ATHLETIC DISCIPLINES AS A FUNCTION OF STRENGHT DEVELOPMENT IN STUDENTS

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Abstract

Individual sports, including athletics, as a part of physical education, presents activity of agonistic character, where certain motor potentials manifest in different ways and different intensity. This demonstration of motor skills depends on the discipline implementation and realization of specific tasks. Also, success in certain athletic disciplines depends on certain motor skills which are primary and fundamental for success in a certain activity, with including other structures (morphological, functional, conative and cognitive). Since success in athletic disciplines mostly depends on the strength, the emphasis of this study is on strength transformation in students who participated in implementation of programs in athletics.

Key words: *athletic, transformations, strength, students*

Introduction

Physical activity of a man in modern society, which follows technology development, is reduced to a minimum. Movement as one of basic life functions and the most natural state of human body is more and more missing. More and more of young people, in order to fit into the modern trends of life, are ignoring the basic principle of its existence, and that is physical activity (exercise). Many individual sports, including athletics, as a branch of sport and a part of physical culture, present antagonistic activities in which the motor potentials manifest in different ways and in different degrees (Kragujević, 1991; Stanković, 2002; Rakovac & Heimar 2003; Malacko & Rađo, 2004). This manifestation of motor skills depends primarily on the approach and the aim of the certain task realization (Milanović, 1997; Stojiljković, 2003).

Also, successes in certain athletic disciplines depend on motor skills which are the base of success in a certain activity, certainly with participation of other structures (morphological, functional, conative and cognitive). Success in sport and motor skills achieve high degree of correlation according to genetic coefficient (Goodway et all, 2003; Čoh, 2003). When it comes to athletic disciplines within curriculum on the faculties (sport and physical education), they have primarily educative character, through which are adopted methodical and technically tactical principles of athletic discipline.

Also, the realization of these principles, indirectly affects the development of a certain anthropological characteristics of the defined population regardless of whether we analyze the students of elementary school or the ones on faculty. More frequently those are transformations of morphological, motor or functional (Dimitros, 1997; Branković, 1998; Dragić, 2003; Antekolović, Žufar, & Hofman, 2003; Skender, 2004; Beets & Pitetti, 2005; Pržulj, 2007).

Problem and the aim

Athletic classes at the Faculty of Physical Education and Sport in East Sarajevo are taking place with a fund of practical training of 3 hours per week, which is implemented by programming tasks in a given case. We considered the need to examine the effects of practical classes on the development of anthropomotoric domain of the students, in other words development of motor skills through the implementation of classes during a single semester with a total fund of 45 hours. Considering success in athletic events, among other things, depends on the strength, in this research the emphasis is exactly on the strength transformations with students who participated in athletic program content realization. The main objective of this research is to determine the effect of athletics classes on strength types transformational changes such as (explosive, dynamic and static) on students.

Methods

The research included the sample of respondents including third year study students, of Faculty of physical education and sport in East Sarajevo, age 21 ± 6 months, who have implemented curriculum in athletics during the semester of the school year 2009/10. Initial measuring was performed first week of classes in October, and second final measuring, last week of December. Considering problem and objectives of the research, a system of variables in order to estimate the strength domain according to action criterion, was defined (Kurelić et all, 1975): *explosive strength*, 1- standing long jump (MSDM), 2-Sargent test (MSAR), 3- throwing medicine ball lying on the back (MBML); *repetitive strength,* 1- lifting torso on Swedish bench, abdomen (MDTS), 2-lifting torso on Swedish bench, back (MDTL), 3- pushups (MSKL); *static strength*, 1- held part in the hang (MVIS), 2- held part in the semi squat (MIZP); 3- held part in push up (MISKL).

We calculated the statistical parameters of the initial and final measurements for each variable (Mean, Min., Max., Rang, St. Dev., CV %). In order to determine statistically significant variations in measuring at each variable we applied multivariate variance analysis and defined relevant function parameters, i.e. tested arithmetic mean differences through F-test in order to determine the degree of these differences.

Results

Table 1. Descriptive parameters of initial measuring

	Mean	Min	Max	Range	Std.Dev.	CV%	Skew	Kur
MSDM	239.00	220.00	280.00	60.00	11.66	4.84	.38	-1.72
MSAR	292.72	273.00	327.00	54.00	13.06	4.46	.31	.27
MBML	400.59	250.00	600.00	350.00	78.93	19.70	.94	1.61
MDTL	26.18	14.00	52.00	38.00	7.77	29.67	.86	-.08
MDTS	14.28	4.00	27.00	23.00	4.97	34.80	.53	.20
MSKL	24.33	5.00	40.00	35.00	6.87	30.45	.41	2.04
MVIS	55.92	18.34	94.00	75.66	17.46	31.22	.40	-.56
MIZP	95.94	34.97	252.38	217.41	48.67	50.72	.35	-.34
MISKL	55.18	18.04	120.71	102.67	21.60	39.14	.13	-1.04

Table 2. Descriptive parameters of final measuring

	Mean	Min	Max	Range	Std.Dev.	CV%	Skew	Kur
MSDM	244.21	230.00	285.00	55.00	9.33	3.82	.28	-1.22
MSAR	293.13	269.00	332.00	63.00	13.98	4.76	.32	.27
MBML	486.03	300.00	720.00	420.00	88.79	18.26	.24	1.01
MDTL	26.59	12.00	60.00	48.00	10.14	38.13	.47	-.02
MDTS	17.92	4.00	35.00	31.00	4.46	24.88	.53	.23
MSKL	27.38	9.00	40.00	31.00	8.91	32.54	.21	1.14
MVIS	53.11	30.92	86.87	55.95	13.79	25.96	.41	-.56
MIZP	135.80	48.52	482.22	433.70	99.61	73.35	.32	-.34
MISKL	58.26	18.52	123.51	104.99	23.71	40.69	.33	-1.24

Result analysis of descriptive statistics indicates normal distribution of applied variables within Gausse's distribution. (Table 1 and 2). Almost all of the variable distribution reflects the symmetry and the value of skew. does not exceed value of 1:00. Gotovo kod svih analiziranih varijabli distribucija oslikava simetričnost gdje vrijednost skew. ne prelazi vrijednost 1.00. Ranging min. and max. there is a sufficient number of standard deviations which enables the conclusion of high-sensitivity variables examined in this study. Normality distribution of the reserached variables on univariate level allows the use of multivariate analysis of variance for the purpose of this research. Inspecting Table 3, values are obtained for multivariate analysis of variance, which identified the relevant parameters on which we can conclude that there was a statistically significant change in the final compared to initial measurement. Values of the results presented in table 4 confirm the transformation occurred on univariate level for the most of researched variables with high statistical significance. Noted certain variations between arithmetic means confirm that applied practical program, formed as transformational model of exercise, gave significant results, especially with variables which in their performance, have the same structure of movement as athletic disciplines.

Discussion and conclusion

Analyzing table (1 and 2), i.e. initial and final state of applied variables, we notice different values of results obtained. In order to gain more complete information on variations of respondents in initial and final measuring, besides arithmetic mean, it is necessary to analyze other parameters. Such parameters are standard deviation (Std.Dev), range (Range), minimal (Min) and maximal (Max) result values as well as variation coefficient (CV%) of applied variables. These parameters provide more information about the composition of the sample. Its' obvious that in the end of the final measuring almost all variables had positive growth trend i.e., higher result value compared with initial measuring, which was expected since athletic disciplines have structure which affects development of the defined motor variables.

Table 3. Multivariate variation analysis

Wilks' Lambda	F	df 1	df 2	p-level
.673	4.37	7	152	.001

Table 4. Univariate variance analysis

	Mean	Std.Dev	F	p-level
MSDM	239.00	11.66	6.90	.000
	244.21	9.33		
MSAR	292.72	13.06	1.71	.005
	293.13	13.98		
MBML	400.59	78.93	7.13	.000
	486.03	88.79		
MDTL	26.18	7.77	1.35	.083
	26.59	10.14		
MDTS	14.28	4.97	3.84	.000
	17.92	4.46		
MSKL	24.33	6.87	3.72	.000
	27.38	8.91		
MVIS	53.11	17.46	1.93	.060
	55.92	13.79		
MIZP	95.94	48.67	2.17	.004
	135.80	99.61		
MISKL	55.18	21.60	2.59	.065
	58.26	23.71		

Parameters that provide us with information about homogeneity or heterogeneity of the group that the value of min and max results, i.e. the range and value of CV% indicate that it is a different homogeneity regarding to the variables applied. The highest homogeneity appeared in variable MSDM and the lowest in variable semi squat (MIZP) where Std.Dev appeared higher then allowable value of arithmetic mean which violates the normality, i.e. discriminativity of the test. However, this could be described with the condition of the respondents during measuring i.e. their motivation for better results. Even if explosive strength is genetically determined (85% approx), there is noticeable satisfactory increase in value. This speaks in favor of the fact that athletics is monostructural sport of cyclic and acyclic type which is characterized by a large number of jumps, throws and running in the structure of disciplines, and as a consequence of such movement the result is incensement of motor skills. The same conclusion relates to repetitive strength variables characterized by lower genetic proportion (60%) and its transformation is easier to affect (Nićin, 2000; Stojiljković, 2003). General conclusion would be a fact, according to initial and final measuring that there is improvement in most of tested variables in almost all strength domains. According to central and dispersion parameters it is not possible to statistically evaluate and determine the changes between the measurements and further result interpretation implies multivariate variance analysis application which provided explanation about changes in entire system of defined parameters. Analyzing Table 3 which presented results of test for variations significance of arithmetic mean levels in all motor test between initial and final measuring on the sample of experimental and control group and statistically significant difference was determined since Wilks' Lambda equals .673, as Rao F-approximation of 4:37 gives the significance of differences at the level of p = .001.According to this, in an applied set of respondent motor ability test it was determined that respondents in final measuring differ statistically and significantly from the values in initial measuring. These results indicate that on multivariate level of athletic practical classes it influenced significantly on variable transformation regardless the type of the strength. Changes were evident in explosive strength even if its mostly genetic and it is hard to affect, unlike repetitive and static strength where the progress can be expected. This can be explained with the fact that athletics curriculum caused certain transformational effects of the respondents regarding better results. Similar results were obtained in previous researches that have examined the same and similar issues (Ilić, 1991; Vuksanović, 1999; Branković, 200; Skender, 2004; Perić, 2004; Petrović, 2006). In table 4 arithmetic means of initial and final measuring were presented, F values, i.e. differences of arithmetic means and the level of significance in this variations (p). Analyzing single results, we could generally conclude that five, out of 9 variable (60%) expressed statistical significance regarding differences of arithmetic means on the default level of p=.05. At variables whre explosive strength was estimated, all three variables (long jump MSDM), throwing medicine ball lying down MBML and high jump MSAR achieved statistical difference of arithmetic means of the first and second measuring. Tests that estimated repetitive strength proved the same positive trend regarding measured variables, since out of three variables, two were statistically and significantly transformed into better result than initial and those variables were pushups (MSKL) and lifting torso, abdomen (MDTS). Speaking of static strength, we notice smaller statistically significant changes in variables where we applied only one variable: semi squat where the variation in measuring equals default level. This can be explained with the fact that athletics is a dynamic sport where explosive and repetitive moves dominate and less moves that require certain performance. It is also necessary to mention that athletic curriculum is defined with the emphasis on methodical principles and learning element and not development of any type of strength. In the opposite case maybe observed variables express better statistical variation in measurement, then this would be training not education from certain sports discipline. As in other sports, here we can talk about impact of other endogenous and exogenous factors among which the particular importance has motivation in the moment of measuring, the condition of CNS etc. However, this would require more detail discussion where we would include some physiological factors as well. Based on the analysis results of the research can be concluded that between the initial and final measurements of different aspects of the power of students there was a statistically significant difference in most of the tested dimension. The smallest effects were observed in variables of static strength that have made changes but did not show statistical significance. Areas of strength have experienced significant transformational effects as a result of teaching that is narrowly focused on training methodology and regarding this on development of certain characteristic of anthropomotoric student potentials. However, the conclusion could also be the thesis that athletic practical classes during single semester enable positive changes in applied variables respectfully to the facts stated in the text.

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ATLETSKE DISCIPLINE U FUNKCIJI RAZVOJA SNAGE STUDENATA

Sažetak

Pojedinačni sportovi, uključujući atletiku, kao dio tjelesnog odgoja, predstavljaju aktivnost natjecateljskog karaktera, pri čemu se motorički potencijali ogledaju u različitim načinima i uz različite intenzitete. Ovo iskazivanje motoričkih vještina ovisi o implementiranoj discipline i ostvarenju specifičnih zadaća. Također, uspjeh u određenim atletskim disciplinama ovisi o određenim primarnim i sekundarnim motoričkim vještinama odgovornim za uspjeh u takvim aktivnostima, uz uključivanje ostalih struktura (morfoloških, funkcionalnih, konativnih i kognitivnih). Budući uspjeh u atletskoj disciplini uglavnom ovisi o snazi, naglasak u ovoj studiji je na transformaciji snage studenata koji su sudjelovali u primjeni atletskih programa.

Ključne riječi: *atletika, transformacije, snaga, studenti*

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