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CHANGES IN THE CARDIOVASCULAR FITNESS AND BODY COMPOSITION OF WOMEN UNDER THE INFLUENCE OF THE AEROBIC DANCE

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Abstract. *The effects of aerobic dance were investigated on the cardiovascular fitness and body composition of 46 women aged 20 to 25. The experimental group was made up 26 female subjects, and the control group numbered 20 subjects. The experimental program of the aerobic dance lasted for a period of three months, with sixty-minute training sessions three times a week. The aerobic dance part of each workout lasted for 40 minutes, and involved high, low and moderate impact segments. The cardiovascular fitness was evaluated by means of the following parameters: resting heart rate, heart rate under strain, systolic arterial blood pressure (mmHg), diastolic arterial blood pressure (mmHg), the absolute value of maximal oxygen uptake (l/min) and the relative value of maximal oxygen uptake (ml/kg/min). Body composition was evaluated by means of the following measurements: body height (cm), body weight (cm), average thorax volume (cm), girth (cm), back skinfold (mm), abdominal skinfold (mm). The basic descriptive statistics coefficients were calculated for all the data from the initial and final measuring, along with the Student t-test and multivariate and univariate covariance analysis (MANCOVA and ANCOVA). There is a statistically significant difference in the variables for cardiovascular fitness and body composition between the initial and final measuring in the experimental group and between the experimental and control group at the final measuring. This study confirmed previous conclusions about significant positive influence of the aerobic dance trainings on the changes in the cardiovascular endurance and body composition parameters in young adult women.*

Key words: *functional abilities, anthropometric characteristics, VO2max, aerobic training, women*

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1. INTRODUCTION

In the numerous research related to fitness, health, recreation and training, what was cited as being the main subject matter were the effects of various kinds of aerobic exercise training used with the aim of improving the functional abilities of the human body, body composition, motor abilities, psychological characteristics and cognitive abilities.

Being at a certain fitness level means being able to perform everyday tasks energetically, with zeal, but that there is still some "energy" left over to be used in one's leisure time and in some special circumstances. It is also the ability to endure stress, which is of great importance for one's health. Fitness activities demand the activation of the entire body, especially the cardiorespiratory and locomotor system. Since exercising can influence brain activity, one could claim that fitness activities, to a certain extent, lead to the improvement of mental liveliness and emotional stability (Kostić, 1999).

When it comes to recreation and the fitness activities of people of various ages, aerobic and anaerobic activities are mainly combined with the aim of producing a more complex impact on one's abilities and health. Aerobic dance demands a group organization of the exercise and accompanying music of a certain tempo, rhythm and dynamics. It is one of the workouts used to develop cardiovascular fitness. It consists of various dance steps, skips, jumps, turns and movements which are performed in all directions and on various plains and are used in accordance with the shape and abilities of the person exercising. Coaches often regulate the intensity of the exercise during the workout itself by activating a number of different body parts. The intensity is always greater if several body parts are activated at the same time.

Much research exists which has confirmed the positive influence of physical exercise on cardiovascular endurance, muscular strength, flexibility and body composition (Gaesser and Rich, 1984; Pollock, Foster, Knapp and Schmidt, 1987; Hagberg, Montain, Martin, et al., 1989; Debusk, Stenestrand, Sheehan and Haskell, 1990; Kohrt, Malley, Coogan, et al., 1991; Ogawa, Spina, Martin, et al., 1992; Gaber, McKinney, Carleton, 1992; Swain, Abernathy, Smit, Lee and Bunn, 1994; Paton, Graves, Pollock, et al., 1996; DeAngelis, Vinciguerra, Gasbarri, & Pacitti, 1998; Toraman and Ayceman, 2004; Toraman, Erman and Agyar, 2004).

Based on the recommendations of the American College of Sports Medicine, issued for people who would like to maintain or allow the further development of their abilities, it is sufficient to exercise three to five days a week at an intensity of 55/65% to 90% of the maximal heart rate, for a period of 20 to 60 minutes of constant training or training in bouts using a rhythmic, aerobic activity which activates large muscle groups in the human body.

An improvement in VO2max is directly related to the frequency, intensity and duration of the workout (Hickson and Rosenkoetter, 1981; Wenger and Bell, 1986; Gossard, Haskell, Barr Taylor et al., 1986; Takeda, Tanaka and Asamo, 1994).

Certain fitness investigations have been carried out on subjects from the younger (Armstrong and Welsman 2002, Guerra et al., 2002) and older population, as well as elderly men and women, (Shigematsu et al., 2002, Kallinen et al., 2002). These investigations had as their aim to check the effects of concrete aerobic dance exercise modes.

Grant, Corbett, Davies, Aichison, Mutrie, Byrne, Henderson and Dargie (2002) compared the obtained effects of two different aerobic exercise models on the functional abilities of women (the training models consisted of aerobic dance or walking). The aero-

bic dance program had a better effect on VO2max and the maximal heart rate than the walking program. Aerobic exercise has as its positive effect a decrease in hypertension (Hagberg, Montain, Martin, et al. (1989) and health improvement in the case of other illnesses.

The effects of exercising are positive and are significant for physiological changes, primarily in the case of female subjects who were classified as needing cardiovascular exercises of a lower level to being with, as stated by Eickhoff, Thorland and Ansorge (1983).

The research carried out by Thompson, Goodroe, Johnson and Lamberth (1991) analyzed the changes of VO2max, heart rate, systolic blood pressure, diastolic blood pressure, the accumulation of blood lactate under the influence of an aerobic dance program (one group) and an aerobic dance program accompanied by simultaneous strength exercises (the second group) for the upper body (1 pound weights). The female subjects who trained aerobic dance with weights had better results. There were no differences in the values of heart rate, arterial blood pressure and lactate between the groups.

The cardiovascular fitness parameter values (functional abilities) and the values of certain morphological characteristics are important not only in recreation, but in all sports as well. A finely shaped and built body has a special significance in the kinds of sports where aesthetics is evaluated (Kostić, Zagorc and Uzunović, 2004). Yet, there are many people who are not in sports but would like to have finely built bodies, especially women. For some of them, it is the only motivation for their exercise.

The need of a young female to have a shapely body was used as an incentive for them to agree to participate in our experiment in the implementation of aerobic dance.

The subject matter of this research is the investigation of the effects of aerobic dance. The results of the research should give an answer to the question of what effects will be achieved on cardiovascular fitness parameters and body composition parameters of the female subjects after a concrete aerobic exercise.

The aim of the research is to determine the effects of aerobic dance on the cardiovascular fitness and body composition of the female subjects.

The hypothesis is that the effects of the experimental model will be positive and statistically significant for the functional abilities and anthropometric characteristics.

2. METHODS

The Sample of Subjects

The sample numbered 46 female students University of Niš, aged 20 to 25. The experimental group numbered 26 female students who participated in organized workouts in a fitness club in Niš during 2004. The control group was made up of 20 female subjects who had not participated in the organized and systematic training sessions of any sport. The members of the experimental group attended the training sessions regularly and were motivated to exercise. Each of the subjects was allowed to miss five of the overall 36 training sessions for medical reasons. During the course of the exercise, all the subjects were healthy and gave informed consent. All of the subjects of the experimental group agreed not to participate in any other sports activities for the duration of the experiment.

The measuring instruments

For the evaluation of cardiovascular fitness the following were used: resting heart rate, (number of heart beats per minute), heart rate under strain (number of heart beats per minute), systolic arterial blood pressure (mmHg), diastolic arterial blood pressure (mmHg), the absolute value of oxygen uptake (l/min) and the relative value of oxygen uptake (ml/kg/min). The resting heart rate frequency was measured by an auscultatory method on the thorax in the heart region. The measuring took place while the subject was seated after a rest period of 15 minutes prior to the measuring itself. The resting arterial blood pressure was measured using the "Tele Optik" brand measuring device under the same conditions as the resting heart rate.

The pulse frequency under strain was obtained in the second 30 seconds of the fifth minute of the Astrad test. By multiplying it by two we obtained the resting heart rate frequency per minute.

The maximal values of oxygen uptake were obtained by the indirect method of the bicycle-ergometer of the "Kettler" brand, in the manner described by Astrand (1960). To evaluate the V02max, pulse was measured in the fifth and sixth minute of the workout with a load of 100 watts. The pulse frequency at a stable state was taken (the difference in the pulse frequency of the fifth and sixth minute was no greater than five beats, and the value of pulse frequency ranged from 120-170 beats per minute). The V02 max values were read off a chart based on the pulse frequency in the sixth minute of the abovementioned weight watts.

The anthropometric measurings were carried out using standard instruments and in accordance with the methodology recommended by the International Biological Program (Weiner & Lourie, 1968). Body height was evaluated (in cm), along with body weight (in kg), average thorax volume (in cm), girth (in cm), back skinfold (in mm) and abdominal skinfold (in mm).

The experimental program

The basic characteristics of the aerobic dance

The overall number of training sessions during the experimental program: 36. The number of training sessions per week: three. Intensity: 60%-80% of HRmax.

Number of weeks: 12. The duration of an individual training session: 60 min.

The duration of an individual aerobic dance: 40 min.

The structure of each individual workout encompassed: a warm-up, the "cardio" part and the cool-down.

The warm-up lasted for 10 minutes. The following movement patterns were used: eight different multi-joint exercises which were used for the purpose of preparing the joints and large muscle groups for the aerobic part of the exercise which was to follow. Each exercise was repeated 8 to 10 times in a row.

The "cardio" part of the workout was based on the "high-low"model concept. The overall duration of the main part was 40 minutes. The model consisted of low-impact, high-impact and moderate-impact aerobic dance sections. Depending on the aerobic dance sequence, the subjects' pulse should have been around 120 during the low-impact, 140 for the moderate-impact and around 160 for the high-impact part. The number of beats was calculated on the basis of the well-known formula: from 220 subtract one's age

and then multiply that number by 60%, 70% and 80%. In that way, the intensity of the training was 60% (low-impact), 70% (moderate-impact) and 80% (high-impact). The intensity of the exercise in each of the choreographed sequences was from 60% to 80% of the maximum, based on which part of the workout it was trained in. Each of the subjects independently monitored her own heart beat by counting the beats over a ten-second interval, and then by multiplying that number by six. The devices used for the low-impact choreographed sequences were: the "step -touch", "side-to-side", "V-step", walking back and front, a combination of the aforementioned steps with the addition of kick steps in all directions and angles. The workouts used in the moderate-impact choreographed sequences consisted of various combinations of the aforementioned steps including hand and body movements used to increase intensity. The contents of the high-impact part encompassed all the disco dance steps which are performed with skipping in place and as part of any combinations, with jumps, turns and more intense hand movements. If any one of the female subjects reached a heart rate of 160, she did not stop exercising, but stopped performing the hand motions, which in turn had an impact on the intensity of the workout. Each choreographed aerobic dance sequence was accompanied by the appropriate tempo of primarily DISCO music (a range of 120 to 150 bpm).

The cool-down part of the workout lasted for 10 minutes. During the stretch exercises the female subjects relaxed the tension in their bodies. While performing each exercise, special attention was paid to breathing. The stretch exercises were accompanied by quiet, calm, slow music. Its contents: stretching exercises which simultaneously activated several body parts, and where each exercise was repeated three to four times. The subjects had to remain for at least 10 second, 20 at the most, in the final stretching position.

Data analysis

The basic statistical parameters were calculated for all the data: the mean, standard deviation, minimal value and maximal value. To determine the differences between the initial and final measuring of each variable of the experimental and control group, the Student –t test was calculated. For the purpose of determining the difference between the experimental and control group at the final measuring (the effects of the exercise carried out under the influence of the experimental program), a multivariate and univariate covariance analysis was used in order to neutralize the differences between the two groups from the initial measuring.

The data was processed by means of the SPSS 8 statistical program.

3. THE RESULTS

The basic descriptive statistics coefficients of the applied variables are shown in Table 1 and Table 2. The results shown in Table 1 indicate that a statistically significant reduction in heart rate occurred at the final measuring (67.44±2.29 heart beats per minute) as compared to its value at the initial one (70.69±3.79 heart beats per minute). This is probably the impact of the applied physical activity program on the functional abilities and the nervous system, (e.g the vagus nerve had far more influence than the parasympaticus). The average values of heart rate frequency under strain were not significantly altered.

Table 1. The basic statistical parameters of cardiovascular fitness at the initial and final measuring and the statistical significance of the difference in the means of the experimental group

The variables		Mean	StdDev	MIN	MAX	T-test	P
PULSR	initial	70.69	3.79	62.00	77.00	3.79	.000
	final	67.44	2.29	63.00	71.00		
PULSS	initial	163.73	8.21	149.00	175.00	.467	.642
	final	162.70	7.78	149.00	175.00		
SISTP	initial	114.00	10.51	110.55	119.05	.396	.693
	final	113.00	9.75	109.84	117.56		
DIAP	initial	70.19	6.07	67.73	72.64	1.484	.144
	final	68.03	4.38	66.30	69.77		
AVOU	initial	2.58	0.40	2.41	2.74	–3.111	.003
	final	2.93	0.42	2.76	3.10		
RVOU	initial	39.00	2.63	37.93	40.06	–3.454	.001
	final	41.48	2.59	40.45	42.50		

Legend
PULSR – resting heart rate, PULSS – heart rate under strain, SISTP – systolic blood pressure, DIAP – diastolic blood pressure, AVOU – the absolute value of maximal oxygen uptake, RVOU – the relative value of maximal oxygen uptake (relative value), Mean – the mean, StdDev – standard deviation, Min –minimal value, Max - maximal value, T-test – the relation between the difference in means and the standard error of their differences, P- the statistical significance of the T-test

Table 2. The basic statistical parameters of the anthropometric variables at the initial and final measuring and the statistical significance of the difference in the means of the experimental group

The variables		Mean	StdDev	MIN	MAX	T-test	P
BODHE	initial	161.07	4.17	153.00	169.00	–1.398	.168
	final	162.66	4.10	153.00	169.00		
BODWE	initial	59.69	4.39	54.00	69.00	.330	.743
	final	59.29	4.33	50.00	67.00		
ATHV	initial	80.69	4.14	75.00	89.00	–1.307	.197
	final	82.25	4.56	75.00	89.00		
G	initial	66.30	5.16	59.00	76.00	-.607	.546
	final	67.07	3.96	60.00	75.00		
BSC	initial	12.15	2.89	9.00	19.00	3.349	.002
	final	9.81	2.14	7.00	15.00		
ASC	initial	13.07	2.81	10.00	20.00	4.222	.000
	final	10.07	2.35	7.00	16.00		

Legend
BODHE – body height, BODWE – body weight, ATHV – average thoracic volume, G – girth, BSC – back skinfold, ASC – abdominal skinfold, Mean – the mean, StdDev – standard deviation, Min –minimal value, Max - maximal value, T-test – the relation between the difference in means and the standard error of their differences, P- the statistical significance of the T-test

The value of systolic arterial blood pressure obtained from the tested sample of women at the initial measuring was 114.00mmHg and 113.00mmHg at the final one. The average value of diastolic arterial blood pressure at the initial measuring was 70.19±6.07mmHg and 68.03±4.38mmHg at the final measuring one.

The results for aerobic capacities of our subjects at the initial measuring were classified as average. These results included both the absolute and relative value of maximal oxygen uptake, and were based on the criteria given by Astrand (1972). In value they were nearer to their lower limit, and at the final measuring nearer to the higher one. Taking into consideration the fact that the mean was obtained on the basis of the criteria set down by Shvartza & Reinbold, 1990, our female subjects had good aerobic capacities at the initial and final measuring. The effect of the implemented aerobic dance resulted in an increase in the average value of maximal oxygen uptake (VO2max) (from 39.00 ±2.63 to 41.48 ±2.59 ml/kg/min).

The results of the aerobic dance program on anthropometric variables are shown in Table 2. Our research has shown that the changes in body height were nonsignificant, which was expected since we were dealing with mature individuals who had finished with their growth period.

The average body height of our subjects was 161.07±4.17cm which is less than the average female student height at the University of Zagreb (Mišigoj-Duraković, Heimer and Matković, 1998). No significant changes were noted of body weight. At the initial measuring the mean was 59.69 kg, and at the final measuring it was 59.29 kg. Statistically significant changes were registered for the thickness of skinfold in the abdominal area (13.07±2.81mm at the initial, and 10.07±2.35mm at the final measuring) and the back (12.15±2.89mm at the initial measuring, and 9.81±2.14mm at the final). This is very significant as it shows that a permanent decrease in the fatty tissue below the skin in these particular areas actually occurred.

Tables 3 and 4 show the statistical values of cardiovascular fitness and the anthropometric parameters of the control group. The value of the t-test and its significance indicate that the cited variables between the initial and final measuring are nonsignificant.

Table 3. The basic statistical parameters of cardiovascular fitness at the initial and final measuring and the statistical significance of the difference in the means of the control group

The variables		Mean	StdDev	MIN	MAX	T-test	P
PULSR	initial	66.20	6.70	61.00	82.00	.35	.55
	final	66.40	6.50	62.00	81.00		
PULSS	initial	160.50	7.119	146.00	172.00	2.01	.10
	final	161.00	7.56	146.30	172.30		
SISTP	initial	118.00	9.9	105.00	131.00	.57	.62
	final	118.15	10.01	105.20	129.90		
DIAP	initial	75.00	4.90	71.00	81.80	1.60	.13
	final	76.00	5.01	70.00	82.00		
AVOU	initial	2.65	1.32	2.10	3.50	1.20	.17
	final	2.70	.95	2.20	3.60		
RVOU	initial	39.10	2.65	34.50	45.10	1.01	.19
	final	39.30	2.78	34.35	45.15		

Legend

PULSR – resting heart rate, PULSS – heart rate under strain, SISTP – systolic blood pressure, DIAP – diastolic blood pressure, AVOU – the absolute value of maximal oxygen uptake, RVOU – the relative value of maximal oxygen uptake (relative value), Mean – the mean, StdDev – standard deviation, Min –minimal value, Max - maximal value, T-test – the relation between the difference in means and the standard error of their differences, P- the statistical significance of the T-test

Table 4. The basic statistical parameters and anthropometric characteristics at the initial and final measuring and the statistical significance of the difference in the means of the control group

The variables		Mean	StdDev	MIN	MAX	T-test	P
BODHE	initial	164.30	4.25	151.00	175.00	1.50	.55
	final	164.25	4.30	151.00	175.00		
BODWE	initial	57.05	6.51	46.5	70.10	.59	.15
	final	56.50	5.95	47.00	69.70		
ATHV	initial	84.53	4.25	78.00	90.00	.54	.65
	final	84.60	4.30	78.50	90.05		
G	initial	74.00	5.60	64.00	82.00	.55	.60
	final	75.00	5.93	64.50	82.50		
BSC	initial	12.00	4.02	7.80	19.00	.11	.72
	final	12.60	4.28	7.91	19.04		
ASC	initial	15.02	5.13	9.10	24.00	.12	.71
	final	15.13	5.33	9.20	24.10		

Legend
BODHE – body height, BODWE – body weight, ATHV – average thoracic volume, G – girth, BSC – back skinfold, ASC – abdominal skinfold, Mean – the mean, StdDev – standard deviation, Min –minimal value, Max - maximal value, T-test – the relation between the difference in means and the standard error of their differences, P- the statistical significance of the T-test

Table 5 shows the multivariate and univariate covariance analysis of cardiovascular fitness of the experimental and control group at the final measuring. On the basis of the value of the Wilk's Lambda significance, it can be concluded that there is a statistically significant difference (but controlling the initial differences in the same measuring), in cardiovascular fitness between the female subjects of the experimental and control group. This difference can be found at the final measuring and for the following parameters: the values of resting hart rate (PULSR), the relative value of maximal oxygen uptake (RVOU), and the absolute value of maximal oxygen uptake (AVOU).

Table 5. A multivariate and univariate covariance analysis of cardiovascular fitness of the final measuring of the experimental and control group

Wilk's Lambda	F	Df1	Df2	P
.31	5,77	10	22	.00

Variable	F	P
PULSR	7.00	.00
PULSS	6.67	.01
SISTP	2.60	.11
DIAP	1.89	.64
AVOU	8.56	.00
RVOU	7.60	.00

Legend
F- Rao'S F-value
Df1 and Df2- degree of freedom

The differences in cardiovascular fitness between the experimental and control group are shown in Table 6 and were calculated by means of a multivariate and univariate covariance analysis. Wilk's Lambda (.26) is significant at the .00 level. According to the obtained results, significant differences between the groups at the final measuring were registered for the variables used for assessing abdominal skinfold and back skinfold.

Table 6. A multivariate and univariate covariance analysis of the anthropometric characteristics of the final measuring of the experimental and control group

Wilk's Lambda	F	Df1	Df2	P
.26	5,38	12	20	.00

Variable	F	P
BODHE	1.56	.53
BODWE	2.10	.57
ATHV	1.12	.69
G	.83	.74
BSC	12.23	.00
ASC	13.20	.00

Legend
F- Rao'S F-value
Df1 and Df2- degree of freedom

4. THE DISCUSSION

On the basis of the performed analyses, the conclusion can be drawn that the greatest contribution to the difference between the two measuring was found in the resting heart rate, the absolute value of oxygen uptake and the relative value of oxygen uptake. The value of resting heart rate was lower at the final measuring (statistically significant), while the heart rate under strain, systolic blood pressure and diastolic blood pressure were also somewhat lower at the final measuring. The differences are not significant, while the values of the absolute oxygen uptake and relative oxygen uptake were higher at the final measuring (statistically significant difference).

Blessing, Wilson, Puckett and Ford (1987) compared the effects of aerobic dance performed with hand held weights and the effects of mere aerobic dance on a sample of female students. The experimental program was carried out three times a week over a period of eight weeks. After the experiment the conclusion was reached that there was a significant improvement in the VO2max results, but the differences between the female subjects who trained with weights and those who did not were nonsignificant.

After implementing the experimental aerobic dance program (29 training sessions, three times a week), there were no statistically significant changes found in the values of systolic and diastolic blood pressure in the research of Dowdy, Cureton, DuVal and Ouzts (1985). Changes were found in the values of VO2max (5-7%), the time spent constantly moving on the treadmill (9%), and the resting heart rate (8%).

In all the aforementioned research, positive and significant changes did occur, primarily in the functional characteristics under the influence of various aerobic dance models. These changes are also significant in our research, and the most important are those of the VO2max (absolute and relative value). Our results are just another confirmation of

the positive effect of aerobic dance when it is implemented in accordance with certain guidelines.

It can be concluded that the implemented experimental program had as its effect on our female subjects, a more economical heart rate. Before using the HI-LO aerobic exercise model, the hearts of our subjects beat at a rate of 102.240 beats over a period of 24 hours. This is an indication of the fact that after the program was used, the hearts of our subjects beat at a rate of 5760 beats less in a 24-hour period, which is a 6% decrease.

The relative values of maximal oxygen uptake (VO2max) which were 39 ml/kg/min were increased under the influence of the implemented recreational program to a value of 41.5 ml/kg/min which is a 5% increase recorded at the final measuring. This increase indicates an improved function of the internal organ systems (cardiovascular, respiratory, as well as an increase in oxygen uptake at the level of the cell). Overall, the implemented program contributed to a 5% improvement in the aerobic abilities of our subjects.

The effect of the implemented program on blood pressure was positive in the sense that there was a decrease in arterial blood pressure, both systolic and diastolic. The results of our research, which studied the effects of aerobic dance on arterial blood pressure, indicate a very small decrease in arterial blood pressure. The changes of diastolic blood pressure are numerically greater compared to those of systolic blood pressure. This is probably the result of physical activity and its impact on the increase of the elasticity of the blood vessels, which in turn leads to a decrease in the obstruction to the blood flow.

When reviewing the means of the variables of cardiovascular fitness at the initial measuring (which is necessary for a clearer picture of the effects of the experimental program), a statistically significant difference can be found between the experimental and control group at the final measuring. A difference was noted for the following variables: resting heart rate, heart rate under strain, absolute value of oxygen uptake and relative value of oxygen uptake. In relation to the results obtained from the multivariate and univariate covariance analysis, a statistically significant difference was obtained for the heart rate under strain variable among the subjects, which can be explained by the possible effect of the applied aerobic dance model.

According to presented results, there were changes of the body composition of female subjects.

The positive influence of high-low training on the reduction of the subcutaneous fatty tissue is registered**.** The values of body height and thoracic volume were somewhat increased at the final measuring, (nonsignificant) the values of body weight and girth were somewhat decreased (nonsignificant); the values of back skinfold and abdominal skinfold were somewhat decreased, and the values are statistically significant.

The significant reduction of fatty tissue was already identified by different authors.

Blessing, Wilson, Puckett and Ford (1987) have, among other things, determined the effects of aerobic dance with weights and aerobic dance without weights on five skinfolds. It turned out that exercising using aerobic dance and aerobic dance with weights had similar significant effects, but that there were no significant differences between the groups. Kravitz, Cisar, Christensen and Setrlund (1993) identified significant reduction in the endomorphic component of the body build (from 5.24 ± 0.18 to 4.93± 0.18; $p<0.01$) with a simultaneous increase in the mesomorphic component of the body composition (from 3.22±0.19 to 3.5±0.19; $p<0.01$) of the college-aged female students during step training with and without hand weights**.**

Our research has also confirmed the influence of organized aerobic dance exercise on the parameters of body composition, and primarily on the decrease of fatty tissue. Considering the fact that at the end of the experimental program the body weight of the female subjects had not decreased, and that the subcutaneous fatty tissue had significantly decreased, we can indirectly come to the conclusion that lean body mass (although not measured in our study) had increased at the final measuring. This we consider to be a significant contribution of the aerobic exercise model to one of the useful body parts (muscle mass) of our subjects. The implemented aerobic dance model consisted of a combination of numerous movements and hand swings in different directions and on different plains with simultaneous skips and leg movements. These are probably the factors that led to the changes of body composition at the end of the experimental program. As a certain support to our conclusions regarding the increase in lean body mass (see previous text) a study carried out by Sekulić, Rausavljević and Zenić (2003) is interesting. They reported significant reduction of the skinfolds but no significant decrease in the paired circumference measures after 25 training sessions of the hi-lo and step aerobic exercise. Since reduction in the measures of the circumferences was expected with regard to the significant reduction in the fatty tissue measures, they presumed that a mild muscular hypertrophy had occurred. The process of increments of muscularity and decrements in fatty tissue kept the body circumferences at the same, initial level.

5. CONCLUSION

This research has confirmed the hypothesis that statistically significant changes will occur to the parameters of cardiovascular fitness and the parameters of body composition on the examined sample of women under the influence of the aerobic dance model. In the area of cardiovascular fitness, statistically significant changes were noted of the values of the following variables: resting heart rate, heart rate under strain, the relative value of maximal oxygen uptake and the absolute value of maximal oxygen uptake. In the area of anthropometric characteristics, statistically significant changes were noted in the value of the variables for: back skinfold and abdominal skinfold. The research results obtained up to date have been verified.

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PROMENE KARIOVASKULARNOG FITNESA I TELESNE GRAĐE ŽENA POD UTICAJEM PLESNOG AEROBIKA

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Istraženi su efekti modela plesnog aerobika na kardiovaskularni fitnes i telesnu građu 46 žena starih od 20 do 25 godina. Eksperimentalnu grupu sačinjavalo je 26 žena, a kontrolnu grupu 20. Eksperimentalni program modela plesnog aerobika realizovan je tri meseca, tri puta nedeljno sa 60 minuta treninga. Sam plesni aerobik na svakom treningu vežban je 40 minuta sa smenjivanjem high, low and moderate tipom naprezanja. Kardiovaskularni fitnes je procenjen sa sledećim parametrima: puls u miru, puls u opterećenju, sistolni arterijski krvni pritisak (mmHg), dijastolni arterijski krvni pritisak (mmHg), apsolutna vrednost maksimalne potrošnje kiseonika (l/min) i relativna vrednost maksimalne potrošnje kiseonika (ml/kg/min). Telesna građa procenjena je merama: telesna visina (cm), telesna težina (kg), srednji obim grudi (cm), obim struka (cm), kožni nabor ledja (mm) i kožni nabor trbuha (mm). Za sve podatke sa inicijalnog i finalnog merenja izračunati su osnovni koeficijenti deskriptivne statistike, Studentov T-test i multivarijantna i univarijanta analiza kovarijanse (MANOVA i ANOVA). Između inicijalnog i finalnog merenja postoji statistički značajna razlika na varijablama kardiovaskularnog fitnesa i telesne građe žena kod eksperimentalne grupe, i između eksperimentalne i kontrolne grupe na finalnom merenju. Ovo istraživanje je potvrdilo već postojeće zaključke o značajnom pozitivnom uticaju plesnog aerobnog treninga na promene u kardiovaskularnoj izdržljivosti i parametrima telesne građe mladih žena.

Ključne reči: *funkcionalne sposobnosti, antropometrijske karakteristike, VO2max, aerobni trening, žene*