

RELATIONS OF THE FUNCTIONAL ABILITIES AND AGILITY IN YOUNG FOOTBALLERS

(Original scientific paper)

Davorin Okiljević¹, Dejan Stojiljković² and Danica Pirš¹

¹University of East Sarajevo, Faculty of Physical Education and Sport, Pale, RS-BIH

²University of Niš, Faculty of Sport and Physical Education, Niš, Serbia

Abstract

The research study was conducted on a sample of 42 subjects, primary school male pupils from Krusevac, aged 13 ± 6 months, included in regular physical education curricula and football as an extracurricular activity. The aim of this study was to determine statistically significant canonical relations between the functional abilities and the results achieved in the motor agility in young football players. To assess the functional abilities the following tests were applied: Margaria test (FMARG), pulse rate after load (FPPO) and vital lung capacity (FVKP). Motor agility was estimated by the following tests: envelope test (MKOT), side steps (MKUS) and agility in the air (MOVZ). Results of canonical correlation analysis showed that there were statistically significant relationships between the functional abilities and motor agility in young football players.

Keywords: *primary school physical education curricula, canonical correlation analysis, motor and functional tests*

INTRODUCTION

Monitoring implementation and evaluating the results achieved are important for the improvement of physical education teaching and training process in order to encourage teachers and coaches to adopt a more responsible and creative approach to work. By implementing such an approach the reliable data are ensured to take any possible corrective intervention in the practical implementation of the program of work (Zdanski, & Galić, 2002; Visnjić, 2006; Bompa, 2006).

It is well known that for the prediction of performing quality of young football players very important are the motor skills - agility and functional abilities. Football is a sports game dominated by polystructural complex movements, defined by specific technical and tactical elements of the game that contains a number of different structures of movement, such as jumps, sprints, falls, kicks and head movements with the change of direction and speed (Jerković, 1991; Malina, 1994; Mikić, Tanović, & Bjeković, 2010; Mitić, 2010).

Agility is present in the implementation of most tasks of physical conditioning football players training and is closely associated with the functional abilities and balance so as to regulate the timely transfer of the body center of gravity in the process of motor exercising. Developing agility in particular is enhanced by the exercises that contain a high temporal and spatial uncertainty, therefore situational and specific motor exercises

should be used for its development (Duraković, 2008).

Functional abilities (anaerobic and aerobic capacity) have a direct impact on the size and character of the working capacity manifestation in young football players and are directly linked to the morphological characteristics and motor skills in all motor exercises (Heimar, & Bear, 1997; Milanović, 2007).

Knowledge of the internal structure, direction and size of the connection between functional abilities and agility is important to structure the teaching and training contents aimed at optimizing the performance results and the overall coordinated development of a series of anthropological dimensions (Kondrić, & Mišigoj-Duraković, 2002).

The aim of this research is to determine statistically significant canonical relations between the functional abilities and achieved results in agility in young football players. The realization of such a set goal would enhance possible formation of more rational procedures for optimal planning, programming and control of the training process with young footballers.

METHODS

The study was conducted on a sample of 42 subjects, primary school pupils in Krusevac, aged 13 ± 6 months, attending regular physical education curricula and football as the optional teaching unit of physical education curricula.

To assess the functional abilities, three tests were conducted: Margaria test (FMARG), pulse frequency after the load (FPLP) and vital lung capacity (FVKPL). These tests were used in studies of Heimar and Medved (1997). The evaluation of the agility motor segment was defined by the following tests: envelope test (MKOT), side steps (MKUS) and agility in the air (MOVZ). The measurement characteristics of these tests have been confirmed in research studies of Kurelić et al., (1975). The data obtained in our study were processed by canonical correlation analysis.

RESULTS

Analysis of the results obtained in Table 1. and 2. in the group of subjects in the area of functional abilities and agility shows that in the applied tests there were no significant deviances of the results from the normal distribution, because the skewness values do not exceed 1.00. Kurtosis results range below the normal value of the distribution of 2.75, which makes distribution mesokurtic.

In Table 3. which shows only the first statistically significant pair of canonical factors on a methodological justified conventional level of .01, one can notice a strong correlation ($R=.7$) between the systems of the applied functional variables and the system of motor variables in the agility segment. This correlation has the appropri-

ate size of the coefficient of determination ($R^2=.53\%$) which points out to the mutual statistically significant effect of both systems of the applied variables. The significance of the canonical factors is confirmed by the test results applying the Bartlett's chi-square test (Chi-sqr.) with a high coefficient (43.58), which shows that the coefficients of canonical factor are statistically significant (P-level .000**).

Given the size of the coefficient of canonical correlation (Can. R) and common variance Can.R² it can be concluded that the results of the subjects' motor agility are manifested largely in relation to their functional abilities. More specifically, this impact is defined by the data shown in Tables 4. and 5. These tables present the structure of canonical factors in the system of functional variables and the system of motor variables in the agility segment.

Analysing canonical factors of the functional abilities tests (Table 4.) it can be concluded that the factor of agility success is best defined by Margaria test (FMARG -.76), slightly less by frequency pulse after the load (FPLP -.63) and the least by vital lung capacity (FVKPL .54).

Analysing canonical factors of agility (Table 5.) it can be concluded that the agility success factor is best defined by side steps test (MKUS -.75), slightly less by the envelope test (MKOT -.64) and the least by the agility in the air test (-.58 MOVZ).

Table 1. Basic statistical parameters for the evaluation of functional abilities

Variables	N	Mean	Min.	Max.	Std.Dev	Skewn.	Kurtos.
FMARG	42	3.56	3.04	4.12	0.52	0.7431	-0.554
FPLPO	42	160.45	145.00	169.00	9.36	1.672	2.352
FVKPL	42	2442.30	2290.00	2860.00	57.48	-0.264	.134

Legend: arithmetic means (Mean), minimum (Min.), maximum (Max.), standard deviation (Std. Dev.), skewness (Skewn.), kurtosis (Kurtos.)

Table 2. Basic statistical parameters for the assessment of motor abilities in agility segment

Variables	N	Mean	Min.	Max.	Std.Dev	Skewn.	Kurtos.
MKOT	42	17.54	14.95	22.43	3.42	0.562	1.428
MKUS	42	12.10	8.46	16.57	2.95	0.452	1.323
MOVZ	42	15.25	11.70	16.84	4.62	0.274	2.050

Legend: arithmetic means (Mean), minimum (Min.), maximum (Max.), standard deviation (Std. Dev.), skewness (Skewn.), kurtosis (Kurtos.)

Table 3. Canonical correlation analysis of the predictor system of functional abilities with criterion agility system

DF	Can.R	Can.R ²	Chi-sqr.	df	P-level
1	.71	.53	43.58	42	.000**

Legend: Canonical factor of the size of canonical correlation between predictor and criterion variables (Can. R), Canonical root of the variability determination of the predictor and criterion expressed in percentages (Can. R²), Bartlett's Chi-square test (Chi-sqr.) to test the statistical significance of the coefficient of canonical correlation), degrees of freedom (df) and the level of significance of the coefficient of determination (P-Level)

Table 4. *Structure of statistically significant canonical factor in the system of functional abilities*

Functional variables	Canonical factor 1
FMARG	-.76
FPLPO	-.63
FVKPL	.54

Table 5. *Structure of statistically significant canonical factor in the system of motor abilities in agility segment*

Motor variables of agility	Canonical factor 1
MKOT	-.64
MKUS	-.75
MOVZ	-.58

DISCUSSION

Analyzing the obtained results shown in Tables 4. and 5., which show the relation of the canonical connection of the first canonical factor from the system of functional variables and the first canonical factor from the system of motor variables in agility segment, appropriate conclusions can be reached. Subjects who achieved better results in all of the applied tests used to establish the first canonical factor of the functional abilities, at the same time achieved better results in tests used to establish the first canonical factor of the motor skills in agility segment.

This is evident from the negative signs of the coefficients saturation tests: Margaria test (FMARG) and pulse rate after load (FPLP), as well as a positive sign for the vital lung capacity test (FVKPL) as compared to the first canonical factor which is defined as a general functional ability. In this regard, it is clear that the negative i.e. lower results in the tests (FMARG) and (FPLP), in fact, are better results. Also, it is clear that positive results of the test (FVKPL), make better result.

Certainly, in this interpretation the reverse relations also apply, meaning that the subjects with better motor abilities in agility segment, achieve better results in the functional tests.

Similar results of the correlation of the functional and motor abilities in the agility segment were obtained in other studies (Stojanović, Ilić, Momirović, & Hošek, 1980; Čavar, Glibić, & Markota, (2009) on the population of the skilled athletes. The values determined by the canonical correlation analysis in the research studies of these authors indicate high interconnection of the functional abilities and motor abilities in the agility segment.

CONCLUSION

The obtained research results show that between the functional abilities, as a predictor system, and the results of the motor agility, as a criterion, there is a statistically significant canonical correlation.

Determining the relation of the functional abilities and results of motor agility, is a fundamental and still very current practical and theoretical problem, which is of great importance, primarily because of the possibility of forming rational procedures for the optimal orientation and selection of young football players, the planning and programming of training, as well as the effective monitoring of the development of relevant anthropological dimensions.

The results of this study can contribute to the rationalization of the regular PE curricula and extracurricular activities as well, so that special attention will be drawn in the training process to the development of those variables of the functional abilities in the context of the development of motor agility, which would on the appropriate level, enhance achieving better results in young footballers.

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Correspondence:

Dejan Stojiljković
 University of Niš
 Faculty of Sport and Physical Education
 Str. Čarnojevića 10a, 18000 Niš, Serbia
 E-mail: dejan78tea@gmail.com