

# APPLICATIONS OF KINETOTHERAPY IN THE PROPHYLAXIS OF OCCUPATIONAL CERVICAL SYNDROME (OVERLOADING) AMONG PROFESSIONS WITH A MEDICAL PROFILE IN THE FIELD OF DENTISTRY - PRELIMINARY STUDY

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**Keywords:** occupational cervical syndrome, overload, dental professionals, kinetic interventional strategy  
**Abstract:** Professionals from different fields are exposed to myo-arto-kinetic disorders, among them those in the medical field with dental profile, respectively dentists, dental assistants and dental technicians. Given that specialists in the field of dentistry are exposed to musculoskeletal risk factors with cervical location, the purpose of this study is to provide data to contribute to an effective kinetic intervention strategy for professionals working in the field of dentistry.

## INTRODUCTION

Prolonged static occupational activity is widely perceived as a risk factor for myo-arthro-kinetic disorders, which have become among the most commonly diagnosed occupational diseases worldwide. Occupational myo-arthro-kinetic disorders correspond to a series of inflammatory and degenerative diseases that affect the musculoskeletal system, leading to subjective symptoms such as pain and sensitivity disorders caused by the mismatch between the physical requirements of the workplace and the physical capacity of the human body. Practitioners from different fields are exposed to myo-arto-kinetic disorders, among them those in the medical field with dental profile, respectively dentists, dental assistants and dental technicians. The prevalence of these disorders is high among dental professionals, manifesting itself especially in the cervical spine, shoulders and lumbar spine. In order to reduce the prevalence of myo-arthrokinetic disorders among dental professionals, a first step should be to identify the main risk factors to which these professionals are exposed in the workplace, so that strategies can be implemented to reduce the negative consequences.(1-6)

Occupational cervical syndrome is a common pathology, which involves destructive alteration of the joints of the cervical spine. Herniation of the intervertebral disc compresses and irritates the nerve roots, spinal cord or vertebral arteries, which will lead to stiff neck, radiated pain in the head, neck or arms, vertigo, with the slow progressive onset of spastic weakness in the legs.

Through the progressive anatomical and functional degradation of the cervical spine joints, the entire articular kinetic chain of the spine will suffer, thus leading to disability in static, dynamic and in carrying out professional and daily physical activities. These deficits, over time, reduce the person's independence, thus affecting their quality of life, while also

having an important impact on the family and the society of which the person is part.(1-11)

The incidence of pain with cervical location is very common, especially in people who carry out their professional activities, in conditions of maintaining prolonged vicious positions of the cervical spine. Specifically, among the people most affected by this cervical overload syndrome, are those who work in the field of health, more precisely in the field of dentistry: dentists, dental nurses and dental technicians.(5-18)

## AIM

Taking into account the above, the purpose of this study is to provide data to contribute to decisions on increasing resistance to these factors, in order to achieve an effective kinetic intervention strategy, prevention of cervical syndrome of occupational overload, strengthening health, improving professional performance and increasing the quality of life of these specialists.

## MATERIALS AND METHODS

Prolonged static positions are often inevitable both in the daily dental work performed by dentists and dentists, but also in the daily work of dental technicians. For example, vicious postures that involve keeping the neck and head in anterior and lateral flexed position in order to gain better visibility during dental treatments are common among dentists.(4)

Chronic cervical pain is one of the musculoskeletal disorders that has a complex etiology, including a number of risk factors, such as:(4-18)

- ergonomic factors - prolonged vicious postures, repetitive movements, use of vibrating instruments, use of force and pressure for the use of work tools;
- individual factors - age, body mass index, personal history

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(history of musculoskeletal pain);

- behavioural factors - smoking and level of physical activity;
- psychosocial factors - job satisfaction, stress levels, anxiety and depression.

Cervical occupational overload syndrome comes in three symptomatic forms, acute, subacute or chronic, resulting from different stages of the degenerative cascade. These evolutionary stages can be systematized as follows:(6)

- stage I, characterized by pain and fatigue present only during the professional activity;
- the second stage, in which the symptoms appear faster during the work schedule and are also present during the extra-professional, daily physical, recreational, leisure activities;
- stage III, in which the symptoms persist in other types of stress, as well as in rest and relaxation, with sleep disturbance, with significant deterioration in quality of life.

Therefore, in the second and third stages the pathological phenomena are advanced, and the morbid process is considered irreversible.(6)

### *Study of bibliographic material*

The documentation activity, carried out rigorously, helped us to identify as accurately as possible the existing capital of previous experiences. This detailed information was based both on classic works on the association between cervical overload syndrome and occupational risk factors, and methods for preventing cervical overload syndrome, and on recent studies and research by both Romanian authors and foreigners, who are the object of the proposed study or represent the completion of some stages in its realization.

### *Method used - Questionnaire method*

For the study, we chose as a research method the questionnaire method, both due to the possibility of collecting information in a very short time, the sincerity of the answers, and the capture of border conditions, before the effects are obvious.

The questionnaire was applied only to the persons involved in the issue. As the answers to the questionnaire were subjective, they represented the opinion of the dental professionals interviewed.

### *Presentation of the group of study subjects*

The study group consisted of 20 subjects, specialists in the field of dentistry, among whom were both dentists, dental nurses and dental technicians. The working conditions in which these practitioners carry out their professional activity, such as prolonged or vicious static positions, repetitive movements, make those subjects potentially exposed to musculoskeletal disorders, cervical syndrome being one of the most common pathologies encountered among them.

The criteria for inclusion in the study were: specialists in the field of dentistry: dentists, dental nurses and dental technicians, who offered their consent to participate in the study. The study period was six months, from December 2019 to May 2020.

Next, we will present the questionnaire entitled "*Identifying the prevalence of cervical syndrome and occupational risk factors among medical professions in the field of dentistry*", including questions with either single or multiple types of answers. The answers to the questionnaire of the dental professionals were fully validated.

### **Questionnaire to identify the prevalence of cervical syndrome and occupational risk factors among medical professions in the field of dentistry**

1. Your gender is:
  - a. Male;

- b. Female.
2. Your age is:
    - a. .... years.
  3. Your place of residence is:
    - a. Urban;
    - b. Countryside.
  4. Your social status is:
    - a. Unmarried;
    - b. Married;
    - c. Divorced;
    - d. Widower.
  5. Your profession is:
    - a. Dentist;
    - b. Dental technician;
    - c. Dental assistant/nurse.
  6. Your job is:
    - a. Private dental office;
    - b. Private dental laboratory;
    - c. Multidisciplinary clinic;
    - d. Hospital.
  7. The category of seniority in which you are employed according to professional training is:
    - a. 1-5 years;
    - b. 6-10 years;
    - c. 11-15 years;
    - d. 16-20 years;
    - e. 21-25 years;
    - f. 26-30 years;
    - g. 31-35 years;
    - h. 36-40 years;
  8. The average number of hours worked per week by you according to your professional training is:
    - a. 20 hours;
    - b. 40 hours;
    - c. > 40 hours, specify how many .....
  9. The number of days worked per week by you according to your professional training is:
    - a. < 5 days;
    - b. 5 days;
    - c. > 5 days, specify how many .....
  10. The activities you do most of the time during a work day are:
    - a. Same (repetitive);
    - b. Different.
  11. Your professional activity is:
    - a. Same (repetitive every day);
    - b. Slightly different from day to day;
    - c. Different from day to day;
    - d. Much different from day to day.
  12. Please locate the area (s) where you feel the most pain:
    - a. At the level of the cervical spine (neck);
    - b. At the level of the cervical spine and between the shoulder blades;
    - c. In the cervical spine and shoulders;
    - d. At the level of the cervical spine, between the shoulder blades and the shoulders;
    - e. Others, mention which.....
  13. Please mention the presence of sensitivity disorders for the muscles of the painful area:
    - a. Yes;
    - b. No.
  14. Please mention the decrease in muscle strength for the muscles of the painful area:
    - a. Yes;
    - b. No.

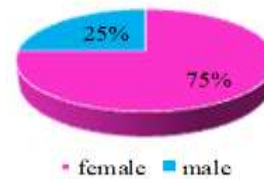
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15. Please evaluate the positions / movements of the cervical spine in which the pain you feel is intensified:
  - a. Maintaining the cervical spine in a flexed position;
  - b. Maintaining the cervical spine in a lateral tilt position;
  - c. Maintaining the cervical spine in a rotating position;
  - d. Movement of the cervical spine (neck).
16. Please assess the intensity of the pain you feel at rest:
  - a. Painless (score 0);
  - b. Very low (score 1);
  - c. Low (score 2);
  - d. Average (score 3);
  - e. High (score 4);
  - f. Very high (score 5).
17. Please assess the intensity of the pain you feel at the end of a work day:
  - a. Painless (score 0);
  - b. Very low (score 1);
  - c. Low (score 2);
  - d. Average (score 3);
  - e. High (score 4);
  - f. Very high (score 5).
18. Please assess the intensity of the pain you feel at the end of a work week:
  - a. Painless (score 0);
  - b. very low (score 1);
  - c. low (score 2);
  - d. average (score 3);
  - e. high (score 4);
  - f. very high (score 5).
19. Please assess the need for rest of the painful area you feel at the end of a working day:
  - a. I don't feel the need to rest (score 0);
  - b. Very low (score 1);
  - c. Low (score 2);
  - d. Average (score 3);
  - e. High (score 4);
  - f. Very high (score 5).
20. Please assess the need for rest of the painful area you feel at the end of a work week:
  - a. I don't feel the need to rest (score 0);
  - b. Very low (score 1);
  - c. Low (score 2);
  - d. Average (score 3);
  - e. High (score 4);
  - f. Very high (score 5).
21. Please evaluate your ability to discontinue professional activity when the pain intensifies:
  - a. Very high (score 0);
  - b. High (score 1);
  - c. Average (score 2);
  - d. Low (score 3);
  - e. Very low (score 4);
  - f. No possibility (score 5).
22. Please assess the difficulty you face in carrying out your professional activity due to the symptoms you are experiencing:
  - a. Without difficulty (score 0);
  - b. Very low (score 1);
  - c. Low (score 2);
  - d. Average (score 3);
  - e. High (score 4);
  - f. Very high (score 5).
23. Please assess the difficulty you face in carrying out your daily living activities due to the symptoms you are experiencing:
  - a. Without difficulty (score 0);
  - b. Very low (score 1);
  - c. Low (score 2);
  - d. Average (score 3);
  - e. High (score 4);
  - f. Very high (score 5).
24. Please assess the difficulty you have encountered in resting/sleeping due to the symptoms you are experiencing:
  - a. Without difficulty (score 0);
  - b. Very low (score 1);
  - c. Low (score 2);
  - d. Average (score 3);
  - e. High (score 4);
  - f. Very high (score 5).
25. Please evaluate the amelioration of the symptoms felt by participating in kinesitherapy – kinesis prophylaxis program:
  - a. Very little improved;
  - b. Slightly improved;
  - c. Much improved;
  - d. Greatly improved.
26. Please evaluate the improvement of your professional activity by participating in kinesitherapy – kinesis prophylaxis program:
  - a. Very little improved;
  - b. Slightly improved;
  - c. Much improved;
  - d. Greatly improved.
27. Please evaluate the improvement of your daily living activities by participating in kinesitherapy – kinesis prophylaxis program:
  - a. Very little improved;
  - b. Slightly improved;
  - c. Much improved;
  - d. Greatly improved.

## RESULTS AND DISCUSSIONS

From the first part of the questionnaire, we can get an overview of the study group. Thus, the study included 15 female subjects and 5 male subjects (figure no. 1), their age being framed by a minimum of 25 years and a maximum of 60 years with an average value of 40.8 years (table no. 1). Most respondents 15 (representing 75%) work in urban areas and only 5 in rural areas (representing 25%) (figure no. 2).

**Figure no. 1. Gender distribution of study group**



**Table no. 1. Age of the subjects included in study**

Minimum (years)	Maximum (years)	Average (years)
25	60	40.8

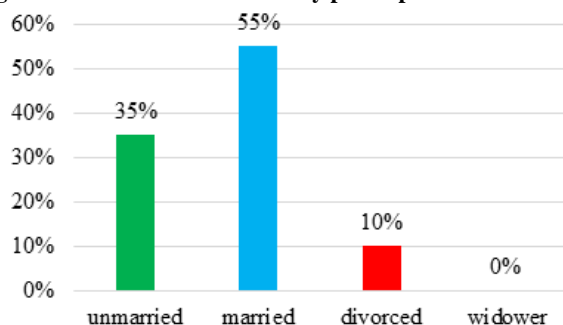
**Figure no. 2. Living environment of study participants**



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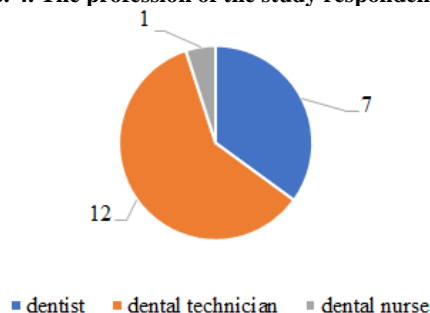
The social status of the respondents can be observed in figure no. 3, most of the respondents being married.

**Figure no. 3. Social status of study participants**

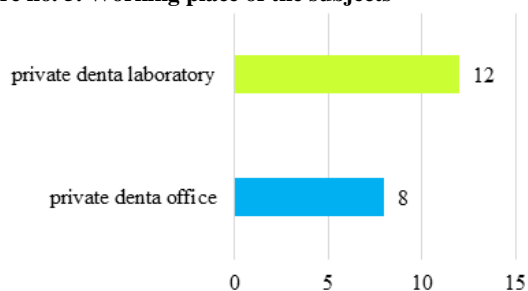


By analysing the questions related to the workplace, we notice that all the participants in the study work in a private practice (dental office or dental laboratory), more precisely 12 dental technicians, 7 dentists and a dental nurse (figure no. 4-5). From the point of view of seniority in work, the respondents to this study cover a wide spectrum from new people entering in work field (1-5 years) to people with rich professional experience (31-35 years) as shown in figure no. 6.

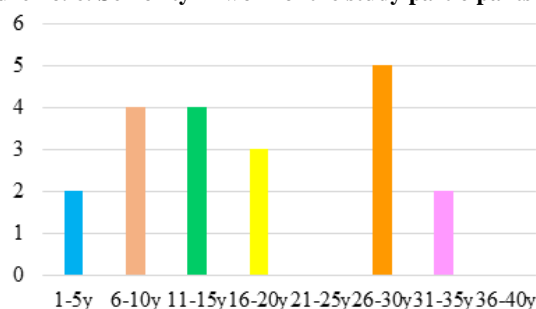
**Figure no. 4. The profession of the study respondents**



**Figure no. 5. Working place of the subjects**



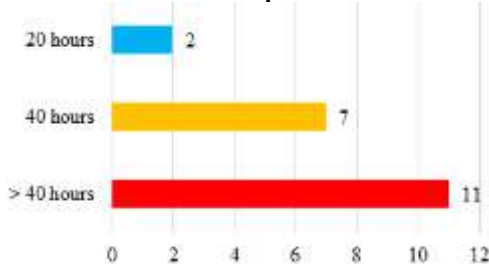
**Figure no. 6. Seniority in work of the study participants**



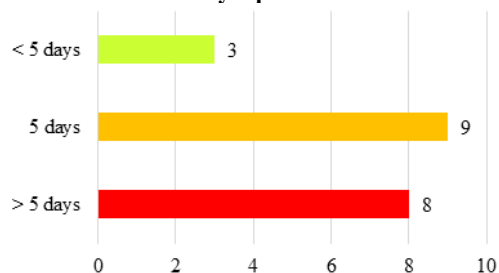
Most participants work an average of 40 hours a week

for 5 or more days (figures no. 7-8).

**Figure no. 7. Number of hours spent at work each week**

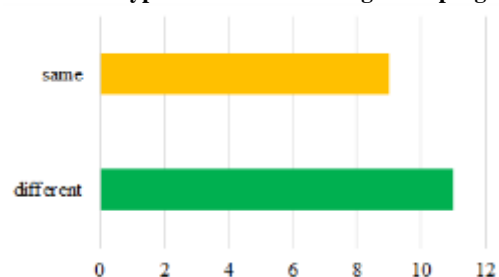


**Figure no. 8. Number of days spent at work each week**

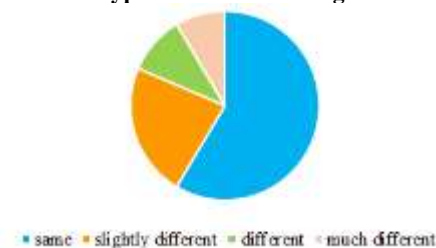


Regarding the specificity of the activity, most of the subjects perform mostly repetitive activities with small changes from one day to the next (figures no. 9-10).

**Figure no. 9. The types of activities during work program**

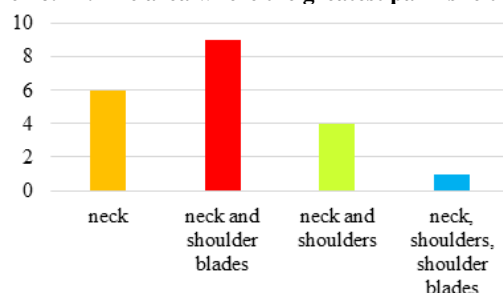


**Figure no. 10. The type of activities during a week**



The greatest pain felt during the activity differs depending on the specifics of each profession, the most affected areas being at the level of the cervical spine and between the shoulder blades figure no. 11.

**Figure no. 11. The area where the greatest pain is felt**



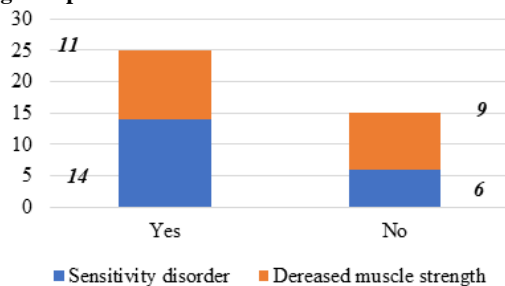
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Pain is not the only symptom felt by respondents, it is often accompanied by sensitivity disorders and decreased muscle strength in the painful area as stated by most respondents figure no. 12. At the same time, the movement of the cervical spine or the maintenance of a lateral inclination position are movements that accentuate the pain felt during the work by the majority of the respondents (table no. 2).

**Table no. 2. Positions/ movements in which the pain felt worsens**

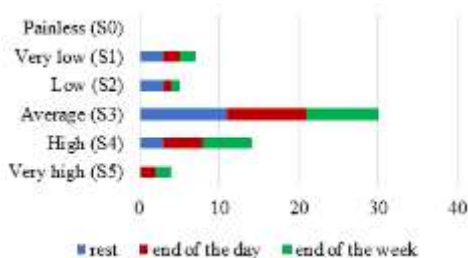
Positions/ movements	Respondents
Maintaining the cervical spine in a flexed position	3
Maintaining the cervical spine in a lateral tilt position	8
Maintaining the cervical spine in a rotating position	2
Movement of the cervical spine (neck)	7

**Figure no. 12. Sensitivity disorder and decreased muscle strength in painful areas**



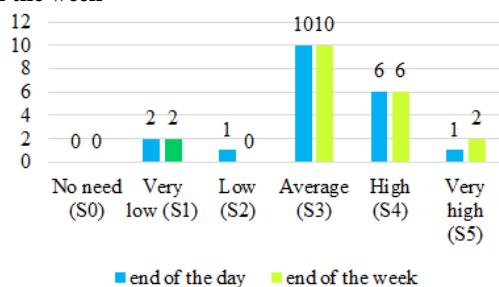
The pain felt during the activities does not cease once the work is stopped. This is felt later and during rest period, at the end of the working day or at the end of a working week as specified by most study participants figure no. 13.

**Figure no. 13. Pain felt in rest, at the end of the day and at the end of the week**



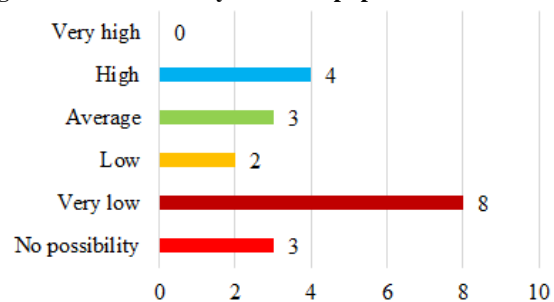
Depending on the resistance of the body, the appearance of painful areas imposes the need for rest of the affected area. For the study participants, the need for rest of the area affected by pain at the end of working days and at the end of the week was considered by most of them as an average (score 3 on the scale established in the questions) figure no. 14.

**Figure no. 14. The need for rest at the end of the day or the end of the week**



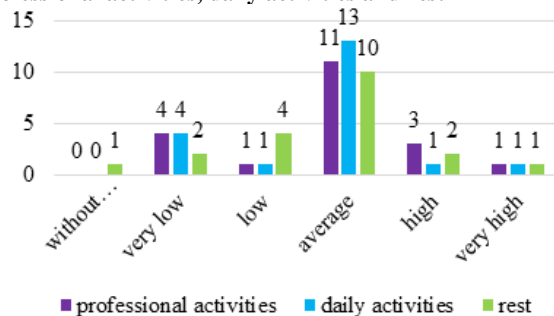
However, interruption of professional activity is not always possible, as most respondents consider this to be unlikely or even impossible (score 4 and score 5) figure no. 15.

**Figure no. 15. Possibility to interrupt professional activity**



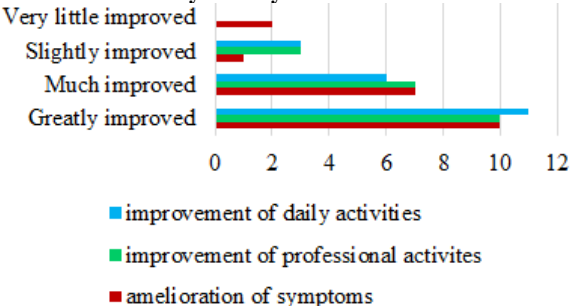
The effects felt over time cause difficulties in carrying out the activities of medical staff, both in terms of professional activity, daily physical activity or during rest. Thus, most subjects experience a medium difficulty for the three types of activities figure no. 16.

**Figure no. 16. The difficulty encountered in carrying out professional activities, daily activities and rest**



The last questions regarding the effect of participating in kinesitherapy – kinesis prophylaxis programs on the medical staff in the field of dentistry, the effect felt by the participants being a positive one. Thus, most participants found a significant decrease of symptoms as well as improvement in current professional or physical activities by participating in kinesitherapy – kinesis prophylaxis programs figure no. 17.

**Figure no. 17. The effect of kinesitherapy/ kinesis prophylaxis on amelioration of symptoms, improving of professional and daily activity of medical staff**



Existing evidence has revealed the effectiveness of therapeutic exercise in decreasing pain and improving the quality of life of people with cervical overload syndrome. This evidence suggests that muscle toning exercises, resistive exercises and mobility exercises significantly reduce the intensity of pain and disability in the cervical area, improving the quality of life of people with cervical syndrome. Particularly important are the intensity, frequency and duration of

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therapeutic exercises. Thus, the more they are performed with a higher weekly frequency and a longer duration, the more positive the results. As for the intensity of the exercises in the kinetic program, it should have a gradual increase, depending on the type of exercise performed. Performing therapeutic exercise programs prescribed at home can also have beneficial effects.(7)

The results of studies in patients with chronic pain in the cervical area have shown that specific, isometric and dynamic endurance training can provide substantial long-term improvements, while general fitness training or stretching (stretching) can only produce a small and transient decrease in pain. Therefore, a program of exercises to increase the strength and endurance of the neck muscles can have favourable long-term results on pain, only if it is performed regularly, with a frequency of 3-5 times a week.(8,9)

Existing evidence has shown that the muscle pain that sometimes occurs at the beginning of a new exercise has decreased as you adapt to the activity. The importance of this lies in the fact that physical activity is unlikely to cause injury to people with cervical syndrome.(10)

In healthy, pain-free individuals, aerobic or endurance exercise usually leads to exercise-induced hypoalgesia, a generalized reduction in pain and pain sensitivity that occurs during exercise and is maintained over a period of time. after performing them. It has been shown that aerobic exercise leads to widespread hypoalgesia, while resistance exercises lead to decreased pain sensitivity near the site of muscle contraction - local hypoalgesia, but also in areas of the body farther from the contracting muscle - global hypoalgesia. In contrast, in people with chronic pain, the sensitivity to pain was variable, in some cases remaining unchanged in response to exercise, one of the possible factors involved may be psychosocial, such as fear of pain and the fact that exercise could cause intensification of pain.(11)

### CONCLUSIONS

In most cases of cervical syndrome, the underlying problem is a postural component. According to data from the literature, the correct posture of the cervical spine is considered when the ears are positioned directly above the shoulders. In this neutral position, the stress on the cervical spine is minimized, the weight of the head being naturally balanced on the cervical spine.

In the case of prolonged maintenance of the flexion position of the cervical spine, some of the neck and upper back muscles become overworked, in a continuous attempt to counterbalance the gravitational attraction of the cervical spine (in the flexion position), these muscles becoming more susceptible to injury and spastic pain.

Prolonged vicious posture of the cervical spine in flexion entails a vicious posture of the shoulders and upper thoracic area of the spine, creating the so-called round back, which will result in pain in both the cervical spine and the upper chest and shoulders.

Occupational cervical syndrome is one of the most common myo-arthro-kinetic pathologies, which limits a person's ability to perform their professional and daily physical and recreational activities, significantly affecting the person's quality of life.

Exercise, through its effects, brings many physical and mental benefits, improving muscle strength and endurance, thus preventing damage to tendons and articular cartilage, improving flexibility and joint mobility, improving circulation throughout the spine thus promoting healing, improving sleep quality and duration, preventing sleep disorders, preventing depression, due to the increase in endorphins that act like a natural sedative.

Physical exercise is considered an important component of effective chronic pain management, with a number of benefits, including improved functionality and mood, as well as reduced risk of secondary illness, with long-term physical training significantly ameliorating chronic neck pain.

Occupational cervical syndrome involves a slow progressive degenerative joint process, which amplifies with age. With proper management, the pain in the cervical spine improves considerably over time, but its recurrence can occur as a consequence of prolonged static professional effort or maintaining vicious postures of the cervical spine during professional activities, as well as in the case of prolonged repetitive activities.

In order to avoid the mechanical stress of the cervical spine joints, it is recommended to avoid overloads, by diminishing the shock produced by the professional and recreational, leisure activities.

It is necessary to approach the professional program from a new perspective, namely to resize it, to avoid maintaining prolonged vicious positions and intensive repetitive activities.

The long duration and the fast pace of professional request of the specialists in the field of dentistry, makes it absolutely necessary to interrupt the professional activity when it is possible, to introduce short periods of relaxation, to remove the discomfort from the cervical spine, as well as the introduction of short periods of exercise, in order to remove joint stiffness, which occur in the prolonged static activities of these professionals.

It is imperative to adopt correct positions, in addition to professional activities, day and night, with a compensatory role.

### *Acknowledgement:*

*In this article, all the authors have equal contribution with the first author.*

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