

EFFECTS OF APPLIED CONTENTS OF ARTISTIC GYMNASTICS PROGRAM ON SOME MOTOR ABILITIES OF THE FACULTY OF SPORT AND PHYSICAL EDUCATION STUDENTS

¹ Faculty of sport and physical education, University of Sarajevo, Bosnia and Herzegovina

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Abstract

Effects of applied contents of artistic gymnastics program on some motor abilities was applied on the sample of 27 male students of the Faculty of sport and physical education at the age of 20 till 22 years. In this research is applied a set of ten tests of motor abilities. The aim of this research is to establish a static importance of differences in arithmetic means between initial and final measuring after a two-month program of the subject artistic gymnastics. On the basis of obtained values of the T-test for paired samples it was concluded that eight variables had statistically important of ten. Eight variables had statistically important on the level ($\text{sig.} \leq .05$), while the two variables is not established statistically important on the level ($\text{sig.} > .05$). The analysis of partial quantitative changes in the area of motor abilities, it can be concluded that the obtained significant positive changes (partial transformation quantitative effects) for all used motor area, as a result of the applied program of artistic gymnastics. The biggest changes are in the area of the strenght where is of the three variables statistically important had three, then the variables to estimate the flexibility where is of the four variables statistically important had three and coordination where is of the three variables statistically important had two. In this research were obtained positive effects of the applied program content gymnastics on some motor abilities to the students of the Faculty of sport and physical education.

Key words: **effects of the program, artistic gymnastics, motor abilities**

Introduction

Previous research has clearly established that certain processes exercise a significant influence on the changes of various human traits and abilities, and motor knowledge. Petković (1989) investigated the relation of morphological, motor and cognitive abilities with success in artistic gymnastics through the implementation of the "school of gymnastics." Based on the results of research the author has concluded that the optimal combination is 10 motor abilities that have a significant projection results in artistic gymnastics and agility, balance, flexibility, static strenght abdomen, forces attempted movements and repetitive forces. Marušić has determined the elective courses (with an emphasis on artistic gymnastic) may affect among others on the development of some motor dimensions. The reserach showed that there was an improvement in 14 motor variables at boys and 12 motor variables at girls. Kocić (1996) using a sample of 40 primary school pupils conducted an experiment in order to determine the influence of the experimental program rhythmic- artistic gymnastics on the transformation of certain basic motor

abilities. The results showed that the experimental program operated significantly to about 60% of the examined tests. The greatest effect was observed in the test to evaluate the explosive strenght of the lower extremities, repetitive strenght abdominal muscles, strenght of arms and shoulders, as well as the ability to maintain equilibrium position. Aleksić (2002) investigated the impact of the scheduled gymnastic exercise on the motor abilities of girls older preschoolers. The results showed that it is possible to affect the physical development of children of this age. The greatest progress was recorded in variables to estimate strenght (explosive, repetitive and static). The reported progress has been made with the variables to estimate flexibility while only in variables for assessing the balance has not been determined statistically significant improvement. Jeričević Radenović, Horvatin-Fučkar, Antekolović and Krističević (2002) investigated the effective of the program artistic gymnastics applied to preschoolers. Results of discriminant analysis showed that after the implementation of the program, the biggest changes at motor abilities are found in static strenght shoulders, balance, coordina-

tion and explosive leg strength. Wolf-Cvitak, Krističević and Grcic-Zubčević (2004) analyzed the impact of programmed training in rhythmic gymnastics at the motor abilities of girls ($n = 36$), at the age eight years. Statistically significant differences were found in seven motor tests (flexibility, explosive strength and coordination). Tabaković and Kozić (2008) Predictive values of motor abilities at the performance in artistic gymnastics floor exercises. The study was conducted on selected sample of 180 male examinees, at the age 16 till 18 years old. All subjects were students of "Sportska gimnazija" in Sarajevo. The study used a set of 24 motor ability variables representing predictor system and a collection of 11 artistic gymnastics floor routine representing criterion system. The authors concluded that the prediction - impact of the predictor variables in the system of motor criterion variable PARTER, can be made with more confidence with the help of the entire system of predictor variables in relation to the reliability that can be done with the help of the obtained partial (Beta) regression coefficients, ie individual impact of predictor variables on the criterion. Madić i sar. (2009.) In a sample of 250 girls involved in the program of development of gymnastics as well as the 580 girls who are not involved in sports, ages 7-11 years with major cities of the territory of Vojvodina, applied a battery of eight motor tests. The authors emphasized that the research results clearly confirm that the gymnastic facilities means a positive impact on motor abilities.

The subject of this research, on the one hand, represent a manifest dimensions of some motor abilities, and on the other hand, the effects of the program artistic gymnastics on the transformation of these dimensions, the students of the Faculty of sport and physical education.

The aim of this research is to analyze and determine the effects of the application of program artistic gymnastics on some motor abilities at students of the Faculty of sport and physical education.

Method

The sample in this research represent the male students at the age 20 till 22 years. The subjects were students of the Faculty of sport and physical education in Sarajevo. Total number of examinees in which are registred values and to which referece is made final processing and analysis of the results is 27.

In this research applied a set of ten tests of motor abilities. To estimate the flexibility were used four variables: wide leg forward bending seated (MFLPRD), wide leg forward bending seated from sternum to floor (MFLPRS), bridge (MLFMO) and shoulder flexibility (MFLIPA). To estimate the strength were used three variables: sit-ups with extended legs (MRSPN), hand grip (MSSŠ) and static chin up hold (MSSIZ). To estimate the coordination were used three variables: air agility (MKOOZ), floor agility (MKOOTL) and baton coordination (MKOKP).

The experimental program (a program of two months training process)

The entire training process was implemented during the school year 2012-2013. in a period of two months on Faculty of sport and physical education in Sarajevo. The fundamental aim of the training process was to prepare students for the exam of the subject artistic gymnastics. The additional aim was to influence the improvement of motor abilities, to help students to be ready for implementation some gymnastics elements and for learning and practicing gymnastics exercises for each gymnastic equipment. In this program were used four mens gymnastic equipment: rings, vault, parallel bars and horizontal bar. Based on the defined aim it was made adequate training program. The entire training process is divided into six microcycle. In the first microcycle performed the initial testing and conducted four training. Trainings were directed toward a specific physical preparation and introduction with the elements of the exercise for elements that are performed on the exam, in order to create a baseline physical and mental conditions for later activities. The second, third, fourth and fifth microcycle were primarily focused on learning elements that were part of the exercise on these gymnastic equipment, which were performed in the practical part of the exam of the subject artistic gymnastic. Sixth microcycle was aimed at improving performance of certain exercises on gymnastic equipment. The last training of sixth microcycle it was held final testing. The realization of the training process, the students were not burdened by any other training process or physically demanding activities. The program was implemented in the period when classes ended and the two months the students were engaged only in the implementation of programs in this research.

Data processing methods

In order to determine the quantitative changes in tests of motor abilities under the influence of the training process between the initial and final measurements, used the program *SPSS Statistics*. The differences in the univariate level between the initial and final measurements in the area of motor abilities, were analyzed with T-test for dependent samples.

Results

Results of training process effects on the measured motor abilities are shown in Table 1. It was analyzed the difference of means at the univariate level T - test for dependent samples. Acquiring insight into the results table presented arithmetic means tested variables for the assessment of motor abilities initial and final states, reveals statistically significant in most of the tested variables (sig. $< .05$). In variables for estimate flexibility statistical significance have three variables: wide leg forward bending seated (MFLPRD), wide leg forward bending seated from sternum to floor (MFLPRS) and shoulder flexibility (MFLIPA). In variables for estimate strength statistical significance

had applied all three variables: sit-ups with extended legs (MRSPN), hand grip (MSSSSŠ) and static chin up hold (MSSIZ). In variables for estimate coordination statistical significance have two variables: air agility (MKOOZ) and baton

coordination (MKOKP). At two variables we are not get the statistical significance one variable for assessing flexibility: bridge (MFLMO and one variable for assessing coordination - floor agility (MKOOTL).

Table 1. The statistical significance differences in arithmetic means between initial and final measuring in motor variables

Paired Samples Test										
Paired Differences										
Variables	N	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)	
					Lower	Upper				
Pair 1	MFLPRDI - MFLPRDF	27	-3.88	3.36	1.01	-6.14	-1.63	-3.83	26	.00
Pair 2	MFLPRSI - MFLPRSF	27	2.43	1.43	.43	1.47	3.39	5.62	26	.00
Pair 3	MFLMOI - MFLMOF	27	5.99	14.06	4.24	-3.46	15.44	1.41	26	.19
Pair 4	MFLIPAI - MFLIPAF	27	4.84	6.92	2.09	.19	9.49	2.32	26	.04
Pair 5	MRSPNI - MRSPNF	27	-14.36	10.47	3.16	-21.40	-7.33	-4.55	26	.00
Pair 6	MSSSSŠI - MSSSSŠF	27	-3.03	4.00	1.21	-5.72	-.35	-2.52	26	.03
Pair 7	MSSIZI - MSSIZF	27	-8.87	6.08	1.83	-12.96	-4.79	-4.84	26	.00
Pair 8	MKOOZI - MKOOZF	27	.64	.34	.10	.41	.87	6.33	26	.00
Pair 9	MKOOTLI - MKOOTLF	27	1.56	2.56	.77	-.15	3.28	2.03	26	.07
Pair 10	MKOKPI - MKOKPF	27	.61	.37	.11	.36	.86	5.39	26	.00

Discussion and conclusion

Flexibility is defined as the capability of making a single maximum range of motion, or the ability to perform movements with greater amplitude. Based on previous research it is known that the successful execution of the artistic gymnastics necessary owning large scale and the extended dynamic flexibility. And here we can say that the results of the variables and elements of flexibility in gymnastic equipment under the influence of the general mechanism for the regulation of movement (automatic synergetic mechanism and regulation of muscle tone). The biggest cause for the resulting partial quantitative changes in variables for assessing the flexibility of movement in the structure of the elements that were performed on gymnastic equipment. For flexibility of the shoulder belt and quantitative change variables shoulder flexibility (MFLIPA) reason may be numbers of heights, and swinging in higher and the element which required great flexibility of the shoulder belt, flex forward at the rings. Quantifiable changes in variables wide leg forward bending seated (MFLPRD) and wide leg forward bending seated from sternum to floor (MFLPRS), the greatest significance had elements ascend the heights

and support where needed body to a closed position with the extended legs. For variable bridge (MFLMO) we get statistical significance, and the reason for that can be applied elements of artistic gymnastics. Exercise applied artistic gymnastics examinees are much more engage and strenght of the abdominal muscles, than as these exercises stretch the spinal musculature and vertebral column. Repetitive strenght, which is defined as the ability of long-term work on alternating contraction and relaxation of muscles. The explanation for the resulting change of variables to estimate repetative strenght can be explained by the fact that: elements are performed one after the other in combination rather than individually, and preforming of the elements was longer. These facts leads to the conclusion that for the successful execution of the elements applied on gymnastic equipment with this kind of performance, it was necessary to engage the muscles on the principle of long-term operation with alternating contraction and relaxation of muscles (repetative strenght). These fact leads to the conclusion that the results of variables of the repetative strenght and elements of aritstic gymnastic under the influence of the general mechanisms for energy regulation (the mechanism for controlling the duration of excitation). Static strenght

(isometric muscle strength) is the maximum strength that can be generated against resistance, which does not yield single muscle contractions and muscle length is held constant during the contraction. Changes between initial and final states in the variables to estimate strength: sit-ups with extended legs (MRSPN), hand grip (MSSŠ) i static chin up hold (MSSIZ) contributed to all the elements that have been applied to the transformation process. Catches, heights and strongholds support and more static strain of the upper extremities have contributed to positive changes in the effects of the program on motor abilities. During the execution of all elements are used strength of body trunk especially when they are performing element pullover on the bar.

Coordination is no single definition. Coordination is the ability to control the movements of the whole body or parts of the musculoskeletal system (Bompa. 2006th). Coordination would be easiest described as the ability to perform simple and complex movements ie ability to perform complex movements, but also the rapid learning of new movements and rapid changes of one movement to another (Drabik. 1996). Since the tests in coordination prevailing complex motor tasks, as well as in artistic gymnastics dominate the complex structure of the movement, it can be said that the results of the coordination variables and elements on the floor under the influence of the general mechanism for the regulation of movement (movement structuring mechanism). In two of the three variables to estimate coordination was obtained statistically significant changes. As it is known that the coefficient of the inherent coordination is very high .80, and a brief training process two months, it can be reasonably assumed that quantitative variables' coordination in this research it can be attributed to more knowledge tests during the final test, than the effects of the training process.

Generally based on the numerical values of t-test for paired samples treated with variable motor abilities it is possible to determine the specific training process caused a number of statistically significant differences between the two measurements.

The aim of the training process is a learning and training students for the exam of the subject called artistic gymnastic and testing transformational effects of gymnastic training on the manifest dimensions of strength, coordination and flexibility. From the results we can conclude that training process practical part of the subject artistic gymnastics can successfully affect change in the level of motor abilities. This change is particularly pronounced in the area of strength and flexibility where we get the highest statistical significance, then in the area of coordination. The general conclusion is that in this research were obtained positive effects of the applied program content gymnastics on some motor abilities to the students of the Faculty of sport and physical education.

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- Submitted: November 25, 2013
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- Correspondence to:
Associate professor Muhamed Tabaković, PhD
Faculty of Sport and Physical Education,
University of Sarajevo
Patriotske lige 41, 71 000 Sarajevo
Bosnia and Herzegovina
E-mail: muhamed.tabakovic@gmail.com