that knowledge by professionals about ergonomics has a great importance to the success and increasing of developed actions during the dental clinical care. However, the application of these ergonomics principles that identify, point out and modify postural inadequacies is necessary, being an effective way to

guarantee salubrity, safety, high performance, motivation and satisfaction on dentistry practice [8].

In this sense, the teaching of this discipline is fundamental in the training of the dentist. Due to lack of experience, the younger students or the professionals are becoming the greater risk of developing occupational diseases. This statement points to the urgency of teaching dental ergonomics [8].

Some brand new experiences on dentistry ergonomic teaching has been presenting great results, those studies showed that both students as dentistry professional are aware about ergonomics and your importance, but they do not used properly during work, what can justify, in part high levels of occupational diseases [9].

With the technological advent, audiovisual resources advanced and got more accessible and this has been contributing to the teaching improvement and consequently the adoption of proper posture during the clinical care. Filming and watching the posture during clinical care is providing a new pedagogical approach which increases the capacity of observation and detection of postural fault during clinical attendance, in real time, for inappropriate use of the equipment and dental instruments. Thus, the students can tempt to identify mistakes and come up with solutions [9].

Those strategies of teaching-learning, through the application of active teaching methodologies, contemplate group discussions and literature search for scientific articles that can provide great sensibility since it acts of reality lived being more powerful to obtain the necessary knowledge. This approach reaches four important dimensions of ergonomics: the conception-deals with the creation of work instrumentals, the correction-applied to real situations to solve the problems in the work process, the awareness-seeks to enable the professional to work on the principles, the participation-involves the worker seeking to solve problems observed during labor activity.

### **Labor gymnastics as a resource to prevent musculoskeletal disorders in dentists**

The development of dental equipment and instruments, designed to facilitate the professional work as ergonomic way, as well the strategic teaching of this discipline to acquire and apply those ergonomic essential concepts are factors which can minimize pain and diseases on professional, but hardly along the years' work on this professionally will be able to exclude completely this possibility [10].

Thus, the practice of labor gymnastics has been used as an alternative of physical activity to be incorporated into the dentist's daily routine in order to prevent possible musculoskeletal disorders of the work's origin. This kind of activity consists in practicing relaxation exercises and muscle stretching during the intervals of the workday aiming the compensation and functional balance, and also as a way to prevent and treat pain and diseases of occupational origin [11].

Labor gymnastics adapted to the needs imposed by the work, carried out without leaving the working environment, in brief periods of time during the workday are able to produce positive results. Using compensatory gymnastics, it is intended to increase the efficiency and pleasure professional, beyond motivation in the local work with awareness of practicing healthy attitudes and through improved conditions the regulatory laws are enforced [12].

Various labor gymnastics programs turned to dentists has been disclosed in the literature. Those programs are divided in three

periods: preparatory or warm up (before the working day); compensatory or distension (during the working day); and relaxation (after the working day). The benefits described on studies showed that these activities propitiates greater awareness of ergonomic postural habits during the work day and more disposition to do the work, enhance capacity to identify the postures which most overload the muscles and joints to avoid them; the importance to do postural changes along the clinical attendance, seeking out to avert static positioning and consequently, muscular fatigue [12].

To seek a professional help to guide an appropriate laboral gymnastic practice has been an important orientation to the dentists in the field of postural care related to work activity.

### **Conclusion**

The literature supports the association between the dentist postures on clinical attendance with the occurrence of musculoskeletal disturbances related to work, which is causing health damage; drop in productivity beyond advance shut down on career. The ergonomic is a science that has been progressing on dentistry and interfering beneficial in these situations. The FDI (Fédération Dentaire Internationale) in partnership with ISO (International Standard Organization) are organizations that have promoted a restructuring to standardize dental work routines and also the manufacturing of dental equipment's by the standards for the optimization of work consequently promote health, comfort and safety to the professionals. Improve the teaching process on dentistry ergonomic area it is an important aiming a better awareness and education of professionals. Labor gymnastics associated with ergonomic principles can minimize to the dentists, health disorders caused by occupational activities, improving their quality of life.

### **References**

1. Gupta A, Ankola AV, Hebbal M (2013) Dental ergonomics to combat musculoskeletal disorders: a review. *Int J Occup Saf Ergon* 19: 561-571.
2. Khan SA, Chew KY (2013) Effect of working characteristics and taught ergonomics on the prevalence of musculoskeletal disorders amongst dental students. *BMC Musculoskel Disord* 14: 118.
3. Shamim T (2017) Musculoskeletal disorders due to poor ergonomic practice in dentistry. *SJMMS* 5: 192.
4. Garbin AJ, Garbin CA, Diniz DG, Yarid SD (2011) Dental students' knowledge of ergonomic postural requirements and their application during clinical care. *Eur J Dent Educ* 15: 31-35.
5. Hokwerda O, Ruijter R, Shaw S (2006) Adopting a healthy sitting working posture during patient treatment. Groningen: NL.
6. Hokwerda O, Wouters JAJ, Ruijter RAG de, Zijlstra-Shaw S (2006) Ergonomic requirements for dental equipment. Groningen: Academisch Centrum Mondzorg Groningen.
7. [http://www.iso.org/iso/iso\\_catalogue/catalogue\\_tc/catalogue\\_tc\\_browse.htm?commid=51%20320&published=on&development=on&withdrawn=on&deleted=on](http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_tc_browse.htm?commid=51%20320&published=on&development=on&withdrawn=on&deleted=on)
8. Rovida TAS, Garbin AJI, Peruchini LFD, Machado ACBM, Moimaz SAS (2015) Dental ergonomics: integrating theory and practice for teaching improvement. *Revista da ABENO* 5: 37-44.
9. Leggat PA, Kedjarune U, Smith DR (2007) Occupational health problems in modern dentistry: a review. *Ind Health* 45: 611-621.
10. Gupta A, Bhat M, Mohammed T, Bansal N, Gupta G (2014) Ergonomics in Dentistry. *Int J Clin Pediatr Dent* 7: 30-34.

11. Kumar VK, Kumar SP, Baliga MR (2013) Prevalence of work-related musculoskeletal complaints among dentists in India: a national cross-sectional survey. *Indian J Dent Res* 24: 428-38.
12. Coury HJCG, Moreira RFC, Dias NB (2006) Evaluation of the effectiveness of workplace exercise in controlling neck, shoulder and low back pain: a systematic review. *Rev Bras Fisioter, São Carlos* 13: 461-479.