Influence of some anthropometric, motor and bone mass parameters on short distance running

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Abstract

The knowledge on morphological development and their impact on motor skills in short distance athletes should be one of the main preoccupations of athletics coaches, because any scientific research in the field of physical culture and sports is concerned with proving the development and evaluation of anthropological characteristics which are responsible in achieving success in athletics. The purpose of this paper is to prove the impact of some anthropometric, motor-specific characteristics and those of bone weight in short distance running, specifically in 100 meters, with students aged 19 ± 6 years, of the Faculty of Physical Education and Sports in Pristina. The sample of this research included a total of 75 students aged 19 of the Faculty of Physical Education and Sports in Pristina. The variables which were applied in this research were 7 anthropometric variables and 6 motor variables and 1 specific motor variable. Regression analysis in the manifest space was applied to determine the relationship between predictive variables (anthropometric and motor characteristics) and criterion variable (100 m running).

Keywords: anthropometry, motor, bone mass, 100 m running, regression.

INTRODUCTION

Athletics operates on the basis of a certain system of practical knowledge and practical skills, which has in its content the theoretical and methodological bases of teaching and sports training [1]. Athletic operates on the basis of a particular system of knowledge that has in its content the theoretical and methodological foundations of sport training [2]. Running is the most universal tool for the athlete's all-round training, but it also occupies an extremely important place in the training of other types of sports.

During running, the body receives many demands on the work of the muscular system and vasocardial and respiratory activity. It is an important tool for maintaining and strengthening

health. Athletic running, as a set of physical movements of a cyclical character, realizes the displacement in space and time through the steps with the lower sides (legs) at a greater speed than in race walking. [3,4,6].

Speed running is a natural form of movement display in general and athletics in particular. These types constitute one of the basic tools of comprehensive preparation: physical, functional and psychological. [6] This is the main reason why they are constantly valued, especially in the context of exercising as a goal for sporting achievement.

Climatic conditions play a role in the outcome of the runs. The breath or wind, depending on the direction in which it blows, can increase or decrease the athlete's speed. Atmospheric pressure or air pressure can be taken into account, but it has no effect because the run is too short and the amount of oxygen for this distance is mostly concentrated in the runners muscles. [7].

An athlete may not have swollen and developed muscles, but he is taller and has the biggest stride. In the length of the athlete a distinction must be made between the stature in general and the length of the legs and the throwing of the step. [9]. Within this, statistical tests and interpretation of results were performed in separate subheadings. After the interpretation of the results, an explanation was given for the importance of the study from the theoretical and practical point of view, also in a separate subheading.

PURPOSE OF RESEARCH

Like any transversal research that aims to prove the relationships, influence, dependence between different anthropological characteristics, abilities and states, this research is based on proving the influence of one anthropological field with another in order to increase information for the benefit of identification of factors that are of particular importance in enhancing the motor skills of the anaerobic character.

The purpose of this paper is to prove the impact of some anthropometric characteristics, bone mass, motor-specific, on the speed of execution of short distance runs, specifically in 100 meter runs on 19-year-old students.

SAMPLE OF VARIABLES

Variables for estimating morphological characteristics:

Body Height (ALATR), Body Mass (APETR), Muscle Mass (AAMUS), Bone Mass (APSHK), Body Mass Index (IMT), Leg Length (AGJKEM), Arm Length (AGJDOR).

Variables for evaluating basic motor skills:

Running 30 meters (V30M), Standing Long jump (MKGJAT), Standing High Jump (MKLAR), Standing High Jump with the Right Foot (MKDJA), Standing High Jump with the Left Foot (MKMAJ), Throwing of Med Ball Lying Down (MHMED).

Specific motor variables: Running 100 m High Start (KV100M)

METHODS OF PROCESSING THE RESULTS

Basic central and distribution parameters:

Arithmetic mean (Am), Standard deviation (Sd), Minimum value (MinV), Maximum value (MaxV), Coefficient of variation (Cv).

2. The distribution curve is tested by the asymmetry coefficient ("Skewness"), and the degree of curvature of the vertex of the distributed results curve (distribution height) through the flat coefficient ("Kurtosis").
3. Reports of the interrelationships between variables in the manifest space, as well as correlations between the system of variables.
4. To determine the relationship between predictor variables (anthropometric characteristics, bone and motor weight) and the criterion variable (running 100 m) regression analysis was applied in the manifest space.

DESCRIPTIVE ANALYSIS OF ANTHROPOMETRIC VARIABLES, BONE MASS BASIC AND SPECIFICIFIC MOTOR

Table 1 presents the descriptive analysis of anthropometric variables – specific motor bone mass in 19-year-old students of the Faculty of Physical Education and Sports.
The sample included the group of 75 male students, where the values of arithmetic mean, minimum score, maximum score, standard deviation, distribution or parameters of asymmetry (Skewness - tilt, asymmetry) and the degree of extension of the curve vertex are presented in the distribution of results (Kurtosis - convexity), and Coefficient of variation (Cv).

Table 1. Basic statistical parameters of anthropometric, basic and specific motor variables of 19-year-old students of the Faculty of Physical Education and Sports

Tab.1	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis	Kv
ALATR	75	165.5	197.6	178.691	6.14304	0.706	1.387	3.44
APETR	75	54.6	87.8	71.1093	7.45948	0.034	-0.15	10.49
AAMUS	75	46.5	73.8	57.7419	5.74172	0.137	-0.122	9.94
APSHK	75	2.5	3.8	3.0564	0.25048	0.316	0.381	8.2
IMT	75	17.11	27.68	22.3524	2.14534	0.073	0.084	9.6
AGJKEM	75	90	110	99.6907	4.65204	-0.071	-0.086	4.67
AGJDOR	75	74.3	88.7	80.352	2.88343	0.599	0.906	3.59
V30M	75	4.25	4.71	4.3908	0.1186	0.41	-0.96	2.7
MKGJAT	75	1.9	2.8	2.3533	0.19579	-0.117	-0.377	8.32
MKLAR	75	29.2	47	37.1733	4.17419	0.278	-0.489	11.23
MKDJA	75	13.7	25.7	19.2707	2.60212	0.513	0.064	13.5
MKMAJ	75	14.3	29.4	20.252	3.82726	0.55	-0.452	18.9
MHMED	75	6.15	9.5	7.7253	0.77505	0.624	-0.683	10.03
KV100M	75	8.7	14.1	11.7208	1.14831	-0.48	0.481	9.8

Photo 1. Histogram of anthropometric variable - body height (ALATR)
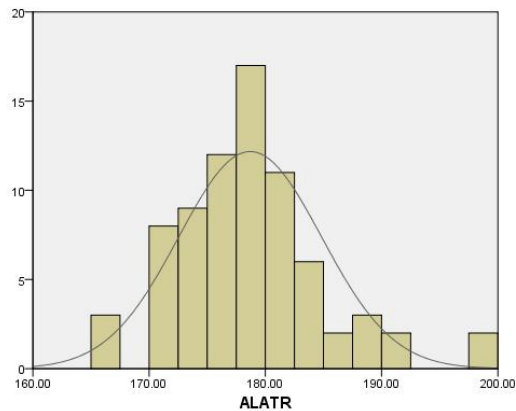
Arithmetic mean of anthropometric variable Body height (BH) is 178.69 cm. The lowest 165.50cm) and the highest results (197.69 cm) of the variable Body height indicates that there is a marked difference between students in this motor variable, as well as a slight inclination of the variable towards higher results , because the asymmetry test is negative (platykurtic). Students in this anthropometric variable are presented as a homogeneous group (Kv = 3.4%) with a larger number of values towards the higher ones. The pronounced difference between the highest and lowest result indicates that the acquired flexibility and convexity (Skewness and Kurtosis) do not have a pronounced asymmetry.

INTERCORRELATION MATRIX

Intercorelation matrix of anthropometric variables, motor and specific motor

The intercorrelation matrix of anthropometric variables is presented in Table 2. Thus the statistically significant coefficients of the variables with the highest degree of statistical inference (p <0.01) are denoted by two asterisks. Easier statistical conclusion criterion (p <0.05) correlation coefficients are marked with an asterisk. The correlation coefficients show that the variables are categorized into the following groups:

Table 2. Intercorrelation coefficients of anthropometric variables, motor and specific motor

Tab.2	ALTRU	APTRU	AMMUS	APKOC	AIMT	AGJKE	AGJKRA	MV30M	MKGJVE	MKLAR	MKMAJ	MKDJA	MHMED	KV100M
ALTRU	1	.460**	.422**	.333**	-0.17	.802**	.988**	0.04	0.004	-0.001	0.085	0.12	0.048	0.046
APTRU	.460**	1	.790**	.579**	.778**	.402**	.456**	-0.019	0.036	0.092	0.196	-0.094	-0.049	0.172
AMMUS	.422**	.790**	1	.651**	.594**	.254*	.386**	-0.116	0.047	0.015	0.121	-0.064	0.063	0.067
APKOC	.333**	.579**	.651**	1	.391**	.274*	.293*	-0.11	0.086	0.047	0.072	0.08	0.014	0.045
AIMT	-0.174	.778**	.594**	.391**	1	-0.194	-0.167	-0.055	0.033	0.068	0.13	-0.209	-0.095	0.156
AGJKE	.802**	.402**	.254*	.274*	-0.19	1	.800**	0.054	-0.059	0.047	0.157	0.133	0.074	0.136
AGJKRA	.988**	.456**	.386**	.293*	-0.17	.800**	1	0.054	-0.002	0.05	0.098	0.128	0.068	0.026
MV30M	0.04	-0.019	-0.116	-0.11	-0.06	0.054	0.054	1	-.754**	-.266*	-0.047	-.336**	-0.192	-0.217
MKGJVE	0.004	0.036	0.047	0.086	0.033	-0.059	-0.002	-.754**	1	.328*	0.159	.364**	0.116	.333**
MKLAR	-0.001	0.092	0.015	0.047	0.068	0.047	0.05	-.266*	.328*	1	.508**	.598**	0.092	0.172
MKMAJ	0.085	0.196	0.121	0.072	0.13	0.157	0.098	-0.047	0.159	.508**	1	.575**	0.124	0.21
MKDJA	0.12	-0.094	-0.064	0.08	-0.21	0.133	0.128	-.336**	.364**	.598**	.575**	1	0.146	0.073
MHMED	0.048	-0.049	0.063	0.014	-0.1	0.074	0.068	-0.192	0.116	0.092	0.124	0.146	1	0.09
KV100M	0.046	0.172	0.067	0.045	0.156	0.136	0.026	-0.217	.333**	0.172	0.21	0.073	0.09	1

In the group (anthropometric) in terms of the height of the correlation coefficients are the anthropometric variables that belong to the longitudinal dimension and that the correlation

coefficients are brought from the highest correlation value .899 ** to the lowest .333 ** p < 0.0. The second group in terms of the height of the correlation coefficients consists of anthropometric variables that belong to the dimensions of body mass and volume as well as subcutaneous adipose tissue and that the correlation coefficients brought from the highest correlation value .293 * to the lowest .254 *, p <0.05.

In the (motor) group, the height of the correlation coefficients consists of the motor variables that belong to the motor dimension of the explosive force of the lower extremities and that the correlation coefficients are brought from the highest correlation value .754 ** to the lowest .336 **, p <0.01. The second group in terms of the height of the correlation coefficients consists of the motor variables that belong to the motor dimension of the explosive force of the upper extremities and that the correlation coefficients brought about the high correlation value .328 * to the lowest -.266 *, p <0.05.

In the first group (specific motor) in terms of the height of the correlation coefficients are the specific motor variables that belong to the specific motor dimension of running 30m and 100m and that the correlation coefficients are brought from the highest correlation value .333 *, p < 0.01.

Table 3. Regression analysis - correlation and influence of anthropometric and motor parameters as independent (predictor) variables on the dependent variable (criterion) - Running 100 meters from low start (LSR100m.)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.557[a]	.311	.112	1.05052

a. Predictors: (Constant), MHMED, APKOC, MKLAR, AGJKE, MV30M, AIMT, MKMAJ, MKGJVE, MKDJA, AMMUS, AGJKRA, ALTRU, APTRU

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.391	13	1.722	1.561	.133[b]
	Residual	49.661	45	1.104		
	Total	72.052	58			

a. Dependent Variable: KV100M
b. Predictors: (Constant), MHMED, APKOC, MKLAR, AGJKE, MV30M, AIMT, MKMAJ, MKGJVE, MKDJA, AMMUS, AGJKRA, ALTRU, APTRU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-56.750	41.565		-1.365	.179
	ALTRU	.589	.279	3.215	2.116	.040
	APTRU	-.339	.283	-2.251	-1.197	.238
	AMMUS	-.040	.043	-.233	-.943	.351
	APKOC	-.305	.554	-.097	-.552	.584
	AIMT	1.247	.902	2.339	1.383	.174
	AGJKE	.120	.063	.503	1.925	.061
	AGJKRA	-.780	.391	-1.997	-1.991	.053
	MV30M	1.073	1.919	.117	.559	.579
	MKGJVE	2.445	1.147	.430	2.131	.039
	MKLAR	.052	.050	.188	1.041	.303
	MKMAJ	.061	.078	.139	.787	.436
	MKDJA	-.067	.062	-.216	-1.083	.285
	MHMED	.154	.204	.103	.756	.453

a. Dependent Variable: KV100M

Through regression analysis in students, the correlation between the group of independent predictor variables (basic anthropometric and motor variables) and the dependent criterion variable - Running 100 meters from the low start (LSR100m.) was confirmed. Regression analysis in students shows that the value of the correlation between the group of independent predictor variables (basic anthropometric and motor variables) and the dependent criterion variable - Running 100 meters from the low start (LSR100m.) has been confirmed. Connectivity of the whole system of independent predictor variables (basic anthropometric and motor variables): Body height (BH), Body mass (BM), Muscle mass (MM), Bone mass (BM), body mass index (BMI), Leg length (LL), Arm length (AL), Running 30 meters (R30m.), Standing Long jump (SLJ), Standing High jump (SHJ), Standing High jump with the right foot (SHJRF) , Standing High jump with the Left foot (SHJLF), Throwing of Med ball (THMB), has been

proven by multiple correlation. The multiple correlation coefficient has the value R = .557 which explains the common variability between the system of predictor variables and the criterion variable about 31% (R Square = 0.311).

The distribution (F) is obtained as the quotient distribution of the two variances, and in these cases it is always necessary to assign the two degrees of freedom. The first degree of freedom is equal to the number of predictor variables (df = n) respectively (df = 14) while the second is performed so that the number of subjects reduced by the number of predictive variables minus 1 (df = N - n - 1) respectively (df = 50 - 14 - 1). We can emphasize that the test (F-test) is always more valuable if the multiple correlation is greater, in the concrete case of this paper is significant (Sig = .133), because the value of the F-test is 1.561.

CONCLUSION

In addition to longitudinal anthropometric parameters, special importance is given to motor skills, especially those of explosive force, which occupies an important place in athletics.

High peak results can only be achieved during a long and well-organized training process, which is subject to the laws of bio-psycho-social development as well as possible training stimulus and necessary for the dynamic development of basic and specific motor and anthropometric skills.

In this paper (research) the population from which the sample was selected for research for this paper is defined as the population of students (males) of late adolescence.

The sample of this research included a total of 75 students aged 19 ± 6 years of the Faculty of Physical Education and Sports Pristina.

For both groups of the system of variables the basic statistical and distribution parameters for each variable are calculated, as well as the asymmetry measures and the normal distribution of the correlation ratio and regression analysis.

The results obtained from the collection of information and their processing show that:

a) Some of the anthropometric features have had pronounced asymmetry indicating that the sample has been heterogeneous in terms of morphological development.
b) Some of the specific speed-motor skills have had pronounced asymmetry indicating that the sample has been heterogeneous with different results.
c) The results obtained from the regression analysis show that in the dependent variable or Running 100 meters from low start (MV100MU) the anthropometric variable Body height (ALART) has an impact, Beta = 3.215 which is not confirmed by the probability scale, Sig =. 133.

We can conclude that from short-distance running 100 meters, to medium-distance running and long-distance running the influence of anthropometric parameters decreases and the influence of metabolic factors of energy production increases.

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