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CYCLING AS A SPORT-RECREATIONAL ACTIVITY*Abstract*

Recreational activities with their resources, facilities and methods have a preventive effect on the occurrence of which reduce working capacity, distorts health and lead to the emergence of the loco motor system dysfunctions. According to the World Health Organization (Global recommendations on Physical activity for health, WHO, 2008/2013), physical activity in adults include activity during leisure time, transport (walking or cycling), activities at work, housework, play, sports, organized and individual exercise and all activities carried out within the family, school and community sports. Cycling grows in popularity in a recreational activity practice, it is preferred that is performed in nature, fresh air where the area is varied configuration, and the use of large muscle groups enhances and makes cycling one of the most widespread form of recreation in the world. The study was conducted with 12 subjects, aged 35 ± 6 months that during the investigation were not involved in any other sports and recreational activities. Prior to conducting the recreational program is determined initial state variables of the functional capacity and body composition of the patients (Institute of Sport Faculty physical education and sport, University of Banjaluka), and the value of the blood parameters (Konzilijum laboratories), and after the implementation of the program found is the final state. Recreational Training is programmed for a period of twelve weeks and is divided into three basic macro cycle, which consisted of four micro cycles - three micro cycle building, neighborhood regeneration. All macro cycle were programmed so that each contained three micro cycle training. The fourth week of the macro cycle represent all the weeks of regeneration, which consisted of leisurely ride on the flat for 60 to 90 minutes. Based on the obtained results, it can be said that the positive effect of changes in VO₂max, fitness index and an increase in hemoglobin levels as parameters of functional abilities of respondents. Applied program for a period of 12 weeks was positively stimulate the heart and the body as a whole and led to an improvement in the work of the cardio vascular system. Loads that are realized in this period did not lead to significant changes in variables of morphological characteristics, i.e. body composition - FAT, FAT left leg, FAT right leg, TBW and the impedance of the whole body which is in accordance with a number of previous studies of this subject and creates space for similar research wherein they could change the parameters of the duration as well as the load during the planned program.

Key words: recreation, cycling, women**1. INTRODUCTION**

Recreational activities with their resources, facilities and methods have a preventive effect on the occurrence of which reduce working capacity, distorts health and lead to the emergence of the loco motor system dysfunctions. Practice has an important role in the prevention of heart

disease and osteoporosis, and delay in the onset of diabetes and musculoskeletal diseases (Mišigoj Duraković, 1999), which suggests the possibility of action in improving the quality of life. The American Heart Association (American Heart Association) has defined a seven factors and parameters that may be used to evaluate the cardiovascular health and the determination of cardiovascular risk of smoking, body mass index (BMI - body mass index), physical activity, nutrition, blood pressure, total cholesterol, and blood glucose level (Lloyd-Jones DM, Hong Y i Labarthe D, 2010). Physical activity has a positive effect on the prevention of cardiovascular disease by reducing the vascular oxidative stress, improves endothelial function and reduce insulin resistance, and the level of atherogenic lipoproteins (Fukai T, Siegfried MR, Ushio-Fukai M, Cheng Y, Kojda G i Harrison DG., 2000, Halbert JA, Silagy CA, Finucane P, Withers RT i Hamdorf PA.,1999) .According to the World Health Organization (Global recommendations on Physical activity for health, WHO, 2008/2013), physical activity in adults include activity during leisure time, transport (walking or cycling), activities at work, housework, play, sports, organized and individual exercise and all activities are carried out within the family, school and community sports. In sporting activities include the activities that are classified into 7 groups, such as: walking tours, water activities (rivers and lakes), activity in the air, sports, activities, detection of interest, activity of working processes, cultural activities and health care guidance (Demonja, Ruzic, 2010). According to WHO adults and elderly people should exercise of moderate intensity activity at least 30 minutes every day in order to maintain mobility through activity. Cycling grows in popularity in a recreational activity practice, it is preferred that is performed in nature, fresh air where the area is varied configuration, and the use of large muscle groups enhances and makes cycling one of the most widespread form of recreation in the world. An important feature of the cycling of accurate dosage during the training load using different speed on the bicycle and changing the speed of rotation of the pedal, as well as overcoming the different pitch with minimal effort or driving on a flat ground of variable intensity. In the classical cycling training professional cyclists annual total volume is between 800 and 1200 hours and at recreational cyclists from 350 to 500 hours (Friel 1998 and 2003). Cycling training aims to increase the success of the results and parameters of the functional capacities of -maximum oxygen uptake (VO_{2max}), and exhibited a maximum power (W_{max}), one of the parameters according to which most discriminatory are selected on professional cyclists cycling (world class), an elite Bicycle (cyclists international level) amateur (cyclists national rank) and recreational (trained cyclists) the VO_{2max} (Impellizzeri, F. M., i Marcora, S., 2007; Lee, H., Martin, D. T., Anson, J. M., Grundy, D. & Hahn, A. G., 2002; MacRae, H. H., Hise, K. J., & Allen, P. J., 2000; Cramp, T., Broad, E., Martin, D. & Meyer, B. J., 2004; Hopker, J., Jobson S., Carter, H. & Passfield, L., 2007 te Lucia, A., Carvajal, A., Calderon F. J., Alfonso, A. & Chicharro, J. L., 1999), which in professional cyclists amounts for the above VO_{2max} 75 ml / kg / min and above 500 W W_{max} (Lucia, A., Carvajal, A., Calderon F. J., Alfonso, A. & Chicharro, J. L., 2001), and in the recreation of 42.6 ml / kg / min and 292 W (Hopker, J., Jobson S., Carter, H. & Passfield, L.,2007). In order to determine the real effect of certain leisure activities and the program on the physical dimension of the individual, and the ability and their transformation effect, it is necessary to spend a great deal of research on the largest possible number of different populations. Thus, it was found that aerobic exercise programs have a transformational impact on the morphological and motor status and programs running and walking to changes in functional capacity (Sekulić, D., N. Rausavljević & N. Zenić., 2003). Johnson, M., Sharpe, G. R. & Brown, P. I. (2007) did not determine statistically significant changes in body weight under the influence of the training process for a period of 6 weeks. Hoogeveen (2000) found a statistically significant difference in the subcutaneous adipose tissue between the preparation and competition period, at intervals of eight months, a sample of 15 professional cyclists ($p < 0.05$). It was found that the athletes have 20-35%

higher values of HDL cholesterol of physically inactive persons. The impact on the levels of total cholesterol and LDL-cholesterol is less; lowering total cholesterol by 6-7% and the LDL-C by 7-12% (Lepšanović 2000). Consequently, this study was carried out in order to determine the possibility of operating the cycling on biochemical parameters that contribute to the functional ability of the cardiovascular system, and the possible changes in body composition.

2. RESEARCH METHODOLOGY

The study was conducted with 12 subjects, aged 35 ± 6 months that during the investigation were not involved in any other sports and recreational activities. Before conducting research, systematic review of the Clinical Center, it was found that all the subjects were healthy and without injuries of the loco motor apparatus. Lasted 12 weeks, during which the patients were 3x a week for 72 ± 13 minutes were subjected to physical activity through the program cycling tour which are then executed within 30km municipality everywhere. Prior to conducting the recreational program is determined initial state variables of the functional capacity and body composition of the patients (Institute of Sport Faculty physical education and sport, University of Banjaluka), and the value of the blood parameters (Konzilijum laboratories), and after the implementation of the program found is the final state. Recreational Training is programmed for a period of twelve weeks and is divided into three basic macrocycle, which consisted of four micro cycles - three microcycle building, a neighborhood regeneration. All macro cycle were programmed so that each contained three micro cycle training. The fourth week of the macro cycle all the weeks of regeneration, which consisted of leisurely ride on the flat for 60 to 90 minutes. In the first macro cyclic compound, in the first week of the program provided for the training of 15 km drive plains, other training 18 km drive plains and the third training 9 km mountain biking (42 km), of which appetizers 43.51 km - 33.78 km plains and 9.73 km hilly terrain . In the second week it was planned that the first training exceeds 11km mountain biking, on another 21 km drive plains and on the third workout 13 km mountain biking (45km), of which appetizers 49.22 km - 23:19 km plains and 26.03 km hilly terrain. For the third week predicted that the first training exported 26km plains, in another 10km of mountain biking and the third 24 plain (60km), of which 61.22 km appetizers - 49.63 km 11.59 Km plains and hilly terrain. In the fourth week of training for each planned to ride the plains in the length of 15 km, and appetizers is 47.48 km. For the second macro cycle was planned to be at every practice cycling on the plain drive even after 3 km, and at every practice mountain biking even after 1 km, making it the first week were transported 50.61 km (38.72 km plain and 11.89 km per hilly terrain), the second 51.93 km (24.82 km plain and 27.11 km in hilly terrain), third in 68.91 km (55.62 km plain and 13:29 km in hilly terrain). In the fourth week of training for each planned to ride the plains in the length of 15 km, and appetizers is 46.38 km. For the third macro cycle was planned to be at every practice cycling on the plain drive even after 3 km, and at every practice mountain biking more per 1 km compared to the second macro cycle so that in the first week were transported 57.15 km (44.76 km per plain and 12:39 km in hilly terrain), the second 56.13 km (26.72 km plain and 29.41 km in hilly terrain), third in 75.71 km (63.02 km plain and 12.69 km in hilly terrain). In the fourth week of training for each planned to ride the plains in the length of 15 km, and appetizers is 48.28 km. Bike routes driven in the southwestern part of the city of Banja Luka, which includes i.e. the northern part of the dinar system and that of the urban area of Banja Luka to the north down to the plains Lijevo fields, and the Pannonian Plain and the Kozara Mountain in the northwest area is perfect for hiking and mountain TREKKING. Mild courts, preserved nature, provide excellent conditions for cycling routes of varying lengths and degrees of difficulty - from easy, length of 10 km, to the demanding length of 80 km. Cycling plain driven at a speed of 15-20 km / h, at an altitude

that varied between 165-250 m, and lasted between 60-90 minutes, while mountain biking implemented on hilly terrain at an altitude of 165-400 m, during which the driven speed of 5-10 km / h in duration of 60-90 minutes.

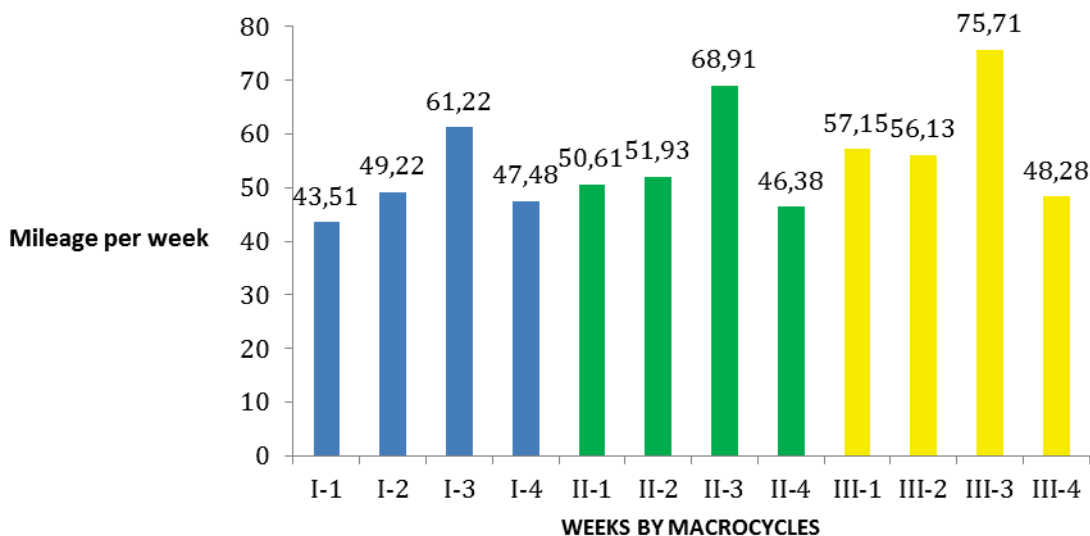


Figure 1. Only the average kilometers driven during each week (micro cycle) in each of the macro cycle

For the evaluation of the applied program used are variables that estimate the functional capabilities - VO₂max, FITNESS INDEX, basal metabolism, hemoglobin, biochemical parameters - triglycerides and cholesterol, and a variable morphological characteristics, i.e. Body composition - FAT, FAT left leg, right leg fat, TBW, the impedance of the whole body. The functional abilities were evaluated using 2km UKK TEST (values of the variables fitness index and VO₂max were obtained by applying the formula for calculating *), the morphological characteristics of basal metabolism using the body composition analyzer times (Tanita BC-418) and the biochemical parameters of the laboratory analysis of blood samples.

$$*FI = 304 - (8.5 \times \text{min} + 0.14 \times \text{sec} + 0.32 \times \text{FS} + 1.1 \times \text{BMI}) + 0.4 \times \text{age}$$

$$*VO_{2\text{max}} = 116.2 - 2.98 \times T (\text{min}) - 0.11 \times \text{HR} - 0.14 \times \text{years} - 0.39 \times \text{BMI} \text{ (Oja \& Tuxworth, 1995)}$$

$$\text{BMI} = \text{WEIGHT (KG)} / \text{HEIGHT}^2 (\text{M})$$

In the processing of the obtained results was used for statistical analysis program SPSS 17.00, and by statistical procedures have been applied to the descriptive statistics, the CF test and T-test for dependent samples.

3 RESULTS AND DISCUSSION

	N	Mean	Std. Deviation
fat1	15	31.78	7.59626
fat2	15	31.65	7.13131
tbw1	15	34.23	4.01331
tbw2	15	34.06	4.28349
imped1	15	652.13	69.24683

imped2	15	651.60	65.26408
fatdn1	15	36.12	6.01643
fatdn2	15	35.95	5.34721
fatln1	15	35.71	6.32296
fatln2	15	36.16	5.04449
holest1	15	5.79	1.4189
holest2	15	5.96	1.46312
triglic1	15	1.64	0.65403
triglic2	15	1.65	1.02448
fi1	15	128.68	16.82739
fi2	15	149.85	15.4539
vo2max1	15	46.34	6.48494
vo2max2	15	53.92	7.61531
hg1	15	126.73	11.07421
hg2	15	130.07	9.80865
bmr1	15	1400.80	182.9111
bmr2	15	1409.60	190.6308

Table 1. Descriptive statistics of variables in the initial and final state

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 fat1 - fat2	.12667	1.20266	.31052	-.53934	.79268	.408	14	.690
Pair 2 tbw1 - tbw2	.17333	1.46798	.37903	-.63960	.98627	.457	14	.654
Pair 3 imped1 - imped2	.53333	27.93837	7.21366	-14.93842	16.00509	.074	14	.942
Pair 4 fatln1 - fatln2	-.44667	3.07963	.79516	-2.15211	1.25877	-.562	14	.583
Pair 5 fatdn1 - fatdn2	.17333	1.88129	.48575	-.86849	1.21515	.357	14	.727
Pair 6 holest1 - holest2	-.17467	.55785	.14404	-.48359	.13426	1.213	14	.245
Pair 7 triglic1 - triglic2	-.01267	.65553	.16926	-.37569	.35035	-.075	14	.941
Pair 8 fi1 - fi2	2.11647E1	16.85609	4.35222	-30.49926	-11.83008	4.863	14	.000
Pair 9 vo2max1 - vo2max2	-7.58000	6.60630	1.70574	-11.23845	-3.92155	4.444	14	.001
Pair 10 hg1 - hg2	-3.33333	5.85133	1.51081	-6.57369	-.09297	2.206	14	.045
Pair 11 bmr1 - bmr2	-8.80000	63.32930	16.35155	-43.87060	26.27060	-.538	14	.599

Table 2. Results of the T-test for dependent samples

The results presented in Table 1 show a significant difference, and a change to the parameters Fitness Inex .000, .001, and hemoglobin vo2max .045 between the initial and final state. The results obtained in part coincide with the results: MacRae (2000) at 6 amateur cyclist determines VO₂max 58.4 ± 2.3 ml / kg / min, and Cramp (2004) at 8 cycling amateurs VO₂max value of 60.0 ± 3.7 ml / kg / min until Hopker, J., Coleman, D. A. i Wiles J. D. (2007) analyzed the difference between the 16 cycling amateurs (VO₂max 62.6 ml / kg / min and Wmax = 421 ± 38) 16 and recreational cyclists (VO₂max 42.6 ml / kg / min, Wmax =

292 ± 34) to the Efficiency at 50 % and 60% Wmax, and at 150 W and to identify statistically significant differences in all load intensity about 1.4% of (20.66 to 19.21%) in favor of the cyclist amateurs. Hopker (2010) observed differences between the sexes in the efficiency between 13 cycling amateurs (VO₂max = 61.3 ± 5.4 ml / min / kg and Wmax = 414 ± 4 W) and 13 recreational bikiklistica (VO₂max = 48.9 ± 6 ml / min / kg and Wmax = 293 ± 22 W). Determines greater efficiency in the female fixed load of 150 W (22.4 ± 21 19.9 ± 1.8 by%), and 180 W (1.8 to 22.3 ± 20.4%), although a lower Wmax and VO₂max . The maximum oxygen uptake (VO₂max) per kilogram body weight (ml / kg / min) is one of the important parameters in cycling on the basis of which can be distinguished: professional cyclist (world class), an elite Bicycle (cyclists international level), amateur (cyclists national-level) and recreational (trained cyclists) (Impellizzeri, F. M., i Marcora, S. 2007; Lee, H., Martin, D. T., Anson, J. M., Grundy, D. i Hahn, A. G. 2002; MacRae, H. H., Hise, K. J., i Allen, P. J. 2000; Cramp, T., Broad, E., Martin, D. i Meyer, B. J., 2004; Hopker, J., Coleman, D. A. i Wiles J. D. 2007 Lucia, A., Carvajal, A., Calderon F. J., Alfonso, A. i Chicharro, J. L. 1999) . Thus obtained results of the group of respondents is in the range of previous studies and demonstrate the positive effects of the applied program. Looking at the results of other variables tested, we can say that there was no statistically significant difference between the initial and final state which coincides with the results of research: Nourry (2005) who investigated the effects of high-intensity training for 8 weeks in children aged 9.7 ± 0.9 years divided into experimental and control group. There was a statistically significant increase in power (Wmax by 94 ± 21 103 ± W to 24 W) and VO₂max (from 37.4 ± 7.3 to 43.2 ± 7.6 ml / kg / min) in the experimental group and statistical significance an increase in body weight, while in the control group showed no statistically significant changes., but unchanged values and in the subcutaneous adipose tissue in experimental and control groups. Morphological characteristics may (Hoogeveen, 2000 te Nourry, C., Deruelle, F., Guinhouya, C., Baquet, G., Fabre, C., Bart, F., Berthoin, S. i Mucci, P. 2005), but not necessarily (Sunde, A., Storen, O., Bjerkaas, M., Larsen, M. H., Hoff, J. i Helgerud, J. 2010; Impellizzeri, F. M., i Marcora, S. 2007; Johnson, M., Sharpe, G. R. i Brown, P. I. 2007; Hopker, J., Coleman, D. A. i Wiles J. D. 2007; Halder, K., Chatterjee, A., Kain, T. C., Pal, R., Tomer, O. S. i Saha, M., 2012 te Lucia, A., Carvajal, A., Calderon F. J., Alfonso, A. i Chicharro, J. L., 1999) have influenced the training process and are dependent on the length of the training process, sample orientation and training process.

4. CONCLUSION

Based on the obtained results, it can be said that the positive effect of changes in VO₂max, fitness index and an increase in hemoglobin levels as parameters of functional abilities of respondents. Applied program for a period of 12 weeks was positively stimulate the heart and the body as a whole and led to an improvement in the work of the cardio vascular system. Loads that are realized in this period did not lead to significant changes in variables of morphological characteristics, i.e. body composition - FAT, FAT left leg, FAT right leg, TBW and the impedance of the whole body which is in accordance with a number of previous studies of this subject and creates space for similar research wherein they could change the parameters of the duration as well as the load during the planned program. Given that this is a sample of respondents who for the first time faced with this kind of recreational exercise can be said that the entire program had a very positive effect acting in addition to the physiological and motivational factors of women who did not hide their satisfaction with the exercise of the nature and effects of such exercise.

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