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STUDY ON EVOLUTION OF BODY MASS INDEX IN DENTAL TECHNOLOGISTS

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Abstract

The working conditions in which specialists of dental technology carry out their activity are factors conducive to a series of changes that affect the body. Thus, factors like prolonged static effort, length of work, work rhythm and ratio between dynamic and static effort lead to metabolic disorders and imbalances which may cause excess weight – one of the most frequent issues society today is struggling with, and which is harmful to the quality of life. This research was conducted on 30 subjects. Initial assessment of body mass index was made for students specializing as dental technologists within "Carol Davila" University of Medicine and Pharmacy of Bucharest and then, five years later after subjects started to work, they were assessed again, taking account of the physical activity performed and diet kept. The purpose of the study was to set out how effective physical exercise is in maintaining / improving the body mass index parameters and, therefore, the quality of life.
Conclusions: This study points out to positive statistical association of regular and constant exercise with maintaining normal values of body mass index. Our proposition is to implement kinetoprophylaxis programs on dental laboratory technicians for preventing prolonged static effort's outcomes, maximizing body functionality and improving the quality of life by stimulating subjects to adopt an active physical exercise regimen, as well as preventing overweight and obesity in these subjects.

Keywords: Body mass index, kinetoprophylaxis programs, dental technologists, sedentary lifestyle, metabolic health.

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1. Introduction

The working conditions in which specialists of dental technology carry out their activity are factors conducive to a series of changes affecting the functional capacity of organs, body systems and last, but not least, on the whole body (Burcea, Georgescu, Burlibașa, Ionescu & Malița, 2014). Thus, factors like prolonged static effort, length of work, work rhythm and ratio between dynamic and static effort lead to metabolic disorders and imbalances which may cause excess weight (Burcea, Georgescu, Popovici, Armean, Burlibașa & Ionescu, 2014). Excess weight is one of the most frequent issues society today is struggling with and which is harmful to these individuals' lives. Numerous studies confirm that sedentary live (lack of physical activity, caused firstly by technology) has compromised, in the entire world, the metabolic health of many people, hence becoming a matter of public health (Nam et al. 2016; Honda et al. 2016; Biddle et al. 2016). Due to the profile of these persons (dental technologists) with low motility, which is the result of both their professional activity per se, and of absence of breaks between occupational effort, as well as frequent association of an imbalanced and maladaptive diet from a qualitative and quantitative standpoints, there is a major need for exercise. The results of a research show that short, frequent interruption of work was a feasible and effective approach to reduce sedentary life at the workplace among the participant employees (Mailey, Rosenkranz, Casey & Swank, 2016). Combating sedentary life and excess weight caused by it in dental technologists is imperative, via a well-structured prophylaxis programme.

2. Methodology

2.1. Purpose of the Study

- Set out how effective physical exercise is in maintaining / improving body mass index parameters and, therefore the quality of life.

2.2. Objectives of the Study

- Identify the body mass index changes 5 years after the specialists in the field of dental technology began their professional activity.
- Set out overweight prevalence in dental technologists 5 years after they began working and subsequent comparison of data to the one gathered during student years.
- Identify correlations between behavioral factors: dietary intake, eating habits, sedentary life, physical activity and overweight.
- Identify prophylaxis methods or treatment with a view to optimizing weight and, therefore, improving the health status and increasing the quality of life in the practitioners from the field of dental technology.

2.3. Research Hypothesis

- If a regular physical exercise program is adopted, combined with a balanced, varied, adequate, moderate diet, tailored to the metabolic needs, the outcome will be body weight reduction, BMI

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parameters improvement, as well as body resilience increase to physical and mental efforts, hence contributing to the increase of the quality of life and occupational activity.

2.4. Material and Methods

The clinical – statistical retrospective and prospective study (case-control type) was carried out on 30 subjects. Initial assessment of body mass index was made for the 30 subjects, students specializing as dental technologists within "Carol Davila" University of Medicine and Pharmacy of Bucharest and then, five years later after subjects started to work, they were assessed again, taking account of the physical activity performed and diet kept. The criteria for inclusion to one of the research samples was made based upon an interview featuring questions to which subjects indicated the number of hours they were working, physical activity level (active or sedentary persons), type of physical effort performed and weekly frequency, as well as the diet they were keeping (nutrition content and energy appropriated-inappropriate, controlled – uncontrolled intake, unilateral eating complex, intake adapted to their energy needs – unsuitable). The use of this method helped particularly to the complete and accurate understanding of factors which taken together, give a personal casuistry value. Two samples made up of 15 persons each were compiled. The experimental sample was made up of persons who exercised after having begun their occupational activity and the control sample comprised sedentary persons. Mention should be made that all the dental technologists carry out their activity in private dental technology laboratories.

3. Results Obtained and Discussions

The data gathered from the dental technologists sample included in the experiment was summarized and statistically analyzed. Next, descriptions of the two samples (experimental and control) are made, then the actual statistical tests results are outlined.

a. The experimental sample

With regard to the *gender* feature, there were 8 females (standing for 53,3% of the total) and 7 male subjects (standing for 46,7% of the total). This data is shown by the frequency table (table 1) below.

Table 1. Subjects gender- frequency table (experimental sample)

	Absolute frequency	Relative frequency (%)
male	7	46,7%
female	8	53,3%
Total	15	100%

Data analysis in terms of *number of hours worked* shows that 8 subjects (53,3%) worked for more than 8 hours per day, 6 subjects (standing for 40% of the total) worked 8 hours a day and one subject (standing for 6,7% of the total) worked less than 8 hours a day. The latter had reduced his occupational

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activity due to medical reasons (carpal tunnel syndrome). The data indicated is illustrated by the frequency table shown below (table 2).

Table 2. Number of hours worked –frequency table (experimental sample)

	Absolute frequency	Relative frequency (%)
< 8 hours / day	1	6,7%
8 hours / day	6	40%
> 8 hours / day	8	53,3%
Total	15	100%

With regard to subjects' *height,* the register values were between 158 cm and 190 cm, with an average height of 171,1 cm. Next, the table showing the descriptive statistical indicators for the feature researched (table 3) is presented.

Table 3. Table showing descriptive statistical indicators – Subjects 'height (experimental sample)

indicator	
mean	171,1
median	169
standard deviation	9,2
minimum	158
maximum	190

Data analysis with regard to the type of *physical effort performed and weekly frequency,* the situation was as follows:

- 7 persons reported moderate physical effort with a frequency of 3 times per week,
- 6 persons reported high intensity physical effort with a frequency of 3 times per week,
- 2 persons reported moderated physical effort with a frequency of 2 times per week.

b. The control sample

With regard to the *gender* feature, there were 11 females (standing for 73,3% of the total) and 4 males (standing for 26,7% of the total). The frequency table (table 4) for the feature researched is presented below.

Table 4. Subjects' gender – frequency table (control sample)

	Absolute frequency	Relative frequency (%)
male	4	26,7%
female	11	73,3%
Total	15	100%

Data analysis with regard to the number of hours worked showed 10 of the subjects (66,7 %) worked for more than 8 hours per day, and 5 of them (standing for 33,3% of the total) worked 8 hours a day. There were no respondents who worked less than 8 hours. The frequency table (table 5) for the feature researched is illustrated below.

Table 5. Number of hours worked – frequency table (control sample)

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	Absolute frequency	Relative frequency (%)
8 hours / day	5	33,3%
> 8 hours / day	10	66,7%
Total	15	100%

Data analysis with regard to subjects' *height* revealed they were between 156 cm and 182 cm with a mean of 165,9 cm. Next, the table showing the descriptive statistical indicators for the feature researched (table 6) is presented.

Table 6. Table showing descriptive statistical indicators – Subjects' height (control sample)

indicator	
mean	165,9
median	164
standard deviation	7,8
minimum	156
maximum	182

Evolution of weight and body mass index (BMI)

A. Differences inside the samples

Analysis was made for every sample separately.

a. Differences between tests- experimental sample

In the initial test:

- mean in the *weight* feature was 63,4 kg with minimum 44 kg and maximum 80 kg and a standard deviation of 9,7;
- mean in the *body mass index* feature was 21,66 with a minimum of 17,19 and maximum 26,1 and standard deviation of 2,8.

In the final test:

- mean in the *weight* feature was 64,3 kg, with minimum 46 kg and maximum 78 kg and standard deviation of de 9,4;
- mean in the *body mass index* feature was 21,9 with minimum 17,97 and maximum 24,82 and a standard deviation of 2.

Next, the evolution of these results is illustrated in the descriptive statistical indicators tables (tables 7 and 8).

Table 7. Table showing descriptive statistical indicators – Subjects' weight (experimental sample)

	mean	standard deviation	minimum	maximum
initial test	63,4	9,7	44	80
final test	64,3	9,4	46	78

Table 8. Table showing descriptive statistical indicators – Body mass index (experimental sample)

	mean	standard deviation	minimum	maximum
initial test	21,66	2,8	17,19	26,1
final test	21,90	2	17,97	24,82

b. Difference between tests – control sample

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In the initial test:

- mean for the *weight* feature was 59,9 kg with minimum 45 kg and maximum 77 kg and standard deviation of 11,2;
- mean for the *body mass in*dex feature was 21,63 with minimum 17,94 and maximum 25,37 and standard deviation of de 2,6.

In the final test:

- mean for the *weigh*t feature was 67,4 kg with minimum 46 kg and maximum 89 kg and standard deviation of 11,9;
- mean for the *body mass in*dex feature was 24,36 with minimum 18,93 and maximum 27,94 and standard deviation of 2,6.

Next, the evolution of these results is illustrated in the descriptive statistical indicators tables (tables 9 and 10) is illustrated.

Table 9. Table showing descriptive statistical indicators – Subjects' weight (control sample)

	mean	standard deviation	minimum	maximum
initial test	59,9	11,2	45	77
final test	67,4	11,9	46	89

Table 10. Table showing descriptive statistical indicators – Body mass index (control sample)

	mean	standard deviation	minimum	maximum
initial test	21,63	2,6	17,94	25,37
final test	24,36	2,6	18,93	27,94

B. Differences experimental sample– control sample

In the initial test (student years) – there was no significant difference between the experimental sample subjects and the control sample subjects with regard to subjects' *weight* and body mass index; this was in fact, a prerequisite for carrying out the experiment.

In the test conducted 5 years after having started the occupational activity there were statistically significant differences in terms of s*ubjects'* weight and body mass index ($p<0,05$), this proving the experimental sample registered better progress.

The difference between means by decreasing the initial mean values from the final mean values has been calculated for each sample separately. Hence, the difference between means in the experimental sample was 0,9 kg and 7,5 kg in the control sample.

Mention should be made that when the experimental sample was first tested, 12 subjects had normal weight, 2 subjects were overweight and one was underweight, and in the final test all subjects had normal weight. In the control sample, 12 subjects had normal weight initially, 2 subjects were underweight and one subject was overweight, and when tested 5 years after having started to work, 9 of the subjects were overweight and 6 subjects had a normal weight.

Next, the charts for initial and final *weight and body mass index* evolution of the two samples are listed (figure 1 and figure 2).

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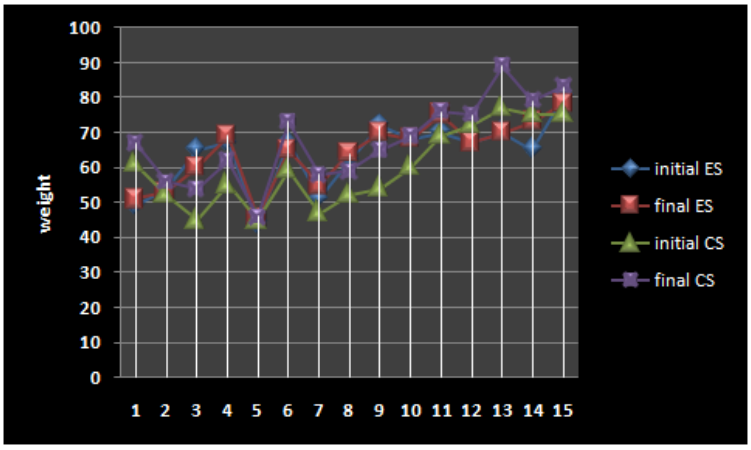

Fig. 1. Evolution of weight

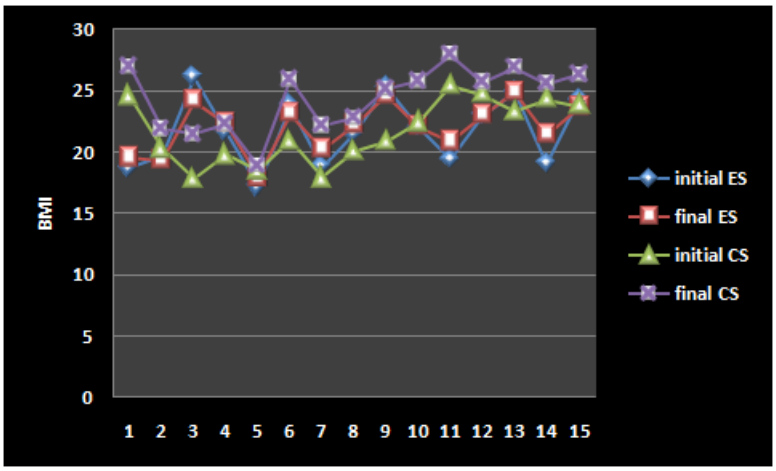

Fig. 2. Evolution of body mass index

As far as diet kept is concerned, the following were reported:

- experimental sample: most subjects reported complex diet with adequate nutrition and energy content, as well as controlled intake;

- control sample: most subjects reported unsuitable and imbalanced diet for the energy and nutrition-related needs, frequently associated to high intake of acidified beverages and concentrated sweets.

4. Conclusions

- Overweight is, in this study, caused by sedentary life and frequent consumption of high caloric density foods, rich in fats and sugars.
- In the assessment made 5 years after having started work, subjects who exercised and combined it with moderate, varied, balanced diet and adapted from a quality and quantity points of view (adapted and balanced diet from an energy, nutrition and quantity points of view) showed small body mass index variations (staying within the range of normal weight), while subjects who have not exercised and/ or consumed frequently unsuitable and imbalanced foods to their energy and nutrition needs, associated with high intake of acidified beverages and concentrated sweets showed larger variations of body mass index (most of them registering in the overweight range).

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- The most adequate way to remove fatty tissue is to use it as energy sublayer to perform muscle contraction. Physical activity, in this study, was not vigorous, but the effort was maintained for a longer period, which comes to show that calorie consumption is high enough to lose the fat mass, not muscle mass, as it happens with slimming cures.
- Adopting healthy habits such as: varied, balanced, moderate diet; eating at fixed times; permanent weight check; active lifestyle from physical standpoint (regularly exercising), contributes substantially to active life extension, alleviating (improving) of physical and functional parameters.
- This study points out that there is positive statistical association between regular and constant exercise and maintain normal values of body mass index.
- The recommendation is as follows:

- to implement prophylaxis or treatment methods by exercise and to change the eating habits among dental technologists which would lead to maintaining an optimum body weight.

- to implement a programme to promote a healthy lifestyle and weight loss in overweight persons by carrying out sanitary education activities so as to improve knowledge about prevention and risks due to sedentary life and imbalanced diet.

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