

APPLICATIONS OF KINETOTHERAPY IN THE PROPHYLAXIS OF SEDENTARY BEHAVIOR AMONG PROFESSIONS WITH A MEDICAL PROFILE IN THE FIELD OF DENTISTRY

CLAUDIA-CAMELIA BURCEA¹, VIOREL ȘTEFAN PERIEANU², RADU CĂTĂLIN COSTEA³, MIHAI BURLIBAȘA⁴, MIHAELA CHIRILĂ⁵, NARCIS MARCOV⁶, GABRIELA TĂNASE⁷, NICOLETA MĂRU⁸, ALEXANDRU TITUS FARCAȘIU⁹, ȘTEFAN MILICESCU¹⁰, MĂDĂLINA VIOLETA PERIEANU¹¹, MIHAI DAVID¹², CAMELIA IONESCU¹³, ELENA-CRISTINA MARCOV¹⁴, LILIANA MORARU¹⁵

^{1,2,3,4,5,6,7,8,9,10,11,12,13,14} "Carol Davila" University of Medicine and Pharmacy Bucharest,

¹⁵ "Titu Maiorescu" University of Medicine and Pharmacy, Bucharest

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Abstract: Sedentary behavior, both professional, occupational, leisure and recreational, is one of the major risk factors for cardio-metabolic health and premature mortality. But, this type of sedentary behavior can be found in many of the existing professional activities in 2021, among them being the professional activities with a medical profile in the field of dentistry: specific activities in the dentist's office (and here we discuss about dentists and dental nurses) and activities specific in the dental laboratory (in this case, we are talking about dental technicians).

INTRODUCTION

Sedentary behaviour, both professional, occupational, leisure and recreational, is one of the major risk factors for cardio-metabolic health and premature mortality.

But, this type of sedentary behaviour can be found in many of the existing professional activities in 2021, among them being the professional activities with a medical profile in the field of dentistry: specific activities in the dentist's office (and here we discuss about dentists and dental nurses) and activities specific in the dental laboratory (in this case, we are talking about dental technicians).(1-5)

Through the specific activity of these professional categories in the field of dentistry (dentists, nurses, dental technicians), most specialists spend most of their time at work in vicious positions, extremely traumatic and harmful to the human body.(6-10)

AIM

The purpose of this study is to identify the level of physical activity among medical professions in the field of dentistry, in order to obtain data, leading to qualitative and quantitative assessment of operational resources needed to manage the needs of active intervention, regarding:

- increasing the body's resistance to risk factors of professional sedentary behaviour;
- improving the dynamic balance to withstand the demands of daily life, based on the causal association between the demands to which the body of these specialists is subjected and the body's response capabilities to these demands;
- reducing the negative impact of sedentary behaviour on health based on scientific evidence, which demonstrates both the buffer effect of physical activity on health, the link between regular physical activity and the proper

functioning of the body, and the risk of functional disorders due to sedentary behaviour.

Starting from the aspects mentioned above, we can specify what are the main objectives of this study, as follows:

- prevalence of specialists in the field of dentistry, regarding participation in physical activity;
- identifying the type of professional sedentary behaviour;
- identification of the type of leisure, recreational (leisure) behaviour;
- identification of the level of physical activity among specialists in the field of dentistry;
- identifying perceptions of behaviour, practices and healthy habits;
- comparison of the data obtained with the existing data at international level, regarding the association of physical activity with health status;
- developing and issuing suggestions on increasing the body's resistance to risk factors for professional sedentary behaviour and / or leisure behaviour.

MATERIALS AND METHODS

Before actually moving on to conducting this study, we conducted an extremely rigorous documentation activity, which helped us to know as accurately as possible the existing situation at the level of 2021. This documentation was based both on classic works on the association between sedentary behaviour and risk factors of non-transmissible disease, and methods of prophylactic intervention in combating sedentary behaviour, as well as on the latest works of both Romanian and foreign authors, which are the subject of the topic or represent the steps taken in conducting the research.

As a research method, we chose the questionnaire

³Corresponding author: Radu Cătălin Costea, Str Plevnei, Nr. 19, Sector 1, București, România, E-mail: trili_poli@yahoo.com, Phone: +40723 472632

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method both due to the possibility of quick collection of information, the sincerity of the answers, and the capture of some borderline factors, before the effects are actually visible. In the elaboration of the questionnaire, made by us, we took into account the clear and precise establishment of its objectives. The questionnaire was applied only to subjects in the field of dentistry, namely: dentists, dental nurses and dental technicians.(11-15)

In the study, we opted for the statistical-mathematical method, which is objective and accurate. The graphical representation of the data was used for the synthetic and visual expression of the evolution and trend of the statistical data. Choosing the type of chart for the representation of a distribution was made, taking into account the variables included in the study and their type. The study group consisted of 26 subjects, specialists in the field of dentistry.

Subjects working in the field of dentistry have a predominantly static professional activity, which predisposes them to risks to their health. In addition to the complications of the sedentary nature of their work, their behavioural habits and lifestyles, which can lead to significant aggravations, must also be taken into account. Thus, active intervention strategies can be established for them, balanced and adapted to each person's capacity.

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 proposed study. The study took place over a period of six months, from December 2019 to May 2020.

The 19 items questionnaire entitled: "Identifying the level of physical activity among medical professions in the field of dentistry", correlates professional factors such as seniority, occupational demands, with non-professionals ones related to age, habits and behavioural practices was self-administered, applied only to specialists in the field of dentistry (dentists, dental nurses and dental technicians). The questions were single or multiple choice. All the answers to the questionnaire of the dental specialists were validated.

In the following, we will present this questionnaire:

1. Please specify your age:
years.
2. Please specify your gender:
 feminine; masculine.
3. Please specify your profession:
 dentist; dental nurse; dental technician.
4. Please specify the average number of hours worked per week by you, according to your professional training:
 20 hours; 40 hours; > 40 hours.
5. Please specify when you started the first form of supervised physical activity:
 during high school (outside the physical activities provided in the analytical program);
 during the faculty (university studies) / college / post-secondary school (outside the physical activities provided in the analytical program);
 after integration in the professional activity.
6. Please specify which was the first form of supervised physical activity you practiced (the type of physical activity you practiced):
 dancing; swimming; cycling; football; handball;
 volleyball;
 basketball; aerobics; table tennis; tennis; judo; wrestling;
 other - specify which.....
7. Please specify your preferred form of physical activity:
 dancing; swimming; walking; cycling; running / jogging; football;

- handball; volleyball; basketball; aerobics; table tennis; tennis; judo;
- wrestling; other - specify which.....
8. Please specify what form of physical activity you are currently practicing:
 dancing; swimming; walking; cycling; running / jogging; football;
 handball; volleyball; basketball; aerobics; table tennis; field tennis;
 judo; wrestling; other - specify which.....
9. Please specify if anyone in your entourage is physically active:
 yes – family; yes – friends; yes – colleagues; yes – others; no.
10. Please specify why you do not practice your preferred form of physical activity:
 lack of time; lack of entourage (partner); for convenience;
 for medical reasons; other - specify which.....
11. Please specify how you feel about your health:
 very poor; poor; average; good; very good.
12. Please specify how you consider your physical activity (excluding domestic and household physical activities):
 very low; low; normal; high; very high.
13. Please specify how you consider your behaviour in terms of the level of effort of the physical activity you are performing:
 sports behaviour - perform high-intensity physical effort at least 3 times a week;
 active behaviour - perform medium intensity physical effort 1-2 times a week;
 sedentary behaviour - perform low intensity physical effort / do not perform.
14. Please specify how you consider your daily level of physical activity:
 very small; small; medium; large; very large.
15. Please specify if you consider it useful to monitor your level of physical activity:
 useless; not very useful; useful; very useful.
16. Please specify if you consider it necessary to participate in an active prophylaxis program:
 I don't consider it necessary; little necessary; necessary; very necessary.
17. Please specify how you consider your physical performance is improving by participating in an active prophylaxis program:
 very little; little; medium; much.
18. Please specify how you consider your performance in the workplace is improving by participating in an active prophylaxis program:
 very little; little; medium; much; very much.
19. Please specify how you consider the development of a guide containing intervention strategies, based on the causal association between the demands to which the body of specialist in field of dentistry are subject and its ability to respond to these demands, as well as instructions on the optimal ratio of effort intensity and fitness level, regularization of training, gradation of effort, warnings regarding the decrease or interruption of effort in case of annoying clinical signs:
 useless; not very useful; useful; very useful.

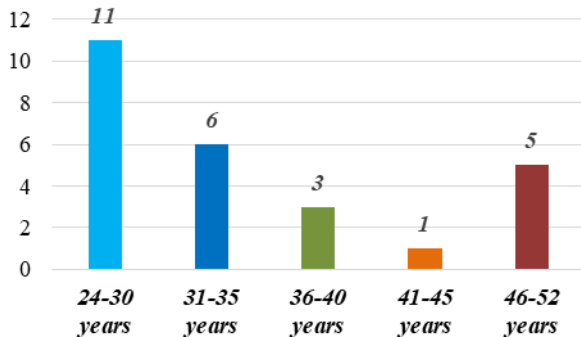
RESULTS AND DISCUSSIONS

The role of the first three questions is to describe the study group in terms of age, gender and occupation of the participants.

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The mean age of the study participants was 34.42 years, with a minimum of 24 years and a maximum of 52 years. The age distribution of the study group is represented in figure no. 1.

Figure no. 1. Age distribution of the study group



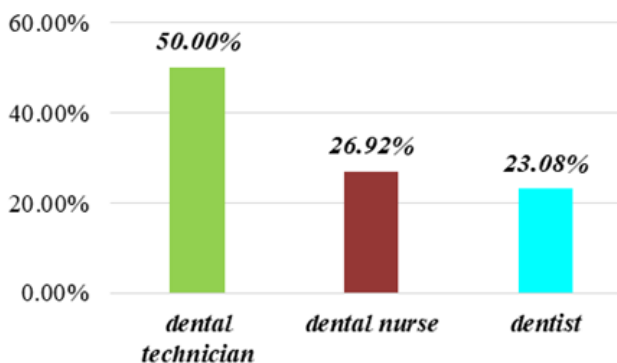
Of the study group, totalling 26 subjects, 18 of them were female (representing 69.23% of the total) and 8 were male (representing 30.77%), according to figure no. 2.

Figure no. 2. Gender distribution of study group



Analysing the profession of study participants, we found that half of them (13 people) were dental technicians, 7 participants were dentists (representing 26.92%) and 6 participants were nurses (representing 23.08%) according to figure no. 3.

Figure no. 3. The profession of study participants.



The following questions develop the basic theme of the study, namely the prophylaxis of sedentary behaviour among dental practitioners.

The distribution of subjects according to the average number of hours worked per week according to professional training revealed that more than half of the participants in the study (14, representing 53.85%) worked more than 40 hours per week. A percentage of 38.46% worked an average of 40 hours per week and only a percentage of 7.69%, said they work part

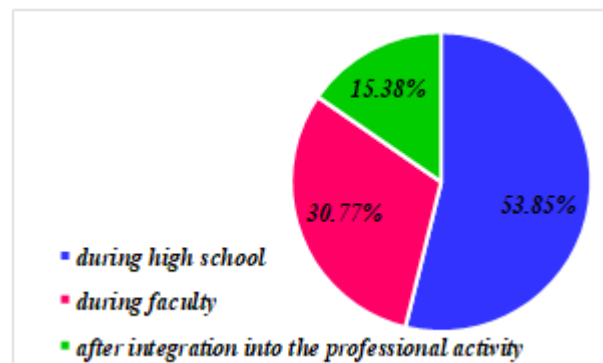
time. The data are presented in table no. 1.

Table no. 1. The number of hours worked per week

	20 hours	40 hours	> 40 hours
Participants	2 (7.69%)	10 (38.46%)	14 (53.85%)

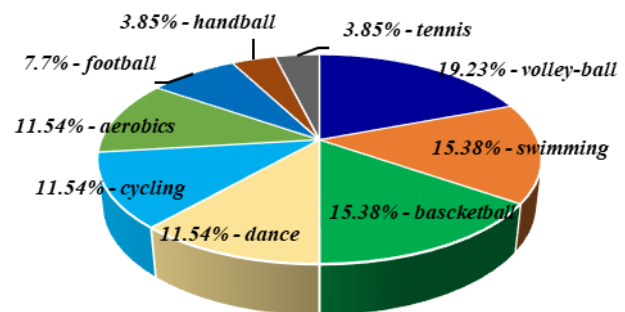
From the analysis of the data regarding the beginning of the first form of supervised physical activity, it appears that over half of the subjects participating in the study (14, representing 53.85%) started it during high school. Another 8 subjects (representing 30.77%) declared the beginning of the first form of supervised physical activity during the faculty (university studies) / college / post-secondary school. 4 of the subjects of the study group (representing 15.38%) started the first form of physical activity, after integration in the professional activity (figure no. 4).

Figure no. 4. The beginning of the first form of physical activity



The distribution according to the first type of supervised physical activity practiced as stated by the respondents of our study, revealed that they practiced the following sports (figure no. 5).

Figure no. 5. The first type of supervised physical activity practiced.



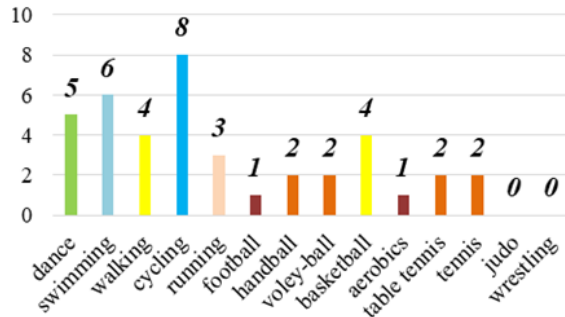
This distribution can be due either to the local popularity of a certain sport, or to the desire of the specialists in the field to practice it, or to the lack of opportunities at that moment, or even due to the influence of the entourage.

Because there was the multiple response variant, subjects had the opportunity to mention several preferred forms of physical activity. Analysing the data related to the form of physical activity preferred by the study group subjects according to the frequency of responses, we found that cycling was preferred by 8 subjects and swimming by 6 subjects. The dance was among the preferences of 5 of the subjects. Both walking and basketball were in the top of the preferences of 4 subjects. Running was the preferred activity of 3 subjects. Volleyball, handball, table tennis and tennis were each mentioned by 2

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subjects, as preferred forms of physical activity. Football and aerobics were mentioned as being preferred by one subject each. Judo and wrestling do not fit the preferences of the subjects of the study group, not registering any response (figure no. 6).

Figure no. 6. Preferred physical activity of study participants.



Regarding the form of physical activity currently practiced, the specialists in the field of dentistry participating in the study had the opportunity to mention several physical activities practiced by them currently, there are multiple response options. The distribution of physical activities performed by the group of subjects, depending on the frequency of answers provided by them, was as follows (figure no. 7).

Figure no. 7. The physical activity currently practiced by subjects included in the study

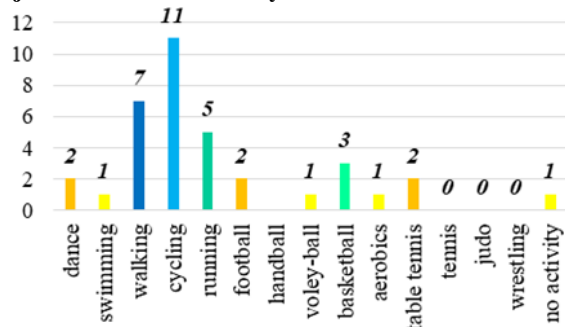
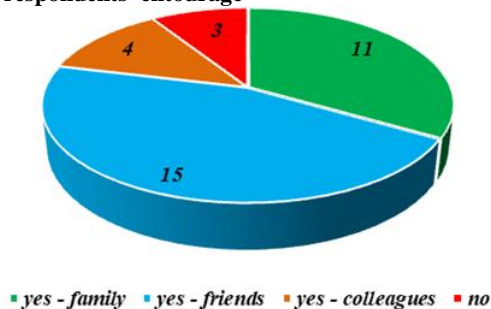


Figure no. 8. Practicing the physical activities by the people in the respondents' entourage

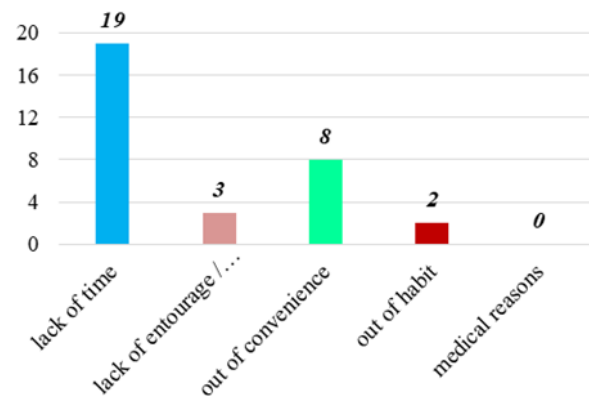


The subjects of the study group were asked to specify if anyone in their entourage practiced physical activities. In the highest percentage, the answer was affirmative (88.46%). Only 3 subjects (representing 11.54%) stated that no person in their entourage practices physical activities. Having this time as well the multiple answer variant, the subjects mentioned in the highest percentage that, from their entourage, friends and family members are the ones who practice physical activities. In a much smaller percentage, colleagues were mentioned as practicing physical activities (figure no. 8).

Being asked to specify, also in the multiple answer variant, what were the reasons why the subjects of the study group do not practice the preferred form of physical activity, the

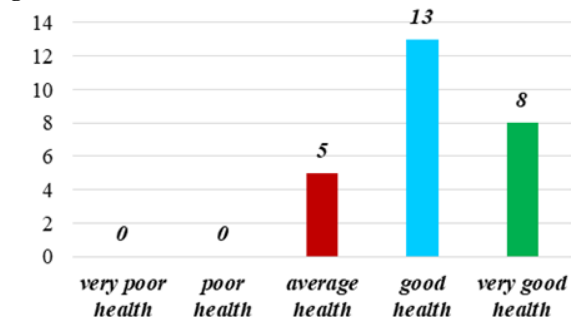
highest percentage (73.08%) was attributed to lack of time. The following reasons why these subjects do not practice the preferred form of activity were, in order of frequency of responses: out of convenience (30.77%), lack of entourage or partner (11.54%) and out of habit (7.69%). These data are illustrated in figure no. 9.

Figure no. 9. Reason/ reasons for not practicing the preferred form of physical activity



The perception stated by the subjects of the present study on health status was as follows: half of the subjects (13) considered that they were in good health, 8 subjects (representing 30.77%) assessed their health as very good, and 5 subjects (representing 19.23%) considered their health as average. No subject declared her health to be very poor or poor. These assessments may be due to the fact that most of the subjects of the studied group are young, with few years of experience in work (figure no. 10).

Figure no. 10. Assessment of health status



Analysing the data obtained regarding physical activity, we found that almost half of the study participants (12, representing 46.15%) assessed their physical activity as low and very low. Another 11 subjects (representing 42.31%) assessed their physical activity as normal. Only 3 people (representing 11.54%) considered that they perform a large amount of physical activity. It was noteworthy that there were no people who considered their physical activity very high. Table no 2 illustrates these data.

Table no. 2. Physical activity performed

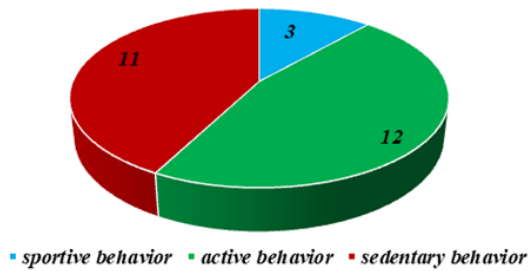
Physical activity performed	Number of participants
Very low	4
Low	8
Average	11
Good	3
Very good	0

The analysis of the perception of the specialists in the field of dentistry from the studied group on the level of effort of physical activity revealed that 12 subjects (representing 46.15%) consider themselves active in terms of physical effort,

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specifying that they perform moderate intensity effort, 1-2 times a week. 11 subjects (representing 42.31%) consider that they have a sedentary behaviour in terms of physical effort, noting that they perform low-intensity effort or do not perform physical activities. It is worrying that only 3 subjects (representing 11.54%) have a sportive behaviour, they perform high intensity physical effort, at least 3 times a week. The data obtained are shown in figure no. 11.

Figure no. 11. Assessing the level of effort of the physical activity performed



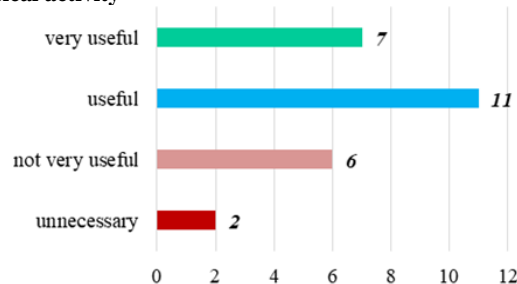
Examining the data on the perception of the subjects of our study on the daily level of physical activity, we found that most of the subjects (20, representing 76.93%) rated their daily level of physical activity as average (42.31%) and low (34.62%). Only 5 people (representing 19.23% of the total) rated their daily level of physical activity as high (11.54%) and very high (7.69%). One subject (representing 3.85%) assessed his daily level of physical activity as very low. These data are presented in table no. 3.

Table no. 3. Assessing the performed daily physical activity

Daily level of physical activity	Number of participants
Very low	1
Low	9
Average	11
High	3
Very high	2

Evaluating the data on the perception of dental specialists participating in the study have on the usefulness of monitoring physical activity, we found that most of the subjects (18 representing 69.23%) considered monitoring the level of physical activity useful (42.31%) and very useful (26.92%). Another 6 subjects (representing 23.08%), considered it not very useful and 2 subjects (representing 7.69%) considered it unnecessary. The subjects' answers to this question are consistent with the answers provided to the previous question, in which the subjects mentioned whether they monitored their level of physical activity, and with the answers they provided regarding the daily level of physical activity. These data are presented in figure no. 12.

Figure no. 12. Assessing the utility of monitoring the level of physical activity



The data obtained concerning the need to participate in an active prophylaxis program showed that most of the respondents (19 representing 73.08%) considered it necessary

(50%) and very necessary (23.08%). 5 respondents (representing 19.23%) found it little necessary and only 2 of the subjects (representing 7.69%) believe that they do not need to participate in an active prophylaxis program (figure no. 13).

Figure no. 13. Determining the necessity to participate in an active prevention program

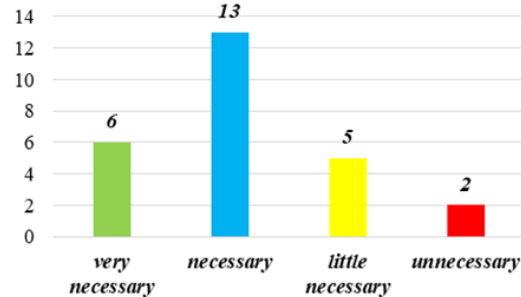
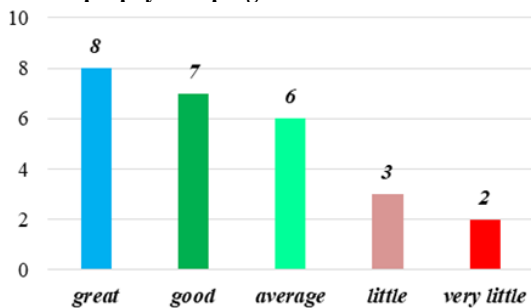


Figure no. 14. Health improvement analysis by participating in an active prophylaxis program



Analysing the perception of the participants to this study, on improving their health by participating in an active prophylaxis program, we found the following: over half of them (15 representing 57.69%) considered that their health can be greatly improved (30.77%) and much improved (26.92%). Another 6 participants (representing 23.08%) appreciated the improvement of their health as average and 3 participants (representing 11.54%) appreciated that performing an active prophylaxis program will little improve their health. Only 2 participants (representing 11.54%) were of the opinion that their health can improve very little after performing an active prophylaxis program, the reason being that these subjects stated that they practice vigorous physical activity (figure no. 14).

Regarding the improvement of performance at work by participating in active prophylaxis programs, we found that a percentage of 53.84% of subjects appreciated that they can be greatly (26.92%) and much (26.92%) improved by performing a prophylaxis program. activate. A percentage of 30.77% considered that the improvement of the performances as average. A small number of subjects considered that their performance at work can be improved slightly (11.54%) and very little (3.85%) by active prophylaxis (table no. 4).

Table no. 4. Assessing the improvement of performance at work by participating in an active prophylaxis program

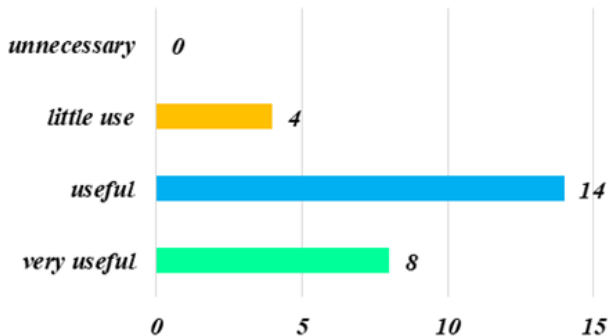
Improving health through active prophylaxis	Number of subjects
Greatly improved	7
Much improved	7
Average improved	8
Slightly improved	3
Very little improved	1

When asked to express opinions on an active prophylaxis guide activities that include intervention strategies, based on causal association between the demands to which the

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body is subjected and its ability to respond to these demands and instructions on proper ratio of effort intensity and fitness level, periodicity of training, grading the effort, warnings on diminishing or interrupting effort in case of annoying clinical signs, most of the respondents found such a guide useful (53.85%) and very useful (30.77%). Another 4 subjects (representing 15.38%) were of the opinion that an active prophylaxis guide is of little use. No subject considered the development of such a guide unnecessary. These data are presented in figure no. 15.

Figure no. 15. Analysis of the development of an active prophylaxis guide



Applied active prophylaxis in fighting sedentary behaviour among medical professions in the field of dentistry

Fighting prolonged sedentary occupational behaviour can be achieved by segmenting the professional activity, preferably every 30 minutes or whenever possible, and introducing resistance exercises or walking exercises, for a short period of time, of about 5 minutes.

To express the intensity of the effort, the metabolic equivalent (MET) will be used, a metabolic equivalent representing the energy needed to cover the body's needs in basal, resting conditions, being equivalent to the consumption of 3.5-4 ml O₂ / kg body weight / min or 1.2 cal / min.(1-5)

Aerobic exercises will be used to combat sedentary behaviour and physical inactivity, respectively to maintain or improve the health of dental professionals, meaning any physical work performed with energy consumption in the presence of oxygen (O₂):

- *Walking* - natural physical activity of movement, in which most components of the musculoskeletal system participate (skeletal muscles, ligaments and joints):
 - walking exercises have a favourable influence on metabolism, producing an intense activity of the body's apparatus and systems - myo-arthro-kinetic, cardiovascular and respiratory;
 - walking at a speed of 3 km/h on flat ground is equivalent to a very low intensity of effort, respectively 3 MET or 10 ml O₂/kg body weight/min or 4 kcal/min;
 - walking at a speed of 4-6 km/h on flat ground is equivalent to a low intensity of effort, respectively 3-5 MET or 11-18 ml O₂/kg body weight/min or 4-6 kcal/min;
 - walking at a speed of 7.5-8 km/h on flat ground is equivalent to a moderate intensity of effort, respectively 5-7 EM or 18-25 ml O₂/kg body weight/min or 6-8 kcal/min.
- *Running/ Jogging* - physical activity that develops an aerobic endurance effort with a high oxygen supply:
 - running at a speed of 8 km/h is equivalent to a high intensity of effort, respectively 7-9 MET or 23-32 ml

O₂/kg body weight/min or 8-10 kcal/min;

- running at a speed of 10 km/h or more than 10 km/h is equivalent to a very high intensity of effort, respectively over 9 MET or 32 ml O₂/kg body weight/min or 10 kcal/min.
- *Cycling* - physical activity in which the muscles of the lower limbs participate mainly, while the muscles of the upper limbs and those of the back are in static tension;
 - cycling stimulates blood, lymphatic circulation and respiration;
 - cycling at a speed of 10-12 km/h is equivalent to a low intensity of effort, respectively 3-5 MET or 11-18 ml O₂/kg body weight/min or 4-6 kcal/min;
 - cycling at a speed of 15-16 km/h is equivalent to a moderate intensity of effort, respectively 5-7 MET or 18-25 ml O₂/kg body weight/min or 6-8 kcal/min;
 - cycling with a speed of 18-19 km/h is equivalent to a high intensity of effort, respectively 7-9 MET or 23-32 ml O₂/kg body weight/min or 8-10 kcal/min;
 - cycling with a speed of 20 km/h or more than 20 km/h is equivalent to a very high intensity of effort, respectively over 9 MET or 32 ml O₂/kg body weight/min or 10 kcal/min.
- Pedalling on an *ergometric bicycle* - physical activity in which all the muscles of the lower limbs participate, while the muscles of the upper limbs and those of the back are in static tension:
 - pedalling the ergometric bicycle stimulates blood, lymphatic circulation and breathing;
 - pedalling the ergometric bike with light resistance is equivalent to a very low intensity of effort, respectively 3 MET or 10 ml O₂/kg body weight/min or 4 kcal/min;
- Pedalling on an *elliptical bike* - physical activity in which most of the skeletal muscles, ligaments and body joints participate:
 - pedalling an elliptical bike stimulates blood, lymph circulation and breathing.

CONCLUSIONS

Although physical activity and sedentary behaviour are often considered reciprocal behaviours, sedentary behaviour must be uniquely differentiated from physical activity, sedentary behaviour is not just the absence of physical activity.

The problem of sedentary lifestyle can be attributed not only to a lack of movement, but also to the stimulation provided by the replacement of activities.

Sedentary behaviours are very common in many occupations, including those with a medical profile in the field of dentistry (dentists, dental nurses, dental technicians). Classical dental treatments, dento-alveolar surgery treatments, the realization of prosthetic or orthodontic appliances are time consuming and require extremely high precision, causing specialists in this field to spend most of their time in fixed, vicious, static positions.

Although specialists in dentistry can be physically active, meeting even the recommendations of the World Health Organization, 150-300 minutes of physical activity per week, they spend most of their daily time through sedentary behaviour, both during professional activity, while traveling (by car) from home to work and from home to work and leisure.

Specialists in the field of dentistry, whose professional activities require the maintenance of fixed positions for a long time and a large number of working hours, should be oriented towards proportional intervention activities, to protect them from musculoskeletal disorders and psychological traumas associated with both sedentary and with the development of pain

from musculoskeletal disorders.

In this sense, for these specialists the prophylactic intervention must aim, first of all, to reduce the time spent in static positions, of prolonged maintenance of positions and to offer alternatives regarding the alternation of effort types (static effort - dynamic effort), by introducing in the plan daily activity of regular and organized physical activities, activities of moderate intensity during the work schedule, as well as the recommendation of a regular vigorous physical activity, during or outside the work schedule.

Dentists, dental nurses and dental technicians are a group of professionals at high risk of developing spinal pain. The conditions in which they carry out their professional activity often involve an excessive tension of the back muscles, determined by the need to maintain a forced body position, the so-called postural stress.

Prolonged static work and a sedentary lifestyle increase the risk of functional disorders and chronic diseases. Prolonged static positions lead to deconditioning of the body, which negatively affects the abilities of dental specialists, to meet the requirements of large volumes of work.

The association of a professional sedentary behaviour with a sedentary behaviour in free time (recreational) has negative consequences on health, with increasing incidence of musculoskeletal disorders, cardiovascular disease, obesity, type 2 diabetes, osteoporosis, depression and anxiety.

Professionals from medical specialties in the field of dentistry should pay attention to changing the individual behaviour of both occupational and leisure, recreational, to move from a sedentary behaviour to an active one. For good behaviour management, physical activity (exercise) should be seen as a vital parameter and monitored as a vital parameter.

It is necessary to improve the physical activity of specialists in the field of dentistry and perform recreational physical exercises during breaks, during the professional activity, which can be beneficial both due to improved health and improved efficiency of professional activity.

Performing physical activities (physical exercises) by specialists in the field of dentistry with colleagues, during the program of professional activity, can be very effective both in terms of increasing the efficiency of work and in terms of increasing the volume and duration of work.

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