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Radomir Zrnić[1], Saša Jovanović[1], Adrijana Lukić-LJubojević[1]
[1]Faculty of Physical Education and Sport of Banja Luka University

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EFFECTS OF RECREATIONAL AEROBICS ON WOMEN'S FUNCTIONAL ABILITIES

Abstract

The research aimed at determining the effects of recreational aerobics on functional abilities of women. The population from which a sample was taken is the one of sedentary women, of chronological age between 35 and 45 years. The assessment of functional ability was tested on the following variables: vital capacity, heart frequency at rest, working pulse, systolic arterial blood pressure, diastolic blood pressure and relative oxygen consumption. The main parameters of descriptive statistics were calculated for all the results, and a T test was applied to determine the differences between the initial and final measurement. The results of research showed that after a three-month application of recreational aerobics statistically significant changes of vital capacity took place (p = 0.000), of heart frequency at rest (p = 0.000), of working pulse (p = 0.020), of systolic arterial blood pressure (p = 0.001), of diastolic blood pressure (p = 0.010) and relative oxygen consumption (p = 0.000). The research established that recreational aerobics program with middle-age women with sedentary jobs may efficiently affect the changes of functional abilities.

Key words: *recreation, recreational aerobics, functional abilities*

1. INTRODUCTION

The most important programs in sport recreation are those programs that can be used to positively affect the improvement of cardiovascular and respiratory systems (Andrijašević, 2010). In order to reduce the risks of development of cardiovascular diseases, osteoporosis, diabetes, hypertension and other diseases and to ensure normal functioning of all bodies and systems in organism, it is necessary to regularly undertake some physical activity (Mišigoj-Duraković, 1999, Wilmore, J., Costill 1999). Group aerobic programmes that undergo daily transformations with different styles are among the affirmed programs. Group aerobic programs are a form of programmed physical exercise aimed at improving psycho-somatic status. Besides having a general effect, the aerobic programs may be targeted, may have an influ-

ence on cardiovascular and respiratory system (functions), body-shaping (work on the ideal/ appropriate body weight) may have an antistress effect, contribute toward social adaptation, socialization and entertainment from which general pleasure is derived, etc. (Blagajac, 1994). Recreational aerobic which is applied in this research represents a set of aerobic exercises, exercises of strengthening and stretching done with an appropriate music. Coaches/trainers who lead such trainings often regulate the intensity of exercising during the training itself by activating different body parts. In that manner, the intensity of exercising is either decreased or increased, resulting in a weaker or stronger influence on individual functions/abilities of certain organic systems (Kostić, 2006). Application of an aerobic model fosters the consumption of calories, improves the activity of cardiovascular system and strengthens the whole body (Perez and Greenwood-Robinson, 2009). Maximum consumption of oxygen is directly related with the frequency, intensity and duration of training (Vengera and Bell, 1986; Gossard, Haskell, Barr Tailor et al., 1986; Takeda, Tanaka and Asamo, 1994). Aerobics programs have positive effects on decrease of hypertension (Hagberg, Montain, Martin et al., 1989) and health improvement. Researches conducted by Thompson, Goodroe, Johnson and Lamberth (1991) in analyzing the changes in VO2max, heart frequency, systolic and diastolic blood pressure under the influence of two aerobic programs (one group dance aerobic, another group dance aerobic with weights) came to a conclusion that the aerobic group with weights had better results. Grant, Corbett, Davies, Aichison, Mutrie, Birn, Henderson and Dargie (2002), having compared the effects of two different models of aerobic exercising (aerobic dance and walking) on the functional abilities and bodily composition of women and established that dance aerobics had better effect on VO2max and maximal pulse compared to the walking program. The designed programs of aerobic exercises with the applied methodology have an influence on the level of working capacity, act preventively and improve health (Mišigoj-Duraković, 1997, Shahana et al, 2010), shape the body, improve body posture, strengthen bones, ankles/wrists and tendon segments of locomotive system (Furjan-Mandić, Kosalec and Vlašić, 2011). The application of different group aerobic programs has shown significant effects in improving functional abilities (Paton, Graves, Pollock et al., 1996; Toraman and Aiceman, 2004; Pantelić, Kostić, Mikalački, Đurašković, Čokorilo, 2007; Mandarić, Sibinović, Mikalački and Stojiljković, 2011; Yfanti, 2014). The intensity of exercising of middle-age women should be adjusted to the possibility and goals of research so that they are motivated for continuous exercises (Gillett, Eisenman, 1987; Perez and Greenwood-Robinson, 2009). Researches in the field of functional abilities mostly focus on studying the structure and function of individual organs and organ systems, based on which multiple laws on their functioning have been established (Pantelić, Kostić, Mikalački, Đurašković, Čokorilo et al., 2007, Yfanti, 2014). Recreational aerobics is designed for health improvement, improvement of physical appearance, physical abilities and psycho-social characteristics of a person (Stojiljković et al. 2005). Unlike sport, which brings to the forefront the top sport results as a priority, the primary result in aerobic is the issue of health, especially with middle-age women. However, besides the main motive which is health, women are also prone to prefer good looks, at all ages (Mitić, 2001; Stojiljković, 2005). Therefore, with recreational population, the aerobic training is among the most important, with other types of training having a big significance too. The goal of this research is to study the effects of recreational aerobics on changes in functional abilities of women.

2. METHOD OF WORK

Sample of subjects

The population from which a sample for research was taken has been defined as a population of women 35 to 45 years of age. The sample of subjects included the women from the Banja Luka City area. All subjects (38) included in the experiment were part of the recreational aerobics program taking place at the Faculty of Physical Education and Sports in Banja Luka.

Sample of variables

The evaluation of functional abilities was measured with the following variables: vital capacity (FVITKP), heart frequency at rest (FFSRCM), working pulse (FFSRCR), systolic arterial blood pressure (FTASI), diastolic arterial blood pressure (FTADI) and relative oxygen consumption (FRO_2max). The working pulse was measured immediately after completion of the walking test UKK2km by palpating in the area of carotid artery by counting heart beats in 10 seconds, by multiplying the obtained value by six. Systolic and diastolic artery blood pressure was measured with the device with cuff of "Teleoptic" brand. Calculating the fitness index and determination of maximum oxygen consumption (VO2max (mL/kg/min) was done by an indirect method via the formulae derived from UKK2km walking test (Oja, & Tuxworth, 1995).

Description of research

The program of exercise lasted for three months, i.e. 12 weeks. Training took part three times a week in the evening hours. Every training session lasted for 60 minutes and was done according to the basic structure of aerobics class: warmup, the main part of training, cooling down and stretching (Zagorc, Zaletel and Ižanc, 1998). The intensity of exercising was determined by the tempo of music that changed during training (it was different depending on the training part). Warming up (8-10minutes, music tempo 120-135 u/m, march, step touch, side to side) implies preparing the whole body for the upcoming strain, all to the end of increasing the body temperature and increasing the blood flow in organism (Brick, 1996). The main part of training implies aerobic (A) part and shaping exercises (B part – treating separate muscle groups). Aerobic part (20-30 minutes, tempo 135-155 u/m, the combination of Low impact and High impact steps) contains the activities directed to the development of cardiovascular and respiratory system (Mišigoj-Duraković, M. 1997). In B part of training (10 minutes, tempo 120-135 u/m) exercises were done for strengthening the abdominal wall muscles, the muscles of the back, hands and shoulder area, abductors and adductors and of the gluteal region (Furjan- Mandić, et all., 2011). Cooling down and stretching (5-10 minutes, tempo up to 100 u/m, relaxation and static stretching exercises) in this part of training is primarily aimed at lowering the heart frequency. Gradual passing from the standing to the sedentary and lying position on the stomach and the back is done, while the relaxation and stretching of tired muscles are combined, all with an appropriate music resulting in both mental and psychological relaxation (Kostić, 1999; Nićin, 2003). The program of recreational aerobics is adjusted to the age of the subjects and is designed to include the

exercises and movements that activate the musculature which is not sufficiently engaged during professional work. Trainings are planned by months and are adjusted to the volume and load intensity as well as to the possibilities of the subjects. The optimum strain intensity is dosed according to the limits from 60% to 85% of maximum pulse frequency (Stojiljković, 2005), which means that in the first month the strain ranged between 60–65% of the maximum individual pulse, and in the second month from 65–75%. In the third, last month of the experiment, the strain was in the range 75–85% of the maximum individual pulse. The fitness part of the class (A part) is programmed in a way that the subjects work out in the aerobic area during that part. The strain capacity was measured on the basis of internal indicators (pulse) by palpation on the carotid artery after the assigned block of exercises (during the break between the next set of exercises). Based on the obtained pulse, the intensity of strain was monitored for the accomplished task. Before every activity the subjects knew which should be the value of the pulse during the activity.

Methods of data processing

A statistical program SPSS (version 15.0) was used in data processing. The main parameters of descriptive statistics were calculated for each variable: minimum result (Min), maximum result (Max), arithmetic mean (AS), standard deviation (SD),- asymmetry of result distribution (Skew), flatness of result distribution (Kurt.). A T test was used to determine the differences between the initial and final measurements (Malacko and Popović, 2001). Significance of conclusion drawing was determined at the level $p<0,05$.

3. RESULTS

The main descriptive parameters of the functional abilities on initial and final measurement were presented in Table 1. By inspecting the results in Table 1, on initial measuring, one may conclude that the values of central and dispersive parameters of the variable for the evaluation of the functional abilities show normal distribution of result; therefore, we can say that the group which is included in the experiment is homogenous on initial measuring.

After inspecting the results of functional abilities on final measuring we can also determine normal distribution of the results except for the variable Systolic Blood Pressure (FTASI) which shows somewhat bigger distribution asymmetry (Skjunis, 1,406), as well as the value of kurtosis coefficient (Kurtosis, 3,449). Based on that, we can say that the group mainly kept homogenous results on final measuring.

The results of descriptive statistics presented in Table 1 show the changes of value of tested parameters after three months of recreational aerobics program. Vital capacity increased by 534,20 ml/kg/min., the pulse at rest decreased by 7,25 beats a minute, the working pulse was increased by 7,25 beats a minute, systolic artery blood pressure increased by 5.23 mm Hg, diastolic blood pressure increased by 2.26 mm Hg, relative oxygen consumption increased by 6,41ml/min/kg. All tested variables on initial and final measuring have a normal result distribution, except for the variable systolic blood pressure (FTASI) which, in final measuring shows a somewhat higher distribution asymmetry (Skjunis, 1,406), as well as the value of Kurtosis coefficient (Kurtosis, 3,449).

Table 1. *Descriptive statistical parameters of functional variables on initial and final measuring*

		n	Min.	Max.	AS	SD	Sk.	Kt.
INITIAL	FVITKP	38	2000	3800	2876.32	425.177	-.303	-.128
	FFSRCM	38	54	108	83.11	11.696	-.067	.125
	FFSRCR	38	120	210	157.32	22.757	.262	-1.007
	FTASI	38	96	143	118.24	9.851	.408	.654
	FTADI	38	64	84	71.47	5.150	.579	.171
	$FRVO_2$maks.	38	15.7	47.5	32.024	7.5108	.084	-.220
FINAL	FVITKP	38	2500.0	4200.0	3410.526	344.6812	-.495	.971
	FFSRCM	38	62.0	96.0	75.868	7.4984	.420	.360
	FFSRCR	38	132.0	204.0	164.579	13.8244	-.161	1.384
	FTASI	38	104.0	174.0	123.474	10.8322	2.672	12.505
	FTADI	38	64.0	82.0	73.737	3.9503	-.007	.193
	$FRVO_2$maks.	38	28.9	51.3	38.434	5.6043	.350	-.409

Legend: ***n*** *– Number of respondents;* ***Min*** *- Minimum;* ***Max*** *- Maximum;* ***AS****- Arithmetic mean;* ***SD*** *– Standard deviation;* ***Skew*** *– Result distribution asymmetry;* ***Kurt. –*** *Result distribution flatness;* ***FVITKP –*** *Vital capacity;* ***FFSRCM –*** *Heart frequency at rest;* ***FFSRCR –*** *Working pulse;* ***FTASI –****Systolic blood pressure;* ***FTADI –*** *Diastolic heart pressure;* ***$FRVO_2$maks. –*** *Relative oxygen Consumption;* ***Initial*** *- Initial,* ***Final*** *– Final.*

T test was applied to determine the changes between the initial and final measurement with subject included in the experiment. Arithmetic means of initial and final measurings (AS in.-fin.), standard deviation between in.-fin. Measurings (SD), Pearson correlation coefficient (r), Student t distribution (T), as well as the probability of error during refuting of hypothesis (p) were applied to establish the changes between the initial and final measurings with the subjects. Based on tested variables for the evaluation of functional abilities one can see that there is a statistically significant difference between the initial and final measuring, in all measured variables. A statistical significant difference at the final compared to the initial measurement is found with the following variables: vital capacity (p = 0,000), working pulse (p = 0,020), pulse at rest (p = 0,000), working pulse (p = 0,020), systolic blood pressure (p = 0,001), diastolic blood pressure (p = 0,10) and relative oxygen consumption. (p = 0,000).

It is obvious that the aerobic stamina is an ability that, due to the lack of movement, may be lost very easily as an inherent property; however, as an acquired ability it may be improved with adequate aerobic training. With growth and development the functions of respiratory and cardiovascular systems increase, i.e. the vital capacity of lungs, frequency of breathing, systolic and minute heart volume. Given the needs of the functions of an adult person, as well as the causes of the sedentary lifestyle on those functions, it is necessary to make an impact with programmed physical exercises. Recreational aerobics, i.e. the program that is applied to the adult population of middle-age women, had a positive influence on all applied variables, however, these acquired abilities, due to the lack of daily physical activities, may progressively decline, especially with sedentary middle-age persons.

Table 2. *T–test between the initial and final measuring in variables for the evaluation of functional abilities*

		AS	SD	r	t	p
FVITKP	initial	2876,316	425,177	0.872	-15.711	**0.000**
	final	3326,921	648,516			
FFSRCM	initial	83,459	11,649	0.561	4.588	**0.000**
	final	75,875	7,490			
FFSRCR	initial	157,838	22,839	0.589	-2.434	**0.020**
	final	158,504	32,880			
FTASI	initial	118,243	9,987	0.604	-3.492	**0.001**
	final	122,081	19,605			
FTADI	initial	71,405	5,204	0.386	-2.714	**0.010**
	final	73,514	12,844			
$FRVO_2$ max	initial	32,000	7,613	0.672	-7.070	**0.000**
	final	39,346	8,708			

Legend: ***M*** *– Arithmetic mean;* ***SD*** *– Standard deviation;* ***SE*** *– Standard error;* ***r*** *– Pearson correlation coefficient;* ***t*** *– Student t distribution;* ***p*** *- Probability;* ***FVITKP –*** *Vital capacity – initial-final;* ***FFSRCM –*** *Pulse at rest initial – final;* ***FFSRCR*** *– Working pulse initial-final;* ***FTASI*** *– Systolic pressure initial - final;* ***FTADI*** *– Diastolic pressure initial - final;* ***$FRVO_2$maks.*** *– Relative oxygen consumption initial – final.*

4. DISCUSSION

Based on the obtained results (Table 2), it is obvious that the applied recreational aerobics brought about significant changes in all observed parameters of functional abilities of women. The biggest changes were accomplished in improvement of the vital capacity (increase by 450,60 cm^3, p = 0,000). Secondly, the pulse at rest decreased by 8,58 beats in a minute (p = 0,000). Further, relative oxygen consumption increased by 7,34 ml/kg/min. (p = 0,000). The results of this research may be compared with the results of Babijak and Milosevic (1992), who studied the influence of aerobics on morphological, motoric and functional status of women who undertook recreational aerobics. Nine variables in the domain of functional abilities were monitored (heart frequency at rest, vital capacity of lungs, systolic and diastolic blood pressure at rest, systolic and diastolic blood pressure after a strain, maximum oxygen consumption, relative oxygen consumption). Statistically significant changes of functional abilities were noted with the variables pulse at rest and the vital capacity of the lungs.

The influence of different aerobic training with music on the functional status of women was studied by Pantelic et al. (2007). Of functional variables the following was measured: systolic and diastolic artery blood pressure, maximum and relative oxygen consumption. The authors conclude that different forms of organized aerobic recreational activities largely influence the functioning of human organs and organ systems, in the sense of their better functioning during strain or at rest. The biggest differences were noted with the following variables: systolic arterial blood pressure, diastolic arterial blood pressure and the pulse function at rest. The results of research have shown that doing aerobic recreational activities lead to bigger changes of functional status with the persons who have longer recreational history.

Sarika et al. (2010) evaluated the effects of two different exercise programs (aerobic and strength training) on cardiovascular fitness variables, such as blood pressure and heart frequency (HR), metabolic parameters, such as cholesterol (HDL, LDL), triglyceride and anthropometric parameters. Thirty women of age between 35 and 45 years participated in the experimental research. Aerobic training was carried out three times a week with 60-70% of intensity of maximum heart frequency during six weeks. Strength training was also carried out in six weeks, while the pulse and the blood pressure were measured before and after exercising in both experimental groups. The results of research showed statistically significant differences in heart rhythm recovery (Pre-training: 97,40 ± 5,378, post-training: 90,70 ± 4,599, t = 8,066, P <0,001), and in post-diastolic blood pressure (Pre-training: 85 ± 3,265, after training : 86,20 ± 2,820, P <0,001); with aerobic training and systolic blood pressure (pre- and post-training) in both groups (P < 0,001). Based on the results, the author concludes that aerobic training is more useful than strength training in improving the cardiovascular fitness and may be used as a preventive measure with the persons with a risk of development of cardiovascular diseases due to obesity and can prevent the occurrence of related diseases.

The program of recreational aerobics primarily has a general influence on the overall psychosomatic status, on the condition that the methodology which relates to the age and the current possibilities of program users is applied. The intensity of strain during the activity is an essential part of every part of training, including the aerobic part too. In that regard, a coach/instructor must have an extensive experience in running the program. This is especially expected with the population of middle-age and elderly program users. Group training such as aerobics is an acceptable training program for middle-age women. The aerobics program should not be constantly burdened with new choreographies, but the motive for exercising should be sought in mixing different models of aerobics training. The exercise program that was carried out accomplished statistically significant results on changes of functional abilities of women; however, with the middle-age women population, it is equally important for physical exercising to become a “lifestyle”, a habit, that makes them healthy and positive.

5. CONCLUSION

Researching the effects of a three-month recreational aerobics on a sample of middle-age women has shown statistically significant changes in functional abilities. They are visible in an increase of vital capacity, decrease of the pulse at rest and increasing the relative oxygen consumption. Besides, the training process of 12 weeks has had a significant impact on changes of systolic and diastolic blood pressure, as well as of the working pulse. Appropriate/ dynamic music that must be adjusted to the age is also an important segment of aerobics. The program content of aerobic does not always have to be a novelty, but it should be modelled in an expert way in terms of a strain posed by one part of training combined with music. Then it gets a „satisfactory“ content which accomplishes effect. Apart from that, for middle-age women, the period of adaptation to physical strain should be gradual, which means that it is longer (at least 12 weeks) and with an optimum interval (every second day). In that way, it is easier for a middle-age woman to adapt and she is more motivated to continue exercising. Physical exercise programs do not have to always focus on the development of functional abilities, although they are the most important in the sense of preservation of health and good

working capacities. Female population, even the one of middle-age, is also very much motivated to be good looking. Therefore, body shape programs, strengthening exercises are necessary, because a middle-age woman enters a period of life where the metabolism is slowed down, due to insufficient physical exercise, and the bone system is weaker as well as the defense mechanism, etc. Thus, in addition to a functional status, good looks, an aerobics training should be combined with the specific stretching exercises that should make the participants in the program satisfied. So far, the effects of different models of aerobics training on different segments of anthropological status have been investigated. This research is also specific by the fact that the experiment was tested on a sample of women of 35 to 45 years of age. This is the so-called „transitional period" after which a woman enters a period of menopause characterized by a change in hormone balance and which can influence health causing a number of syndromes and clinical disorders. Therefore, this population is recommended to join regular exercising forms, especially aerobics, which can significantly mitigate the symptoms of that age of life (loss of bone mass, cardiovascular diseases and psychoneuroendrocrinology disorders).

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Korespondencija:

Doc. dr Radomir Zrnić,

Fakultet fizičkog vaspitanja i sporta,

Univerzitet u Banjoj Luci, Bosna i Hercegovina

E - mail: *sportzasvebl@blic.net*

Tel: 00 387 65-542 – 474