https://doi.org/10.7251/SSH2402144P **UDC:** 796.012.1-051:613.25
Original scientific paper ***Originalni naučni rad***

Nutritional Status and Body Composition in a Sample of Adults After Nutrition Counseling

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Abstract: *Obesityis one of the most common risks for chronic non-communicable diseases. The aim of this work was to assess changes in nutritional status and body composition in working adults after nutrition counseling. The research was conducted during 2022 at the College of Vocational Studies in Subotica, Serbia. The initial assessment included 31 participants and 18 participants in the control assessment. Data on physical activity were collected by a questionnaire. Nutritional status and body composition were determined using the bioimpendancescale (InBody 230). The five-months nutrition counseling included practical tips for a balanced diet and physical activity. Pearson's correlation coefficient and Wilkoxon's rank test were applied for the statistical analysis. A quarter of participants had a sedentary lifestyle and only 13% of them are physically active at least 150 minutes a week. The average BMI 27.7 kg/m², and 62% of participants were overweight or obese. The respondents weighed an average of 26.6 kg, i.e. 31.2% of fat tissue. After the conuseling, a third of participants experienced a decrease in percentage of fat tissueand abdominal fat and 40% had an increase in muscle mass. However, 48% of respondents had an increase in BMIafter counseling.*
The body weight, body mass index or the amount of adipose tissue did not change significantly after nutrition conuseling, butthe deviation of the actual compared to the ideal body masssignificantly greater. After the nutrition counseling, an increase in muscle mass, i.e. lean body mass and total body waterwas determined.
Keywords: *BMI, fat mass, muscle mas, total body water.*

Abbreviations: *non-communicable diseases (NCDs); body mass index (BMI), ideal body mass (IBM), relative body mass (RBM). actual body mass (ABM), Fat mass (FM), percentage of fat mass (PFM), Abdominal fat (AF), muscle mass (MM), total body water (TBW, kg), clean (fat-free) body mass (CBM),*

INTRODUCTION

Overnutrition and obesity represent a significant public health problem and one of the most important risk factors for the development of chronic non-communicable diseases (NCDs). Obesity is an excessive, progressive accumulation of body fat. Obesity occurs when caloric intake is greater than energy needs for a long period of time, which means that there is an imbalance between nutrient intake and energy consumption (Simić B, 1998).

Obesity increases overall mortality. The life expectancy of obese adults is about 5 years shorter compared to optimally nourished people. Obesity is thought to be responsible for 1.2 million deaths annually globally. About 7% of the total funds intended for the treatment of all diseases are spent on the treatment of obesity and its consequences in Europe (Simonyi, Bedros, Wittmann, 2022). An increase in BMI by 5 kg/m² increases morbidity from cardiovascular diseases by 40%, diabetes by 60-120%, but also overall mortality by 30%. (Croatian Medical Association, 2014).

According to Eurostat data, 53% of the adult population in the countries of the European Union have a body mass index above 25 kg/m². A better economic status and a higher level of education of the population is associated with a higher incidence of obesity (Eurostat, 2024). In Serbia, more than half of the population (57.1%) is overnourished, i.e. pre-obese (36.3%) and obese (20.8%). Excess body weight poses a significant problem from an early age, given that in Serbia 29.5% of children and youth are overweight (12.9% of children aged 5-14 are obese, and 16.6% are moderately obese) (Institute of Public Health of Serbia, 2021).

Abdominal, central obesity poses a particular health risk. Visceral fatty tissue releases free fatty acids, which leads to increased infiltration of the liver and muscles by fat cells and cell resistance to insulin. Over a long period of time, central obesity can lead to diabetes mellitus, disorders of lipid status and cardiovascular diseases. These data indicate that it is necessary to change the approach to solving this problem. Reducing BMI by 5-10% significantly

reduces the risk of all comorbidities of obesity. Proper, balanced nutrition and regular physical activity are of key importance in achieving energy balance and optimal nutrition. Contemporary society and the rhythm of life require that all information that is important for the promotion of a proper lifestyle be available in a digital environment, preferably through different types of media (Ash, Contento, Olfert & Koch, 2023). It has been shown that nutrition counseling, as a part of multi-component programs, may improve dietary habits in obese adults (Al-Nimr, 2020). Individualized consultations are the most common method for the weight management of overweight and obesity in adults (Williams, 2019).

The aim of the work is to assess the changes in nutritional status and body composition of the adult, working population after a five-month online nutrition counseling.

MATERIAL AND METHODS

The research was conducted as a prospective, evaluation study in the period from May to October 2022. The sample consisted of employees at the College of Vocational Studies for the Education of Preschool Teachers and Sports Trainers in Subotica. Participation in the research was voluntary, anonymous and free of charge, which the participants confirmed by signing a written informed consent. The research was approved by the Ethics Committee of the College in May 2022. As part of the research, basic demographic data, data on physical activity and anthropometric measurements were collected. Data were collected at the beginning of the research (initial assessment) and after the nutrition counseling (control assessment).

Data on the frequency and level of physical activity at work and in free time on a weekly basis were collected using a questionnaire created for research purposes. Based on physical engagement at work and in free time, physical activity level (PAL) is classified as follows: low level of physical activity/sedentary style (PAL 1.4), moderate level of physical activity/moderately active style (PAL 1, 5), and a high level of physical activity/active (PAL 1.6) and a very active style (PAL 1.7) (National Agricultural Library, 2022).

Anthropometric measurements included measurement of body height (HW), body mass (WW). To measure body composition, a device based on the principle of bioelectrical impedance (model InBody 230) was used. Thefollowing data were obtained: body mass (TM, kg), fat mass (kg), percentage of adipose tissue (%), amount of abdominal fat (kg), body water (kg), muscle mass (kg), clean-lean body mass (kg), recommended control of fat mass (kg) and muscle mass (kg) in order to achieve ideal body mass, recommended daily energy intake (kcal).

The obtained values are classified according to the reference values proposed by the manufacturer of the apparatus for measuring body composition into the following categories: 1. Low; 2. Extremely low; 3. Optimal; 4. Borderline elevated and 5. Increased value (InBody230, 1996).

Body height (TV, cm) of the subjects was measured by an anthropometer using the Martin procedure. Based on anthropometric measurements, the following anthropometric indicators were calculated: body mass index (BMI kg/m^2), ideal body mass (IBM), relative body mass (RBM).

Classification of the body mass index (kg/m^2) of the subjects was carried out according to the recommendations of the World Health Organization (WHO, 1995).

In order to determine the deviation of the current body mass from the optimal one, the BMI (kg) of the subject was determined according to the Lorenz formula: BMI = TVcm–100–(TVcm-150/ 4 ♂ or 2.5 ♀ (Novaković, Mirosavljev& Jevtić, 2005).

In order to determine the percentage deviation of the actual body mass (ABM) from the ideal (IBM), the relative body mass (RBM, %) was determined, according to the formula: (RBM = ABM / IBM x 100). The values are classified as: 1. Risk for malnutrition (≤89%); 2. Optimal nutrition (90-109%); 3. Excessive body mass (110-119%) and 4. Obesity (≥ 120%) (Simić, 1998).

After the initial assessment, nutrition counseling was conducted. The nutrition counseling included electronic educational material with practical tips for a balanced diet and recommendations for physical activity that was delivered to the participants on a monthly basis for five months.

The statistical program package IBM Statistics SPSS 20 was used for the statistical analysis of the data. The data were presented using descriptive statistical analysis. The non-parametric Pearson's $\chi 2$ test was used to examine the correlation between two characteristics. Wilcoxon's rank test was used to analyze changes in anthropometric measures and indicators, as well as the direction of those changes after counseling. Values $p \leq 0.05$ were considered statistically significant.

RESULTS

In the initial assessment31 employees participated, 21 women (68%) and 10 men (32%), with an average age of 44 years. The first basic group was divided into two age categories: 1. younger respondents ≤ 44 years (n 15, 48%), and 2. older respondents ≥ 45 years old (n 16, 52%). The majority (75%) of respondents stated that they live in the city, with an average of three family members. More than half (59%) of respondents is engaged in the teaching process, while 41% of respondents are employed in auxiliary or administrative jobs.

The control assessment included 18 employees (58%), 12 women (39%) and 6 (19%) men. The median age of the subjects at the follow-up assessment was 42 years. The results related to physical activity at work and in free time are shown in **table 1.**

Half of the respondents are engaged in the work that is not physically demanding. A greater number of employees under the age of 45 are engaged in physically undemanding jobs and they significantly more often use a car as a means of transportation ($\chi 2$=0.472, p=0.007**).

Taking into account physical activity at work and during free time, a quarter of respondents have a sedentary lifestyle. Half of the respondents indicated that they are moderately physically active in their free time; a quarter is physically active for at least half an hour a day, while only 13% is physically active for 150 minutes a week.

At the initial survey, 42% of employees stated that there was a change in body mass in the previous three months from the beginning of the survey. In a third of cases, it was an increase in body weight. In the period between February and May 2022, 20% of respondents gained an average of 2-4 kg in body weight, and 13% gained 5 to 10 kg.

Table 1. *Physical activity at work and in free time at the initial assessment*

Variables	Total N (%)	Age ≤ 44 year	≥ 45 year	Correlation with age
Physical activity at the workplace				
1. Physically demanding	4 (13)	2 (7)	2 (7)	χ^2=-0.111; p=0.551
2. Physically moderately demanding	9 (29)	3 (10)	6 (19)	
3. Physically undemanding (sitting)	18 (51)	10 (32)	8 (26)	
Physical activity in free time				
1. Easy	8 (26)	5(16)	3 (10)	χ^2=0.000;
2. Moderate	15 (48)	5 (16)	10 (32)	p=1.000
3. Intensive	8 (26)	5 (16)	3 (10)	
Frequency of engaging in additional physical activities				
1. Everyday	4 (13)	3 (10)	1(3)	χ^2=-0.156; p=0.401
2. Several times a week	12 (39)	3 (10)	9 (29)	
4. Occasionally	14 (45)	8 (26)	6 (19)	
5. Never	1 (3)	1 (3)	-	
Time spent on additional physical activities during the week				
1. 15-25 minutes	8 (26)	4 (13)	4 (13)	χ^2=-0.039; p=0.834
2. 30-45 minutes	8 (26)	4 (13)	4 (13)	
3. 45-60 minutes	1 (3)	-	1(3)	
4. over 60 – 150 minutes	9 (29)	4 (13)	5 (16)	
5. over 150 minutes	4 (13)	2 (7)	2 (7)	
6. I am not physically active	1 (3)	1 (3)	-	
Means of transport when arriving/departing from work				
1. Hiking	3 (10)	1 (3)	2 (7)	χ^2=-0.129; p=0.490
2. Bicycle	4 (13)	2 (7)	2 (7)	
3. Motorcycle, e-bike	1 (3)	1 (3)	-	
4. Car	20 (64)	8 (26)	12 (39)	
5. Public transport	3 (10)	3 (10)	-	
Lifestyle				
1. Sedentary	8 (26)	5 (16)	3 (10)	χ^2=0.000;
2. Moderately (weakly) active	15 (48)	5 (16)	10 (32)	p=1.000
3. Active lifestyle	8 (26)	5 (16)	3 (10)	

Change in body weight in the previous three months				
1. Yes	13 (42)	6 (19)	7 (23)	χ^2=0.078;
2. No	13 (42)	6 (19)	7 (23)	p=0.675
3. I don't know	5 (16)	3 (10)	2 (7)	
Change in body weight in the form of:				
1. Increases	10 (32)	6 (19)	4 (13)	χ^2=-0.306; p=0.094
2. Reductions	3 (10)	-	3 (10)	

30 subjects participated in the analysis of body composition by bioelectrical impedance at the initial assessment, and 18 (58%) subjects participated in the control assessment.

Excessive body mass was found in 55% of respondents. After counseling, 7 (23%) respondents experienced a reduction in body weight, although this did not affect the change in body weight categorization. In 11 (36%) subjects, there was an increase in body weight in the five-month period.

Based on the calculation of the ideal body weight, the subjects had an average of 18 kg of excess body weight at the initial assessment. At the control measurement, 14 (45%) subjects (p=0.008) experienceda significant increase in the deviation of the ABM compared to IBM. According to RBM at the initial assessment, excessive weight was identified in 81% of the respondents.

The average value of BMI was 27.7±7.4 kg/m^2. An increase in BMI was found in two thirds (62%) of the subjects and one third were found to be obese (BMI ≥ 30 kg/m2). Observing by age categories, overweight was more prevalent in the older and obesity in the younger age group (total 17%, compared to 13%), although the correlation was not significant (χ2=-0.034; p=0.856). At the control measurement, 6 (19%) subjects had a decrease in BMI. Only in one respondent, the decrease in BMI affected the change in BMI categorization, while an increase in BMI was registered in a statistically significantly larger number of employees(p=0.001) (table 2).

Table 2. *Anthropometric data of the subjects at the first and control assessment, the number and direction of registered changes after the nutrition counseling*

Variables	Initial assessment (n 30. 97%)		Control assessment (n 18. 58%)		Wilcoxon rank test		The significance of the change
	$\bar{X}$ ± SD	Range	$\bar{X}$ ± SD	Range			
Body height (cm)	172.0±9.2	156-189	172.7±8.7	156-188			
Body mass (BM. kg)	83.5±24.9	50.6-168.0	77.65±24.9	51.9-155	Reduced: Raised: Unchanged:	7 11 0	Z = -1.177 p = 0.239
BM classification	N (%)		N (%)				
2. marginally low 3. optimal 5. elevated	1 (3) 13 (42) 17 (55)		- 12 (39) 6 (19)		Reduced: Raised: Unchanged:	0 1 17	Z = -1.000 p = 0.317
Category average	4.1 ±1.1		3.7 ±1.0				
Ideal body mass (IBM. kg)	64.9 ±7.4	53.6-78.5	65.2 ± 7.1	53.6-78.5			
Deviation of the actual BM compared to the ideal (kg)	18.3 ±21.9	-95 - +9	12.4 ± 21.2	-7.7-82.5	Reduced: Raised: Unchanged:	4 14 0	Z = -2.635 p = 0.008**
Relative body mass (RBM. %)	128.2±33.2	85-231	117.9±30.0	87 -214	Reduced: Raised: Unchanged:	7 11 0	Z = -1.286 p = 0.198
Classification of RBM	N (%)		N (%)				

1. ≤ 89% (malnutrition)	2 (7)		1 (3)		Reduced: Raised: Unchanged:	2 2 14	Z= 0.000; p= 1.000
2. 90-109% (optimal nutrition)	7 (23)		8 (26)				
3. 110-119% (excessive nutrition)	7 (23)		5 (16)				
4. ≥ 120% (obesity)	15 (48)		4 (13)				
Category average	3.13 ± 1.0		2.7±0.9				
Body Mass Index (BMI. kg/ m^2)	27.7 ±7.4	18.4-52.0	25.7±6.9	19.1-47.9	Reduced: Raised: Unchanged:	6 12 0	Z = -0.874 p = 0.382
Classification of BMI	N (%)		N (%)				
1.< 18.5 (malnutrition)	1 (3)		-		Reduced: Raised: Unchanged:	1 15 2	Z = -3.350 p = 0.001**
2.18.5 - 24.9 (optimal nutrition)	11 (35)		-				
3.25 - 29.9 (excessive nutrition)	10 (32)		12 (39)				
4.30.0 - 34.99 (obesity 1°)	3 (10)		-				
5. 35.0 - 39.99 (extreme obesity 2°)	4 (13)		6 (19)				
6. > 40.0 (morbid obesity 3°)	2 (7)		-				
Category average	3.1 ±1.3		3.7 ±1.0				

** *Statistically significant difference at p ≤ 0.01 level.*

The largest number (75%) of respondents at the initial assessment had an increased amount of fat mass, abdominal fat and percentage of fat tissue, thus a significant risk for the development of NCDs. Excessive amount of fat mass was significantly more often registered in highly educated respondents, who are employed in the teaching process (p= -0.045). At the control assessment, about a third of the subjects had a decrease in fat mass (n=9; 29%), percentage of fat tissue (n=11, 4%) and abdominal fat (n=12.4%), but these changes were not statistically significant. Fat mass indicators of the subjects at the initial and control measurement, number and direction of registered changes after the nutrition counseling are presented in table 3.

Table 3. *Fat mass indicators of the subjects at the initial and control assessment, number and direction of registered changes after the nutrition counseling*

Variables	**Initial assessment (n 30. 97%)**		**Control assessment (n 18. 58%)**		**Wilcoxon rank test**		**The significance of the change**
	$\bar{X}$ ± SD	**Range**	**$\bar{X}$ ± SD**	**Range**			
Fat mass (FM. kg)	26.6±15.2	8.5-84.0	23.5±14.6	6.0 -71.9	Reduced: Raised: Unchanged:	9 9 0	Z = -0.458 p = 0.647
Classification FM (kg)	*N (%)*		*N (%)*				
1. low 2. marginally low 3. optimal 4. borderline elevated 5. elevated	1 (3) 1 (3) 5 (16) 2 (7) 21 (68)		2 (7) - 5 (16) 2 (7) 9 (29)		Reduced: Raised: Unchanged:	4 0 14	Z = -1.890 p = 0.059
Category average	4.4 ±1.1		3.9 ±1.4				
Percentage of fat mass (PFM. %)	31.2±10.2	6.0-50.0	28.1±10.4	5.8 -46.4	Reduced: Raised: Unchanged:	11 6 1	Z = -1.731 p = 0.083
Classification of PFM	*N (%)*		*N (%)*				

1. low	-		1 (3)		Reduced:	1	Z = 0.000
3. optimal	7 (23)		3 (10)		Raised:	1	p = 1.000
5. elevated	23 (74)		14 (45)		Unchanged::	16	
Category average	4.5 ±0.9		4.4 ± 1.5				
Abdominal fat (AF. kg)	14.1 ±6.1	5.7-30.0	12.4 ± 6.2	2.3- 27.5	Reduced:	12	Z = -1.541
					Raised:	5	p = 0.123
					Unchanged:	1	
Classification AF	*N (%)*		*N (%)*				
1. low	-		1 (3)		Reduced:	1	Z = 0.000
3. optimal	7 (23)		3 (10)		Raised:	1	p = 1.000
5. elevated	23 (74)		14 (45)		Unchanged:	16	
Category average	4.5 ±0.9		4.4 ± 1.5				
Recommended control of fat mass (kg)	-12.6 ±14.2	-70- +2	-10.5 ±14.6	-57.3-+5.1			
Classification	*N (%)*		*N (%)*				
Range: - 70 to -1 kg	27 (87)		15 (48)		Reduced:	7	Z = -0.52
Range: + 0.5 to +2 kg	3 (10)		3 (10)		Raised:	11	p = 0.601
					Unchanged:	0	
Range Average:	-12.6 ± 14.2		-10.5 ± 14.6				

** *Statistically significant difference at p ≤ 0.01 level.*

At the control assessment a large number of respondents experienced an increase in muscle mass (n=12, 39%) and a statistically significant increase in lean mass (n=14, 45%). As a result, a significant increase in the amount of body water (bound to glycogen in the muscles) was registered (table 4).

Table 4. *Indicators of the subjects' muscle composition at the first and control assessment, number and direction of registered changes after nutrition counseling*

Variables	**Initial assessment (n 30. 97%)**		**Control assessment (n 18. 58%)**		**Wilcoxon rank test**		**The significance of the change**
	$\bar{X}$ ± SD	**Range**	**$\bar{X}$ ± SD**	**Range**			
Muscle mass (MM. kg)	30.8 ±8.4	18.7-49.1	30.2 ± 8.18	19.6 -47.4	Reduced:	6	Z = -1.679
					Raised:	12	p = 0.093
					Unchanged:	0	
Classification of MM	N (%)		N (%)				
1. low	3 (10)		1 (3)		Reduced:	1	Z = -1.081
2. marginally low	2 (7)		1 (3)		Raised:	5	p = 0.279
3. optimal	12 (39)		11 (36)		Unchanged:	12	
4. borderline elevated	2 (7)		-				
5. elevated	11 (36)		5 (16)				
Category average	3.5 ± 1.3		3.4±1.1				
Total body water (TBW. kg)	40.6±10.4	25.6-62.8	39.9 ±10.3	26.4 -61.0	Reduced:	5	Z = -2.061
					Raised:	12	**p = 0.039***
					Unchanged:	1	
Classification TBW	N (%)		N (%)				
1. low	2 (7)		-		Reduced:	0	Z = -2.000
2. marginally low	2 (7)		1 (3)		Raised:	4	**p = 0.046***
3. optimal	14 (45)		12 (39)		Unchanged:	14	
4. borderline elevated	1 (3)		-				
5. elevated	11 (36)		5 (16)				
Category average	3.6 ± 1.3		3.5 ± 1.0				
Clean (fat-free) body mass (kg)	55.3±14.0	34.8-50.6	54.2±13.6	36.1 -83.2	Reduced:	4	Z = -2.266
					Raised:	14	**p = 0.023***
					Unchanged:	0	

Classification of CBM	N (%)		N (%)				
1. low	1 (3)		-		Reduced:	0	Z = -1.342
2. marginally low	1 (3)		-		Raised:	2	p = 0.180
3. optimal	15 (48)		13 (42)		Unchanged:	16	
5. elevated	13 (42)		5 (16)				
Category average	3.8 ±1.2		3.6 ± 0.9				
Recommended control of muscle mass (kg)	1.4 ± 2.5	0.0-8.3	1.5 ± 2.2	0.0-6.9			
Classification of recommended control odmuscel mass	*N (%)*		*N (%)*				
Range: 0.0 kg (optimal)	20 (65)		11 (36)		Reduced:	8	Z = -1.956
Range: + 0.5 to 8 kg	10 (32)		7 (23)		Raised:	1	p = 0.050
					Unchanged:	9	
Range Average:	1.4 ± 2.5		1.5 ±2.2				

** Statistically significant difference at the p ≤ 0.05 level.*

DISCUSSION

Employees with an average age of 44 participated in the initial assessment. Only 58% of employees, average age 42, responded to the control assessment after the six-month advisory work. It is possible that a large number of respondents after the initial assessment and nutrition counseling did not become more aware of the importance of regular body weight control in order to prevent NCDs. Based on the average age at the control assessment, it can be assumed that younger respondents are more aware of the importance of body weight control.

Respondents included in this research predominantly perform sedentary jobs, which is expected considering the nature of jobs in higher education. The results of the national survey on the health of Serbian residents show that residents of urban areas, with a higher level of education and with higher incomes, are more inclined to a sedentary lifestyle (Institute of Public Health of Serbia, 2021). Only 13% of respondents are physically active for at least 150 minutes a week, as recommended by the WHO for adults in order to prevent NCDs (WHO, 2018). Looking at the physical activity habits of the adult population of Serbia, a national survey shows that only 9.7% of adults engage in physical activity for at least 30 minutes a day. The same study showed that physical activity decreases with age and that young people aged 18-24 are the most active (Institute of Public Health of Serbia, 2021). In this research, a quarter of the respondents were physically active for at least an hour a day. At the initial measurement, the subjects of the older age group (>45 years) were physically active more regularly and longer than the younger subjects. It is possible that due to the presence of chronic diseases, older respondents are more aware of the importance of physical activity in controlling and preserving their health, or that physical activity is prescribed to them as part of the treatment of the underlying disease.

Based on BMI values, more than half of the respondents were overweight, which reflects inadequate habits related to nutrition and physical activity. Only a third of the respondents had a normal weight status. This result is in accordance with data on the state of nutrition at the national level (Institute of Public Health of Serbia, 2021).

After six months of counseling, a large number of employees (37-39%) experienced a significant increase in body weight and body mass index, and a quarter also experienced an increase in fat mass and abdominal fat. Taking into account that a certain number of respondents at the initial measurement indicated a significant increase in body weight in the previous three months before the survey, it can be concluded that the trend of increasing body weight continued even after the implementation of the nutrition counseling. In the case of the aforementioned respondents, counseling had no effect on changing habits related to nutrition and physical activity.It is possible that the counseling was not effective due to the length of its duration, intensity, form in which it was carried out. Or it is possible than nutrition counseling is not enough to lead to significant changes in eating habits. In a study conducted by Al.Nimr et al. in a sample of obese adults, a 12-week intensive nutrition counseling program contributeted to a significant weight reductionas well as a decrease in waist circumference (Al-Nimr,2020). Williams et al. concluded that individualized consultations with dietitians have small but significant effect on the control of body weight (Williams, 2019. It is clear the differences in methodology, outcomes that are monitored lead to different results of the effect of various interventions on body weight.

The main weaknesses of this study are related to the relatively small and unrepresentative sample, and especially to the number of respondents who responded to the control assessment. Changes in the frequency, duration, and intensity of physical activity after counseling were not monitored, nor were changes in eating habits, so it cannot be asserted with certainty whether counseling had an effect on changes in eating habits and physical activity. The advantages of the research are related to the use of objective methods for assessing body composition as well as numerous indicators of nutritional status. The obtained results can be used for planning similar studies or public health interventions aimed at reducing the risk factors of NCD's in the working population.

CONCLUSION

Insufficient physical activity, sedentary lifestyle and excessive nutrition are significantly represented in the examined group of employees in a higher education institution.

The body weight, body mass index or the amount of adipose tissue did not change significantly after nutrition conuseling. After the nutrition counseling and the six-month follow-up, there was an increase in the mentioned parameters and a significantly greater deviation of the actual compared to the ideal body mass. After the nutrition counseling, an increase in muscle mass, i.e. an increase in lean body mass and total body waterwas determined which may be the result of increase in physical activity. However, the mentioned changes were not reflected in changes in body weight or in the amount of fat mass, which indicates that the respondents did not change eating habits and that possibly they tried to influence the reduction of body weight by means of physical activity.

Founding: *The research was conducted as part of the project "Assessment of Metabolic Syndrome Risk Factors in the Working Population," funded by the Provincial Secretariat for Higher Education and Scientific Research of Serbia [number: 142-451-2256/2022-02/1].*
Conflict of interest: *The authors declare that they have no conflict of interest / competing or financial interests.*

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Primljen: 29. maj 2024. / Received: May 29, 2024
Prihvaćen: 26. septembar 2024. / Accepted: September 26, 2024