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IMPACT OF SOME ANTHROPOMETRIC CHARACTERISTICS ON THE SUCCESS OF SPRINTER RUNS OF 30, 80 AND 100 METERS IN 14-YEARS-OLD STUDENTS

Original scientific paper

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Abstract

This research aims to validate the influence of anthropometric characteristics as a predictor system on the resultant efficiency in the sprinter runs disciplines at 30, 80 and 100 meters as a criterion system. The study was conducted on a sample of 90 male respondents, aged 14 years ± 6 months, students of elementary school "Bajram Shabani" - Kumanovo. A total of 20 variables were used in this research, of which: 17 variables for assessing anthropometric characteristics and 3 variables for assessing specific motoric skills.

By validating the individual influence of anthropometric characteristics on the success of running at 30, 80, and 100 meters, the interpreted results conclude that: between the predictor system and the running criterion system at 30, 80, and 100 meters, there is a strong affective relationship, influencing statistically at confidence level Q = 0.000. Regarding the individual influence of predictor variables, in the criterion variable running at 30 meters, the following variables showed statistically significant relationship: ATRSF - triceps skinfold, ATHTC - thoracic thigh circumference, ADK - diameter of the knees and AASF - abdominal skinfold. Individual influence of predictor variables on running criteria at 80 meters, statistically significant correlations were shown for the variables: ATHTC - thoracic thigh circumference, AASF - abdominal skinfold and ATRSF - triceps skinfold. And concerning the individual impact of the prediction variables on the 100 - meter run variable, only statistically significant correlations have been shown with the ATHTC - thoracic thigh circumference.

From this analysis we can conclude that students of this age group who have larger chest circumference and larger abdominal adipose tissue have poorer results in sprinter runs at 30, 80 and 100 meters, while those students who have a larger layer of adipose tissue in their arms (are more obese) have poorer results in sprinter runs at 30 and 80 meters and vice versa.

Keywords: *anthropometric characteristics, specific motoric skills, sprint running*

INTRODUCTION

Sprint running are relayed with maximum intensity, and therefore the technique of mastering and refining this technique is much more severe than the techniques of running in the middle and long trails, which are performed at lower speeds (Asllani, 2016). The achievements of good results in sprinter runs depend primarily on the explosive force and neuromuscular reaction speed (Newton & Kreamer, 1994). Rapid reaction depends largely on the release of antagonistic muscle. These disciplines are one of the most attractive disciplines in terms of all athletic training (Radic & Simeonov (Радиќ & Симеонов), 2009). Many authors have concluded that motor skills and functional abilities are determinant of achieving good results in sprinter runs in different age groups (Brown, Ferrigno, & Santana, 2000; Mackata, Fostiak & Kowalski, 2015; Bonacin et al, 2012). Also, the relevance of anthropometric characteristics can be defined as a very important anthropological dimension in achieving success in sprinter runs (Aerenhouts et al, 2012; Blazevic, Babic & Zagorac, 2015; Asllani, Iseni, Kamberi & Bilalli, 2017; Stojanvović et al, 2014). The main purpose of this research is to determine the impact of anthropometric characteristics on the results of sprinter runs at 30, 80 and 100 meters in students aged 14 years. The results of the research on the impact of anthropometric characteristics on sprinter runs have high theoretical and practical value in the training process as we expect new scientific information on the value of morphological status, in particular tests for estimating body volume and mass, such as and subcutaneous tissue, tests that most affect the efficacy of sprinter runs.

METHODS

The subjects were male students aged 14 ± 6 months, the research is based on 90 examiners in elementary school. The research school "Bajram Shabani" – Kumanovo.. A total of 20 variables, from which 17 anthropometric and 3 variables for the assessment of specific motor skills were applied. The variables of anthropometric characteristics are: (ABH - body height), (AAL - arm length), (ALL - leg length), (ATL - thigh length), (ALT - length of tibia), (ABB - biacromial breadths), (ABIB - biiliocristal bredths), (ADK - diameter of the knees), (ABW - body weight), (ATHTC – thoracic thigh circumference), (ATC - thigh circumference), (APC – calf circumference), (BMI - body mass index), (ATRSF - triceps skinfolds), (ACSF – calf skinfolds), (ATSF - thigh skinfolds), (AASF - abdominal skinfolds), and motor-skill variables: (RU30m - running in 30m), (RU80m - running in 80m) and (RU100m - running in 100m).

The obtained data were analyzed using basic statistics parameters.

RESULTS AND DISCUSSIONS

Results from basic statistics parameter analyses of anthropometric variables and specific motor tests are presented in Table 1.

Table 1. present the result of descriptive statistics of the indicators of the anthropometric characteristics and specific motor abilities, as follows: the minimal score, the maximal score, the arithmetic medium as the main indicator and the standard deviation as a main indicator. From the analyses of results presented in Table 1, it can conclude that the values of all variables have slight differences between their minimum and maximum score, and it is about results that are homogeneous or have low variability.

The results from regressive analyses between anthropometric parameters are presented in Table 2. According obtained results from regressive analysis of RU30m variable, it seems that between the predictor system and variable criterion exist attachment with statistical significance R (.826), the confidence level of sig=0.000 (F=9.114). The over mentioned correlation explains common variability by about 68.3% (R2= .683). Another percentage 31.7% of the variability explanation of the variable RU30m, belongs to other anthropological characteristics that are not investigated in this paper as (functional skills, motor, conative, cognitive, etc).

Table 1. Descriptive statistics of the indicators of anthropometric characteristics and specific motor abilities of students aged 14 (N=90)

Variablat	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
ABH	90	149.00	179.90	167.5067	7.32154	-.394	-.261
AAL	90	63.00	82.00	73.1778	3.98020	-.381	.061
ALL	90	88.00	112.00	101.6667	5.40027	-.362	-.480
ATL	90	42.00	63.00	53.4056	3.92550	-.333	.146
ALT	90	41.00	55.00	48.4389	3.11739	.001	-.409
AABB	90	31.00	41.00	36.4611	2.52874	-.217	-.540
ABIB	90	22.00	36.00	26.6978	2.23461	.453	3.110
ADK	90	6.00	8.00	7.0044	.40721	.082	-.276
ABW	90	36.40	94.60	59.4067	11.83576	.838	.975
ATHTC	90	66.70	104.50	83.8611	7.66103	.755	.826
ATC	90	36.30	60.30	47.1689	5.15627	.310	-.258
APC	90	28.50	45.50	35.4689	3.54187	.663	.220
BMI	90	13.90	31.80	21.0967	3.79010	1.116	.836
ATRSF	90	3.70	19.80	10.1600	4.56980	.804	-.243
ACSF	90	3.90	19.80	12.5111	4.33469	.113	-.896
ATSF	90	5.30	19.80	11.0100	4.25409	.783	-.662
AASF	90	5.20	19.80	10.6122	4.20101	.790	-.497
RU30m	90	4.00	6.20	4.7727	.52869	.672	-.153
RU80m	90	9.50	14.90	11.5524	1.36114	.833	.113
RU100m	90	12.50	19.80	14.9949	1.71822	.987	.516

Table 2. Regression relationship between anthropometric characteristics with the criterion variable RU30m (summary model)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig.
1	.826a	.683	.608	.28168	.683	9.114	17	72	.000

Table 4. Regression relationship between anthropometric characteristics with the criterion variable RU80m (summary model)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig.
1	.802a	.642	.558	.79124	.642	7.611	17	72	.000

Table 6. Regression relationship between anthropometric characteristics with the criterion variable RU100m (summary model)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig.
1	.814a	.662	.582	.8804	.662	8.294	17	72	.000

Table 3. Regression analysis of variable RU30m- Coefficients (a)

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	8.210	4.766		1.723	.089
ADK	-.330	.109	-.279	-3.017	.004
ATHTC	-.036	.011	-.617	-3.355	.001
ATSF	.059	.021	.582	2.812	.006
AASF	-.036	.014	-.347	-2.534	.013

(a) dependent variable RU30m

Table 5. Regression analysis of variable RU80m- Coefficients (a)

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
1		B	Std. Error	Beta		
	(Constant)	35.334	13.386		2.640	.010
	ATHTC	-.116	.030	-.751	-3.848	.000
	ATSF	.155	.059	.581	2.645	.010
	AASF	-.109	.040	-.393	-2.705	.009

(a) dependent variable RU80m

Table 7. Regression analysis of variable RU100m- Coefficients (a)

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
1		B	Std. Error	Beta		
	(Constant)	31.959	14.897		2.145	.035
	ATHTC	-.095	.034	-.536	-2.82	.006

(a) dependent variable RU100m

Table 3 presents individual impact of all the predictor system on the situational-motor variable running at 30 meters (RU30m). From presented data, it can be seen that the predictors of statistically significant value have only 4 variables out of the total of 17, including ATSF (triceps skinfold), .582 and 0.006 reliability, positive and negative impact variables, respectively; on this ability are the variables, ATHTC (thoracic thigh circumference), with value -617 and with a reliability value of 0.001, ADK (diameter of knees), with a standardized beta coefficient of -279 and with a reliability value of 0.004 and variables AASF (abdominal skinfold), with a value of -.347 and a reliability value of 0.013. This means that males with greater periphery of the thoracic thigh, greater cartilage diameter, and greater abdominal adipose tissue have lower scores in the 30-meter running test.

Table 4 presents the results from regression relation between an-

thropometric variables with criterion variable RU80m. Based on obtained results, we can notice that the multiple correlation between the dependent variable, in this case running in the 80meters (RU80m), as well as all other independent variables (predictors) is statistically significant (.802), respectively variability explains common about 64.2% (R2=.642), while another 35.8% share of explaining the variability of the variable common criteria (RU80m) belongs to other anthropological characteristics (anthropometric, motor, conative, cognitive, functional, etc.). The value of the F test is 7.611, while the level of confidence p=0.000 indicates that the value of variability between and within group variance has multiple regression statistical significance difference.

Table 5 presents the standardized beta coefficients and their impact on the following capability: ATHTC, negative beta coefficient -.751 with a confidence level of 0,000; AASF, negative value -.393 with confidence level 0.009 and ATSF variables, positive value .581 and confidence level 0.010. From the table it can be seen that the highest impact on this ability has the thoracic thigh circumference (ATHTC), with a value of -.751 and a confidence level (significance) 0.000. But since this value shall be a negative, it means that the impact of this variable negative. From here we can come to conclusion that as greater is the circumference of thoracic thigh and skinfolds of abdomen, the more slowly is realized the running in the 80m sprint.

From results presented in Table 6, it could be notice that the multiple corrélation between the dépendent variable, in this case running in the 100 meters (RU100m), as well as all other independent variables (predictors) is statistically significant (.814), respectively variability explains common about 66.2% (R2=.662), while another 33.8% share of expalining the variability of the variable common criteria (RU100m) belongs to other antropological characteristics (motoric, conative, cognitive, functional, social, etc..). The value of F test is 8.294, while the level of confidence p=0.000 indicates that the value of variability between and within group variance has multiple regression statistical significance difference.

Results presented in Table 7. shows the standardized beta coefficients and their impact on the following capability. According the results it can be seen that predictors with statistically significant value have only one variable: variables (ATHTC), with a value of -.536 and with a reliability value of 0.006. But since this value shall be a negative, it means that the impact of this variable negative. From here we can come to conclusion that as greater is the circumference of thoracic thigh, the more slowly is realized the running in the 100m sprint. Similar results are obtained in the study of Iseni & Asllani (2014), Iseni, 2011, 2013, Pelenis et al, 2013.

CONCLUSION

Based on the obtained and analyzed results, we can conclude following:

• The anthropometric characteristics used as predictor variables in this paper have statistically significant significance in the criterion variables running at 30 meters (RU30m), running at 80 meters (RU80m) and running at 100 meters (RU100m). The regressive analysis of the variables (RU30m), (RU80m) and (RU100m) shows that there is a statistically significant relationship between the predictor system and the criterion variables, at the confidence level of 0.000.

• From the entire predictive system, individual impacts on specific motor variables (RU30m), (RU80m) and (RU100m) have the following variables: (ATHTC - thoracic thigh circumference), with negative values in the three criteria variables, (ATSF - triceps skinfold), with positive values in the RU30m and RU80m criteria variables, and variables (ABSF - abdominal skinfold), with negative values in the RU30m and RU80m criteria variables.

• Students of this age group who have greater periphery of the thoracic thigh circumference and larger abdominal skinfold have poorer results in sprint running at 30, 80 and 100 meters, whereas those students who have a larger layer of adipose tissue in their wings (are more obese) have poorer results in sprint running at 30 and 80 meters.

Based on results from this study, we can recommend to all lecturers and trainers who cultivate short track runs, especially in our case running at 30, 80 and 100 meters, to pay more attention of different parameters of young athletes during the process of their selection. Particularly, they should include different morphologic variables as criteria for selection and pay more attention not just to physical performance and qualities, but also to particular anthropometric predispositions.

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