

CONNECTION OF FUNCTIONAL ABILITIES WITH JUMPING AND THROWING ATHLETIC DISCIPLINES

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Abstract. The aim of this study was to determine the connection between functional abilities with results of jumping and throwing athletic disciplines with athletes. The sample was taken from a population of elementary school students from Prokuplje region, 13 and 14 old, included in regular physical education classes. The sample consisted of 200 male athletes involved in the training process in sports clubs at least three times a week in addition to physical education classes. For assessment of functional abilities six functional tests were used: resting heart rate, Cooper test, heart rate in the first minute after Cooper test, heart rate in the second minute after Cooper test, systolic arterial blood pressure, diastolic arterial blood pressure. For assessment of jumping and throwing athletic disciplines four tests were used: long jump, high jump, shot put and javelin. Data analysis was performed with canonical correlation and regression analysis. The results showed a statistically significant correlation between functional abilities with all of tests in jumping and throwing athletic disciplines.

Keyword. *Functional abilities, Jumping and throwing disciplines, Athletes.*

1. INTRODUCTION

It is well known (Beunen et al. 1997; Kršmanović, 2000) that the results achieved by athletes are conditioned with application of science in the processes of selection and guidance of potential athletes, with programming and monitoring of training, recovery and with planning of participating at competition. Recently, sports coaches and physical education teachers have been in intensive use of information and knowledge obtained during the application of science for making plans and programmes, the choice of content and methods, and for determining the volume and

intensity of the load in the training process.

Development of anthropological characteristics and increasing the level of motoric abilities with athletes should start with determining the current state of abilities and characteristics in order to properly accomplish the planning, programming, implementation of work and analysis of the effects of the training process. The application of transformational training processes is possible unless the level of anthropological characteristics and motor skills involved in success of some motoric activities and their relations is known. On this basis, it is known which program content, methods, and workload can be optimally achieved adaptive processes with (Malacko and Popović, 1997).

Successful selection of future athletes, athletic performance improvement of individuals and teams can only be achieved with the help of scientific researches in the field of sports and sports training. In most countries whose athletes achieve significant results, the science of sport is at a high level. Scientific knowledge obtained during researches in the field of sport are applied primarily in analysis of athletic performance and degree of conditional readiness. On the basis of such data, the planning and programming of preparations for the next competition are performing.

Considering the fact that sports training is very complex in its structure, because the transformation is taking place in the space of morphological, functional and motoric dimensions belonging to the multi-dimensional dynamic system, it is necessary to completely and accurately analyze the anthropometric characteristics of athletes. For this purpose, it is important to apply appropriate scientific methods to determine the structure of dimensions, relations and development principles, and measures that enable the direction and control of the effects of work. In addition, it is important to establish a reliable measuring

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instruments for monitoring and measuring the changes that are to be achieved by using the means of physical exercises.

The results of this study should demonstrate which dimensions of functional abilities contribute to result from efficiency of jumping (high jump, long jump) and throwing (shot put, javelin) athletic disciplines. Therefore this research will contribute to the rationalization of training and teaching, which will result in better results in athletic disciplines.

2. WORKING METHOD

The aim of this study was to determine the connection between functional abilities with results of jumping and throwing athletic disciplines with athletes. The sample was taken from a population of elementary school students from Prokuplje region, 13 and 14 old, included in regular physical education classes. The sample consisted of 200 male athletes involved in the training process in sports clubs at least three times a week in addition to physical education classes.

For assessment of functional abilities six functional tests were used: resting heart rate (RHR), Cooper test (COOPER), heart rate in the first minute after Cooper test (HR1), heart rate in the second minute after Cooper test (HR2), systolic arterial blood pressure (SABP), diastolic arterial blood pressure (DABP).

Functional tests in this study were obtained from the model of the functional tests (Heimar & Medved, 1997).

For assessment of jumping and throwing athletic disciplines four tests were used: long jump (LONG), high jump (HIGH), shot put (SHOT) and javelin (JAVEL).

Data analysis was performed by statistical package Statistica 7.0, and canonical correlation and regression analysis were being used.

3. RESEARCH RESULTS

3.1. Canonical correlation analysis

Table 1. Canonical correlation analysis

	<i>Can.R</i>	<i>Can.R²</i>	<i>Chi-sqr.</i>	<i>df</i>	<i>p</i>
0	0.69	0.47	44.4	140	.000

Results of canonical correlation analysis show (Table 1) that in connection between

the predictor system, consisted of functional tests and criteria, consisted of jumping (long jump and high jump) and throwing athletic disciplines (shot put and javelin), statistically significant canonical factor (Can.R 0.69) is obtained. That factor indicates the size of correlation coefficient, confirmed by common variance percentage of determination coefficient (Can.R²) for both sets of variables in the level of 47%.

Given the size of canonical correlation coefficient and common variance, it can conclude that the results of jumping and throwing athletic disciplines will be largely manifested depending on their functional area. Canonical root is statistically significant at P = .000.

Table 2. Canonical factors

<i>Variables</i>	<i>Root 1</i>	<i>Variables</i>	<i>Root 1</i>
<i>RHR</i>	-0.59	<i>LONG</i>	-0.46
<i>COOPER</i>	-0.49	<i>HIGH</i>	-0.44
<i>HR1</i>	-0.50	<i>SHOT</i>	-0.39
<i>HR2</i>	-0.36	<i>JAVEL</i>	-0.36
<i>SABP</i>	-0.33		
<i>DABP</i>	-0.22		

In Table 2, resting heart rate (RHR -0.59), heart rate in the first minute after Cooper test (HR1 -0.50) and Cooper test (COOPER -0.49) have the highest projection of canonical factor, and therefore, they the highest impact on results in all tests of jumping and throwing athletic disciplines. Slightly smaller, but significant impact on manifestation in the jumping and throwing athletic disciplines are with heart rate in the second minute after Cooper test (RH2 -0.36) and systolic arterial blood pressure at rest (SABP -0.33), and diastolic blood pressure at rest (DABP -0.22) is with the least impact. Factor of specific-motoric performance is best defined with long jump (LONG -0.46) and high jump (HIGH -0.44). Effectiveness of specific-motoric performance clearly depends on factors resting heart rate (RHR) and Cooper test (COOPER).

3.2. Regression analysis

Table 3. Regression analysis

Variables	LONG (q)	HIGH (q)	SHOT (q)	JAVEL (q)
RHR	.220	.124	.020*	.168
COOPER	.040*	.031*	.110	.090
HR1	.230	.150	.150	.139
HR2	.740	.740	.740	.387
SABP	.800	.800	.800	.663
DABP	.480	.480	.480	.727
Q	.045*	.050*	.035*	.004**

Results of regression analysis indicate statistically significant connection of functional abilities as a unique area with all tests of jumping and throwing athletic disciplines. Connection with long jump (LONG .040), high jump (HIGH .050) and shot put (SHOT .035) is at the confidence level of 95%, while confidence level of connection with the javelin (JAVEL .004) is 99%.

In univariate level, long jump (SKDA) has a statistically significant connection with Cooper test (COOPER .040).

High jump (SKVI) also has a statistically significant connection with Cooper test (COOPER .031).

Shot put (SHOT) has a statistically significant connection with resting heart rate (RHR .020).

4. DISCUSSION AND CONCLUSION

In every athlete's career, functional abilities are one of the crucial indicators of readiness for competition. Functional capacity of humans is very complex, and besides the heart and blood vessels, it depends on many other factors, primarily nerve-vegetative and endocrine system. It believes that there is no functional ability of the cardiovascular system common to all life situations, but a series of specific skills for different activities and situations (Malacko and Popović, 1997). Under functional abilities in the physiological sense, aerobic and anaerobic abilities are implied, depending on whether muscle activities are conducted in the presence of oxygen (aerobic) or in the absence of oxygen (anaerobic).

Functional abilities are the subject of numerous studies in different areas of sports science. In the researches related to sport, the impacts and effects of some experimental treatments on development of functional abilities were mainly looked for, which can be found

in athletics (Raković 2003; Vučetić, 2008), football (Chamari et al., 2005; Impellizzeri et al., 2006, Bangsbo, Mohr and Krstrup, 2006; Milenković, 2010), basketball (Carvalho et al., 2011), handball (Vuleta and Gruić 2009; Živković, 2011), etc. There are also studies that have explored the connection of functional abilities with other parts of anthropological space (Milenković et al., 2008; Ivanović and Mijić, 2009; Milenković and Brankovjć, 2009; Milenković, 2009; Stanojević, 2010; Šamija et al., 2010; Rakojević, 2011) or differences in developing level between two or more groups (Vujkov et al., 2009; Jovanović, Vučetić and Sporiš 2009; Branković et al., 2009).

The attention being paid to aerobic and anaerobic capacities of athletes and their connection with other parts of anthropological space can be clearly seen through a numerous of contemporary researches of domestic and foreign experts. The aforementioned scientific approaches suggest the area of functional abilities as of significant impact for a successful career of any athlete. When we are speaking of metabolic processes of athlete's, coaches leave nothing to chance. Researches show detailed assessment and verification of top athletes readiness for challenges that professional career is carrying.

No less significant impact of functional ability is recorded with younger athletes. This research has just been talking about elementary school young athletes who demonstrated their effectiveness in athletic disciplines related to jumping (long jump and high jump) and throwing (shot put, javelin). Connection of functional abilities with these disciplines pointed to their statistical significance in the multivariate level, and in some individual tests. On this basis, the conclusion that can be made is pointing that the connection between functional abilities and jumping and throwing athletic disciplines is at a statistically significant level.

Conflict of interests

Authors declare no conflict of interest.

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