

## Connection of the subskin fat tissue and volume and body mass with the leg's explosive force

Georgi Georgiev, Vujica Živković, Žarko Kostovski, Viktor Mitrevski

**Connection of the subskin fat tissue and volume and body mass with the leg's explosive force:** *The survey was conducted on a population of regular female students at the age of 14-15 ( $\pm 3$  months) years from three Balkan's countries (R. Macedonia, R. Serbia and R. Albania). The total number of respondents was 221 respondents. The aim of this research was to see, what kind of connection, i.e. influence has the subskin fat tissue and the body volume on the explosive force of the legs. The sample of indicators consisted of two criteria variables for explosive force estimation and nine morphological measures for assessing the subskin fat tissue and the volume of the body. With regression analysis was determined the impact of the morphological measures on the criteria.*

**Key words:** *students, connection, measures, evaluation, impact.*

### INTRODUCTION

Tests are only one of the instruments that can be carried out for assessment of motor skills among students. On the other hand, the morphological characteristics possessed by each individual separately, of course it has a positive or negative impact on the overall achievements and results of the student. Continuous monitoring of the development of the individual, by the teaching process provides an opportunity for precise timing and proper intervention and influence for improving, as on the morphological characteristics, and the same on the motor skills and abilities among them.

The subject of our research were the regular female students of age 14-15 ( $\pm 3$  months) years from several countries of the Balkans (R. Macedonia, R. Serbia and R. Albania). The aim of the research was to show, what is the influence of the subskin fat tissue and the body volume on the leg's explosive power at the female pupils involved in the teaching process.

### SAMPLE OF RESPONDENTS AND METHODS OF WORK

The survey was carried out among 221 female students regularly engaged in the teaching process. By numbers, 153 from Macedonia, 47 from Serbia and 21 from Albania. Here were applied eleven indicators in total, of which two indicators as criteria variables for estimation of the leg's explosive force and nine predictor variables of which: three for assessing the subskin fat tissue, five variables for estimation of the body volume, i.e. the body's circular dimensionality and one for the body weight. The criterion was consisted of the variables jump forward from place (SDM) and triple jump from place (TDM). The predictor system was composed of the variables: skin fold of the upper arm (AKNN), skin fold of the back (AKHG) and skin fold of the stomach (AKNM); measures for assessing the volume or the scopes of the body: scope of the upper arm outstretched (AONL), scope of the upper arm bent (AONLS), forearm scope (AOPL), scope of the leg (AOPK) and average scope of the stomach (ASOG) and the body's weight (ATEZ).

Data from all variables are treated with the basic descriptive statistical parameters, but previously tested about their normality of distribution by the method of Kolmogorov and Smirnov. The data processing for the connection of motor tests with the morphological parameters is performed by the regression analysis. By the regression analysis were calculated: the coefficient of the multiple correlation between the criteria variable and the system of predictors ( $R$ ), the correlation coefficients between each criteria and predictor variable ( $R^2$ ), the coefficient of partial correlation each with criteria variable (PART -  $R$ ), partial and regression coefficients of each predictor variable (BETA), the standard error of

predikcion (SIGMA), T-test, the significance level of partial regression coefficients (Q-BETA), the coefficient of determination, standard error of the criteria forecast based on the prediction system (SIGMA), and for checking the hypothesis that the true value of the multiple correlation is actually zero, was calculated F-TEST and its significance with appropriate degrees of freedom (DF1 and DF2).

## RESULTS AND DISCUSSION

After the data processing of the basic statistical parameters was performed a regression analysis in the manifested space, in which as a criterion were taken two tests for assessment of the explosive strength of legs: long jump forward and triple jump from place, and as predictors were taken measures to assess the subskin fat tissue, measures to assess the volumes or body's scopes and the body weight.

**Table 1**

### Basic statistical parameters of morphological measure

Descriptive Statistics (adstudy.sta)									
	Valid N	Mean	Minimum	Maximum	Range	Variance	Std.Dev.	Skewness	Kurtosis
АОНЛ	221	237,81	160,00	360,00	200,00	986,579	31,410	0,512	0,439
АОНЛС	221	254,95	160,00	370,00	210,00	1104,684	33,237	0,291	0,196
АОПЛ	221	221,66	140,00	350,00	210,00	670,436	25,893	0,623	2,717
АОПК	221	332,81	200,00	465,00	265,00	2165,767	46,538	-0,857	1,240
АСОГ	221	817,48	590,00	1070,00	480,00	7169,469	84,673	0,088	-0,008
АКНН	221	13,37	2,00	34,00	32,00	40,006	6,325	0,458	-0,022
АКНГ	221	11,62	1,00	40,00	39,00	39,382	6,276	1,143	1,815
АКНМ	221	13,86	2,00	40,00	38,00	44,658	6,683	0,453	0,239
АТЕЖ	221	539,24	295,00	960,00	665,00	9834,540	99,169	0,833	1,608

**Table 2**

### Basic statistical parameters of motor tests

Descriptive Statistics (adstudy.sta)									
	Valid N	Mean	Minimum	Maximum	Range	Variance	Std.Dev.	Skewness	Kurtosis
СДМ	221	147,63	88,00	235,00	147,00	540,807	23,255	0,221	0,709
ТДМ	221	473,62	320,00	652,00	332,00	3420,255	58,483	0,098	0,386

Table 3

Regression analysis of a system of morphological variables with the criteria variable for estimation of the explosive force of the legs, long jump forward

R= ,35046294 RI= ,12282427 Adjusted RI= ,08540919 F(9,211)=3,2827 p<,00092 Std.Error of estimate: 22,240						СДМ
	BETA	St. Err. of BETA	B	St. Err. of B	t(211)	p-level
АОНЛ	-0,3727	0,1738	-0,2759	0,1287	-2,1440	<b>0,0332</b>
АОНЛС	0,1908	0,1661	0,1335	0,1162	1,1487	0,2520
АОПЛ	-0,0508	0,0934	-0,0456	0,0839	-0,5437	0,5873
АОПК	-0,0421	0,0874	-0,0210	0,0437	-0,4815	0,6307
АСОГ	-0,1114	0,0841	-0,0269	0,0203	-1,3242	0,1869
АКНН	-0,1403	0,1090	-0,5158	0,4007	-1,2872	0,1994
АКНГ	0,1296	0,1059	0,4803	0,3924	1,2239	0,2224
АКНМ	-0,0233	0,1170	-0,0811	0,4071	-0,1992	0,8423
АТЕЖ	0,0124	0,1058	0,0029	0,0248	0,1173	0,9068

Table 4

Regression analysis of a system of morphological variables with the criteria variable for estimation of the explosive force of the legs, triple jump from place

R= ,31393376 RI= ,09855441 Adjusted RI= ,06010412 F(9,211)=2,5632 p<,00812 Std.Error of estimate: 56,698						ТДМ
	BETA	St. Err. of BETA	B	St. Err. of B	t(211)	p-level
АОНЛ	-0,0473	0,1762	-0,0881	0,3281	-0,2685	0,7886
АОНЛС	0,0181	0,1684	0,0318	0,2963	0,1074	0,9146
АОПЛ	-0,0504	0,0947	-0,1138	0,2139	-0,5321	0,5952
АОПК	-0,2180	0,0886	-0,2739	0,1113	-2,4605	<b>0,0147</b>
АСОГ	0,0569	0,0852	0,0345	0,0517	0,6672	0,5054
АКНН	-0,1598	0,1105	-1,4778	1,0216	-1,4466	0,1495
АКНГ	0,0019	0,1073	0,0180	1,0004	0,0180	0,9856
АКНМ	-0,0659	0,1186	-0,5771	1,0379	-0,5560	0,5788
АТЕЖ	0,1091	0,1073	0,0644	0,0633	1,0174	0,3101

From the inspection of the Tables 3 and 4, one can notice that was carried out a Multiple regression analysis on the system of morphological measures with the tests for assessing the legs' explosive force of the female respondents. The coefficient of multiple correlation, ie the correlation of the system of morphological measures with the criterion, the test long jump forward from place was  $R = .35$ , and the prediction coefficient was  $R^2 = .12$ , which means it explains the joint variability about 12%. Such a relationship was significant at the level of  $p = .001$ . The remaining 88% were in the explaining of the overall variability which remains on some other features and capabilities of participants which are not subject of this research (eg other morphological measures, motor variables, conative, cognitive, motivational, functional, etc.). Although the whole system of morphological variables noted statistically significant connection from low-level with the criteria, a single negative statistically significant connection was observed only with the variable scope of the outstretched upper arm. The coefficient of multiple correlation, i.e. the correlation of the system of morphological measures with the criterion, the test triple jump forward from a

place is  $R = .32$ , and the prediction coefficient is  $R^2 = .10$ , which means it explains the joint variability about 10%. Such a relationship was significant at the level of  $p = .008$ . The remaining 90% were in the explaining of the overall variability which remains on some other features and capabilities of participants which are not subject of this research (eg other morphological measures, motor variables, conative, cognitive, motivational, functional, etc.). Although the whole system of morphological variables noted statistically significant connection from low-level with the criteria, a single negative statistically significant connection was observed only with the variable scope of the leg.

## CONCLUSION

Based on the survey results we can conclude the following:

- The system of morphological indicators preconditions the performance of tests for assessing the explosive force of the female students' leg.
- Individually negative statistically significant impact on tests was noted at the variables scope of the outstretched upper arm and scope of the leg, meaning that these contribute most to the success of the tests' performance.

## LITERATURE

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## For Contact:

Ass. Prof. Georgi Georgiev, PhD, University “Ss. Cyril and Methodius”, Faculty of Physical Education, Skopje, Macedonia; e-mail: ggeorgiev2005@yahoo.com

Full. Prof. Vujica Živković, PhD, University “Ss. Cyril and Methodius”, Faculty of Physical Education, Skopje, Macedonia; e-mail: zivkovicvujica@yahoo.com

Full. Prof. Žarko Kostovski, PhD, University “Ss. Cyril and Methodius”, Faculty of Physical Education, Skopje, Macedonia; e-mail: zarkostovski@yahoo.com

Mr. Sci. Viktor Mitrevski, SOU “Krstev Petkov Misirkov”, Demir Hisar, Republic of Macedonia, e-mail: mitrevski\_viktor@yahoo.com

**The report has been reviewed.**