ANALYSIS OF SOME ATHLETIC EVENTS RESULTS AND THEIR CORRELATIONS

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Abstract
Athletics is a very demanding and complex sport which, together with its branches, makes a diverse and dynamic unity. Beside other motor abilities that need to be developed and improved in a long-term training process, this paper analyses power, speed and endurance. Tests used for evaluation of these motor abilities are: 100m running, 800m/1500m running, long jump and shot put. Testing was done on a sample of 383 students. Research that was done had a goal to define correlations and internal influence of results accomplished through these tests. Based on the analysis and processing of obtained data, correlations and mutual influence of these results were confirmed.

Key words*: training, strength, speed, endurance*

Introduction, problem and aim

Athletics is one of the most complex sports, and it is based on a great diversity of movement activities, which is why it is considered to be „the queen of all sports“. It can be proud to be named like that, not only for the previous reasons, but also due to the fact that, as it is generally known, success in most of modern sports is linked to proper running, jumping, walking, throwing, etc. The basic ideas of athletics influence those types of movement, develop them, improve them and allow everyone to set good foundations of movement activities which are important for almost all sports. However, when talking about athletics as a sports event, it is divided into four categories. This paper deals with three of these (running, throwing, jumping). To be successful in each of these categories it is necessary to develop specific motor abilities. When talking about sprint running as an athletic event, the most dominant motor abilities are speed and power. Middle distance runners, besides those two previously mentioned motor abilities, need to have and develop endurance as a motor ability. To be successful in jumping events, besides explosive power which is basic to everything, one needs speed, endurance and coordination. Based on previously said, it can be concluded that jumping is a very hard and complex event, and to reach success and top results it is necessary to address a lot of factors. Finally, when analysing throwing events, it is enough just to look at top athletes in these events to realize which motor ability prevails with them, and that is power. However, besides this motor ability, throwers need to be fast, to have good coordination and flexibility. The above mentioned shows that the basic elements of all three athletic categories are motor abilities: power, speed and endurance. Following that, this paper goes into that direction and analyses each of these motor abilities through results in 100 m running, where speed and power are important, 800 m and 1500 m running, where endurance is important, long jump, where speed and power are needed, and shot put, where power and speed are needed. Research problem in this paper are relations between results in several athletic events (100m, 1500m/800m, long jump and shot put). The Subject is analysis of several athletic events (100m, 800m, 1500m, long jump and shot put). Having in mind the theme of this paper, the goal is to determine existence of correlations between results that the examinees achieved in several athletic events.

According to the goal the following objectives are set: 1. To determine if there is connection between running results, 2. To determine if there is connection between running and jumping. 3. To determine if there is connection between running and throwing. Hypotheses set in relation to the defined problem, subject and goal are: H1 – statistically significant correlation is expected between 100m, 800m and 1500m running, long jump and shot put results; H2 – statistically significant prediction is expected of the 800m and 1500m running, long jump and shot put results based on 100 m running results; H3 – statistically significant prediction is expected of the 100m running, long jump and shot put results based on 800 m running results; H4 – statistically significant prediction is expected of the 100m running, long jump and shot put results based on 1500 m running results; H5 – statistically significant prediction is expected of the 100m, 800m and 1500m running and shot put results based on long jump results; H6 – statistically significant prediction is expected of the running results in 100m, 800m and 1500m running and long jump results based on shot put results.

Methods

In this paper, the method that is used is theoretical analysis which is directed towards explanation of results achieved in several athletic events. A method of description was also used with the goal to describe connections between achieved results, as well as their relations.

Sample of examinees

The sample of examinees is 383 students from the Faculty of Physical Education and Sports in Banja Luka, 305 male and 78 female examinees. Measuring was done during practical lessons of the subject „Athletics".

Sample of variables

Variables in this research are: 100m running- SPRINT, 800m/1500m running – SRPRUGE, long jump- SKOKDALJ, shotput – BAKUGL. Variables were obtained based on results of measuring 100m, 800m and 1500m running, long jump and shot put. Measuring of achieved results in all four events was done during practical lessons of the subject „Athletics". 100m running (all examinees), 800m (women) and 1500m (men) were measured on a racetrack in accordance with all relevant rules. Time was measured manually. Jumps were done on a runway which is in accordance with all the standards prescribed in athletic rules. Results were measured with a meter steel tape with presence of five referees.

Students threw shots on an appropriate shot put field which is in accordance with all necessary rules. Results were measured with a meter steel tape with presence of five referees. Both men and women threw shots of certain weight which are prescribed in the athletic rules (men: 7.26 kg shot, women: 4 kg shot).

Data analysis methods

There is a possibility to solve the problem defined in the research model in an optimum way, but solving it successfully depends on the way of collection of primary information and choice of mathematical-statistical procedures for condensation and transformation of raw data. In order to come to proper conclusions, the following was calculated: basic descriptive parameters, parameter statistics, correlation links – numeric links between achieved results, regressive links – prediction of results. Statistical data analysis was done on a PC Pentium IV. Statistical programme SPSS (version 11.0) was also used.

Results

Table 1. Correlations

Men	SPRINT	SRPRUGE	SKOKDAL	BAKUGL
SPRINT	1.00			
SRPRUGE	0.31	1.00		
SKOKDALJ	-0.48	-0.21	1.00	
BAKUGL	-0.11	-0.08	0.14	1.00
Woman	SPRINT	SRPRUGE	SKOKDAL	BAKUGL
SPRINT	1.00			
SRPRUGE	0.48	1.00		
SKOKDALJ	-0.69	-0.34	1.00	
BAKUGL	-0.60	-0.34	0.56	1.00

Table 2. Descriptive and dispersive parameters

Stud	Variables	N	Range		Mean	Std.	Skew	Kurt
			Min	Max				
men	SPRINT	305	11.34	16.25	13.25	0.69	0.56	1.44
	SRPRUGE	305	265.20	428.10	335.30	29.53	0.35	0.04
	SKOKDALJ	305	351.00	584.00	475.01	37.64	0.03	0.85
	BAKUGL	305	520.00	1131.00	811.70	96.48	0.36	0.59
women	SPRINT	78	12.51	19.02	15.81	1.18	-0.29	0.91
	SRPRUGE	78	146.10	309.10	202.52	27.50	1.63	3.48
	SKOKDALJ	78	301.10	498.10	373.50	40.66	0.90	1.64
	BAKUGL	78	461.10	1310.00	713.88	124.31	1.37	5.64

Table 3. Regression analysis

Students	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Dependent Variable
men	1	0.24	0.05	0.05	28.74	SRPRUGE
women	1	0.48	0.23	0.22	24.27	SRPRUGE
men	1	0.51	0.26	0.26	33.01	SKOKDALJ
women	1	0.68	0.46	0.45	30.07	SKOKDALJ
women	1	0.60	0.36	0.35	99.90	BAKUGL

Table 4. Influence of 100m running results on 800m and 1500m running, long jump and shot put results

Students		Unstand.Coeff.		Stand.Coeff.	t	Sig.	Dependents Variable
		B	St.Er.	Beta			
Men	constant	196.64	32.76		6.00	0.00	SRPRUGE
	SPRINT	10.47	2.47	0.24	4.23	0.00	
women	constant	25.86	37.06		0.70	0.49	SRPRUGE
	SPRINT	11.17	2.34	0.48	4.78	0.00	
Men	constant	852.96	36.463		23.39	0.00	SKOKDALJ
	SPRINT	-28.55	2.748	-0.51	-10.39	0.00	
women	constant	741.95	45.926		16.15	0.00	SKOKDALJ
	SPRINT	-23.31	2.897	-.067	-8.04	0.00	
women	constant	1714.3	152.54		11.23	0.00	BAKUGL
	SPRINT	-63.29	9.62	-0.60	-6.57	0.00	

Table 5. Regression analysis

Students	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Dependent Variable
women	1	0.48	0.23	0.22	1.04	SPRINT
women	1	0.34	0.12	0.10	38.50	SKOKDALJ
women	1	0.34	0.11	0.10	117.75	BAKUGL

Table 6. Influence of 800m running results on 100m running, long jump and shot put results

Students		Unstand. Coeff.		Stand. Coeff.	t	Sig.	Dependent Variable
		B	Std. Error	Beta			
women	constant	11.62	0.88		13.14	0.00	SPRINT
	SRPRUGE	0.02	0.00	0.48	4.78	0.00	
women	constant	475.07	32.60		14.57	0.00	SKOKDALJ
	SRPRUGE	-0.50	0.16	-0.34	-3.14	0.00	
women	constant	1023.5	99.71		10.26	0.00	BAKUGL
	SRPRUGE	-1.53	0.49	-0.34	-3.13	0.00	

Table 7. Regression analysis

Students	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Dependents Variable
men	1	0.24	0.06	0.05	0.65	SPRINT
men	1	0.21	0.04	0.04	36.89	SKOKDALJ

Table 8. Influence of 1500m running results on 100m running and long jump results

Students		Unstand. Coeff.		Stand.Coeff.	t	Sig.	Dependent Variable
		B	Std. Error	Beta			
men	constant	11.45	0.42		26.97	0.00	SPRINT
	SRPRUGE	0.005	0.00	0.23	4.23	0.00	
men	constant	562.90	24.12		23.34	0.00	SKOKDALJ
	SRPRUGE	-0.26	0.07	-0.21	-3.66	0.00	

Table 9. Regression analysis

Students	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Dependent Variable
Men	1	0.49	0.24	0.23	0.58	SPRINT
Women	1	0.68	0.46	0.45	0.87	SPRINT
Men	1	0.20	0.04	0.04	28.94	SRPRUGE
Women	1	0.34	0.11	0.10	26.04	SRPRUGE
Men	1	0.14	0.02	0.02	95.75	BAKUGL
Women	1	0.55	0.31	0.30	104.01	BAKUGL

Table 10. Influence of long jump results on 100m, 800m and 1500m running and shot put results

Students		Unstand. Coeff.		Stand. Coeff.	t	Sig.	Dependent Variable
		B	Std. Error	Beta			
men	constant	17.34	0.42		40.91	0.00	SPRINT
	SOKDALJ	-0.019	0.00	-0.48	-9.70	0.00	
women	constant	23.17	0.92		25.15	0.00	SPRINT
	SOKDALJ	-0.02	0.00	-0.67	-8.04	0.00	
men	constant	411.94	21.01		19.60	0.00	SRPRUGE
	SOKDALJ	-0.16	0.04	-0.20	-3.65	0.00	
Women	constant	288.23	27.42		10.51	0.00	SRPRUGE
	SOKDALJ	-0.23	0.07	-0.34	-3.14	0.00	
Men	constant	638.57	69.52		9.19	0.00	BAKUGL
	SOKDALJ	0.36	0.15	0.14	2.50	0.01	
Women	constant	78.97	109.52		0.72	0.47	BAKUGL
	SOKDALJ	1.70	0.29	0.56	5.83	0.00	

Table 11. Regression analysis

Students	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Dependent variable
women	1	0.60	0.36	0.35	0.95	SPRINT
women	1	0.34	0.11	0.10	26.05	SRPRUGE
Men	1	0.14	0.02	0.02	37.32	SKOKDALJ
women	1	0.56	0.31	0.30	34.02	SKOKDALJ

Table 12. Influence of shot put results on 100m and 800m running and long jump results

Students		Unstand. Coeff.		Stand. Coeff	t	Sig.	Dependent Variable
		B	Std. Error	Beta			
women	constant	19.89	0.63		31.52	0.00	SPRINT
	BAKUGL	-0.01	0.00	-0.60	-6.57	0.00	
women	constant	255.94	17.30		14.79	0.00	SRPRUGE
	BAKUGL	-0.08	0.02	-0.34	-3.13	0.00	
men	constant	430.00	18.12		23.72	0.00	SKOKDALJ
	BAKUGL	0.06	0.02	0.14	2.50	0.01	
women	constant	243.69	22.59		10.78	0.00	SKOKDALJ
	BAKUGL	0.18	0.03	0.56	5.83	0.00	

Discussion

Table 2 shows descriptive parameters of results in all four events by examinees of both sexes. The values shown are arithmetic mean (average), standard deviations, range, or in other words difference between maximum and minimum results, and discriminative parameters, values for skewness and kurtosis. When analyzing results shown in Table 2 it can be noticed that male examinees have the highest variation span at shot put results, a bit lower at long jump and 1500m running, and the lowest at 100m running. Female examinees have the highest variation span at shot put results, a bit lower at long jump and 800m running, and the lowest at 100m running.

When calculating dispersive parameters, it has been noticed that, based on standard deviation of examinees, male and female examinees have the most homogeneous results in 100m running. A reason for such quite homogeneous results may be justified with the fact that the examinees passed trainings in sprint techniques and crouch start, This athletic event is also less demanding, and it is easier to run it than 800m and 1500m events, where one needs substantial endurance and power. That is why the results in these events, 800m and 1500m, are not homogeneous. The reason for this fact can be that in order to achieve good results in these events it is necessary to develop endurance and strength, and this is done through long term training processes. Analysis of the sample of examinees shows that the majority of examinees are not in the process of regular trainings, they are active only during practical lessons. The fact that long jump and shot put results are not homogeneous can be explained with the fact that, although passing trainings in these techniques, a certain number of examinees have not mastered these techniques completely and they are not capable of using their abilities to the full extent.

Table 1 shows results of completed correlation analysis for 100m, 800m and 1500m running, long jump and shot put results achieved during measuring by examinees of both sexes. Results of correlation analysis between 100m and 1500m running, long jump and shot put results at male examinees are 0.24, -0.49 and -0.11. In the first two cases the significance value is 0.00, and in the third one 0.06. These values prove that in the first two cases there is a statistically significant connection, while it is not present in the third case. Correlation values between results from 100m and 800m running, long jump and shot put at female examinees are 0.48, -0.68 and -0.60. In all three cases the significance value is 0.00, and this proves a statistically significant connection.

Sprint and middle distance running techniques are basically different, as well as motor abilities which are essential for good results in each of these events (speed-sprint, speed endurance-middle distance). Statistically significant connection of these results can be justified with another secondary motor ability necessary in both events, and that is power. Connection between sprint and long jump results can be justified with motor abilities whose development is necessary for good results. At crouch start and take-off it is necessary to develop explosive power of lower limbs, while at distance running and long jump approach it is necessary to develop speed. The reason for lack of statistically significant connection between 100m running and shot put results at male examinees can be explained with throwing technique which is quite demanding and it takes a lot of time to master it completely, and it can also be explained with weight of the shot which requires work on different aspects of power. Existence of connection between these results at female examinees can be explained with the fact that although the technique is quite demanding, the shot weight is more appropriate. Correlation analysis results between results from 1500m running and long jump and shot put at male examinees are -0.21 and -0.08. In the first case the significance value is 0.00, and in the second one 0.16. These values prove that in the first case there is a statistically significant connection, while it is not present in the second case.

Correlation values between results from 800m running and long jump and shot put at female examinees are -0.34 and -0.34. In both cases the significance value is 0.00, and this proves a statistically significant connection. Existence of connection between middle distance results (800m and 1500m) and long jump at both sexes can be justified with the fact that to achieve good results in middle distance running it is necessary to develop speed endurance, but it is also necessary to develop sprint speed. This kind of speed is developed though long jump training process. Moreover, middle distance runners while doing their running technique (swinging technique) must use their foot as much as possible (active foot). Foot development and strengthening is achieved through long jump take-off trainings. The reason for lack of statistically significant connection between 1500m running and shot put results at male examinees can be explained with throwing technique which is quite demanding and it takes a lot of time to master it completely, and it can also be explained with weight of the shot which requires work on different aspects of power. Existence of connection between these results at female examinees can be explained with the fact that even the technique is quite demanding, the shot weight is more appropriate.

Correlation results between long jump and shot put results at male examinees is 0.14 with the significance value of 0.01, while at female examinees it is 0.56 with significance value of 0.00. In both cases the significance value proves a statistically significant connection between these results. In order to achieve good results in both events it is necessary to develop explosive power of lower limbs and a torso. Explosive power is important during a long jump take-off, and a shot put power position. Torso explosive power at long jump is present during a flight and at shot put during the phase of maximum strain. If specific exercises for explosive power needed for long jump take-off are used in training, explosive power needed for shot put can also be successfully developed. Moreover, use of specific exercises for development of explosive power of shot-putters, successfully develops explosive power of long jumpers. H1 hypothesis presumed that there is a statistically significant correlation between running results in 100m, 800m, 1500m, long jump and shot put. Correlation results analysis shows that that there is a statistically significant connection between them, except for 100m and 1500m running results and shot put results at male examinees. For this reason this hypothesis can be partially accepted. The paper is focused on prediction of all results reciprocally, when all variables are analysed as predictors. In the first case predictions of 800m and 1500m running, long jump and shot put results were analyzed, based on 100m running results. To confirm this prediction, 100m running results were taken as predictors, and 800m and 1500m running, long jump and shot put results as criteria. After completed regressive analysis, where prediction of 1500m and 800m running results was done based on 100m running results at both sexes, significance value is 0.00, and according to this it can be concluded that there is a statistically significant prediction based on 100m running results. Prediction of 1500m and 800m running results may be justified with a secondary motor ability necessary in both events, and that is power. This means that if we develop power needed for sprint running we can influence power needed for middle distance running. Detailed analysis leads us to conclusion that if 100m running result is down for one second, 1500m running result will be improved for 10.47 seconds, and 800m running result will be improved for 11.17 seconds. Regressive analysis shows that, where prediction of long jump results was done based on 100m running results at both sexes, significance value is 0.00, and according to this it can be concluded that there is a statistically significant prediction based on 100m running results. This prediction of long jump results based on 100m running can be justified with the fact that the sprint running technique is done in the same way as long jump approach technique. Moreover, these two events are connected with motor abilities necessary to achieve good results. At crouch start and take-off it is necessary to develop explosive power of lower limbs, while at distance running and long jump approach it is necessary to develop speed. This means that if we develop power needed for sprint running we can influence improvement of explosive power needed for better take-off in long jump technique. We can also influence development of speed needed for good approach in long jump by development of sprint running technique. Based on the value of B coefficient, we come to the conclusion that results in these two events are in a negative relation, and if 100m running result is improved for one second, long jump result will be improved for 28 cm at male examinees, or 23 cm at female examinees. Correlation analysis presented in the previous chapter does not show statistically significant connection between 100m running results and shot put results at male examinees, and that is the reason why regressive analysis of results prediction has not been done. When prediction of shot put results was done based on 100m running results at female examinees, significance value was 0.00, and according to this it can be concluded that there is a statistically significant prediction based on 100m running results. This prediction of shot put results based on 100m running can be justified with the fact that to achieve good results in both events it is necessary to develop both speed and power.

Values of B coefficient lead us to the conclusion that results in these two events are in a negative relation, and if 100m running result is improved for one second, shot put result will be improved for 63 cm. H2 hypothesis, which expects that there is a statistically significant prediction of 800m and 1500m running, long jump and shot put results based on 100m running results, was tested with regressive analysis. Results of regressive analysis show that that there is a statistically significant connection only between 100m running results and shot put results at female examinees. For this reason this hypothesis is partially accepted. In the next case predictions of 100m and 1500m running, long jump and shot put results were analysed, based on 800m running results. To confirm this prediction, 800m running results were taken as predictors, and 100m and 1500m running, long jump and shot put results as criteria. Regressive analysis, in all three cases, shows that significance value is 0.00, and it can be concluded that there is a statistically significant prediction in all three events based on 800m running results. The values oh B coefficient show that if 800m running result is improved for one second, 100m running result will be improved for 0.02 seconds, and long jump and shot put results will be improved for 0.5 and 1.5 cm respectively.

In the previous chapter, based on correlation analysis, it has been concluded that there is no statistically significant connection between 1500m running results and shot put results at male examinees. For that reason, prediction of these results has not been done. In further analysis, 1500m running results were taken as a predictor, and results from 100m running and long jump as criteria. Significance value in both cases is 0.00, and, based on that, it can be concluded that there is a statistically significant prediction of 100m running and long jump results based on 1500m running results. If 1500m running result is improved for one second, 100m running result will be improved for 0.005 seconds, and long jump results will be improved for 0.26 cm. We have seen that for 100m running, long jump and shot put results statistically significant prediction can be made based on 800m running results, while, based on 1500m running results, 100m running and long jump results can be predicted. Justification of prediction can be proved with the fact that top 800m and 1500m runners need to develop power, speed and speed endurance in their training processes. All these motor abilities are necessary for runners, jumpers and throwers. While using characteristic middle-distance running trainings for development of these abilities, sprinters, jumpers and throwers can improve their abilities, and therefore their results. In accordance with that, H3 hypothesis can be accepted, while H4 hypothesis is partially accepted due to the lack of statistically significant prediction of shot put results based on 1500m running results. In the next case predictions of 100m, 800m and 1500m running and shot put results were analysed, based on long jump results.

To confirm this prediction, long jump results were taken as predictors, and 100m, 800m and 1500m running and shot put results as criteria. In all analysed cases, regressive analysis shows that significance value is 0.00, except in the case of shot put results at male examinees where it is 0.01.Significance value confirms that there is a statistically significant prediction of all results based on long jump results. If long jump result is improved for one centimetre, 100m running result will be improved for 0.009 seconds at male examinees and 0.02 seconds at female examinees. If long jump result is improved for one centimetre, 1500m running result will be improved for 0.16 seconds at male examinees, while 800m running result will be improved for 0.23 seconds at female examinees. Shot put result will be improved for 0.36 centimetres at male examinees and 1.70 centimetres at female examinees, if long jump result is improved for one centimetre. Based on long jump results, statistically significant prediction is possible of 100, 800, 1500 m running and shot put results.

During their training process, long jumpers develop motor abilities like speed, necessary for approach, explosive power of lower limbs, necessary for good take-off, and power, which is basic for both speed and explosive power. Sprinters, middle-distance runners and throwers, by using segments which are characteristic for long jump trainings, can successfully develop these motor abilities which they also need to achieve top results. According to previous statements, H5 hypothesis is accepted. In the next case predictions of 100m, 800m and 1500m running and long jump results were analysed, based on shot put results. To confirm this prediction, shot put results were taken as predictors, and 100m, 800m and 1500m running and long jump results as criteria. In the case where 100m and 800m running and long jump results prediction was examined at female examinees the significance value was 0.00.

Following that, it can be concluded that statistically significant prediction of these results, based on shot put results, is possible. If shot put result is improved for one centimetre, 100m and 800m running results will be improved for 0.006 seconds and 0.08 seconds respectively. Long jump result will be improved for 0.18 cm. In the previous chapter correlation did not show statistically significant connection between shot put results and results from 100m and 1500m running. According to this, prediction was only analysed for long jump results. Significance value is 0.01, which means that there is statistical significance. By improving shot put result for one centimetre, long jump result will be improved for 0.06 cm. During their training process, throwers develop power, speed and explosive power necessary for good results. By using these trainings, sprinters and jumpers can successfully develop their power which they need to achieve good results. They can develop explosive power necessary for start, and speed needed for running and long jump approach. These throwers specific trainings can be used with success by middle-distance runners to increase speed and power. In this case H6 hypothesis is partially accepted due to the lack of possibility to predict 100m and 1500m running results at male examinees.

Conclusion

The goal of this paper is to come to statistically significant data based on which we can confirm certain regularities by applying certain statistical procedures on numeric values from four athletic events. To be more specific, this paper tries to confirm connection between 100m, 800m and 1500m running, long jump and shot put results, and prediction of all results in relation to each other when all variables are analysed as predictors.

The analysis was done on the sample of 383 examinees, 305 male and 78 female examinees. The final results enable further application in research and tracking of training processes, as well as subsequent comparison of results from running, jumping and throwing. Based on previously formulated research goals and hypothesis, the following conclusions can be made. Results of analysis show that there is a statistically significant connection between all results, except between 100m and 1500m running results and shot put results at male examinees. Based on 100m running results, statistically significant prediction of 800m running, long jump and shot put results is possible at female examinees. As well as prediction of 1500m running and long jump results at male examinees. Based on 800m running results, it is possible to successfully predict 100m running, long jump and shot put results at female examinees, while, based on 1500m running results, statistically significant prediction of 100m running and long jump results is possible at male examinees. Long jump results can be used to predict 100m, 800m and 1500m running and shot put results. Finally, based on shot put results, it is possible to predict 100m and 800m running and long jump results at female examinees, while the only prediction possible at male examinees is for long jump results.

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ANALIZA REZULTATA NEKIH ATLETSKIH DISCIPLINA I NJIHOVA POVEZANOST

Sažetak

Atletika je vrlo zahtjevan i kompleksan sport, koji sa svojim granama čini jednu raznovrsnu i dinamičnu cjelinu. Od velikog broja motoričkih sposobnosti koje je potrebno razvijati i usavršavati dugotrajnim procesom treninga, u ovom radu analizirane su snaga, brzina i izdržljivost. Za procjenu ovih motoričkih sposobnosti korišteni su testovi: trčanja na 100m i 800m/1500m, skok u dalj i bacanje kugle. Testiranje je izvršeno na uzorku od 383 ispitanika. Sprovedeno istraživanje je imalo za cilj utvrditi međusobne povezanosti i međusobni utjecaj rezultata postignutih na ovim testovima. Na osnovu sprovedene analize i obrade dobivenih podataka utvrđena je međusobna povezanost i međusobni utjecaj ovih testova, jednih na druge.

Ključne riječi*: trening, snaga, brzina, izdržljivost*

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