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CANONICAL RELATIONS OF FUNCTIONAL ABILITIES WITH EXPLOSIVE POWER IN HANDBALL CADETS

(Original scientific paper)

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Abstract.

A sample of 86 subjects in this study was taken from the population of students of secondary schools in the municipality of Nis, ages 15 and 16 ± 6 months, who have organized training work and are active players in handball clubs. The main objective of this research is to determine a statistically significant relations between the functional abilities with the results of explosive strength in participants. To determine the functional capabilities, three tests were performed: resting heart rate (FPUM), heart rate after a heavy load (FPPO) and vital lung capacity (FVKP). Explosive strength was evaluated by tests: standing long jump (MSDM), standing high jump (MSKV) and standing triple jump (MTRS). The survey results were analyzed by a canonical correlation. The obtained results show that the functional abilities of the participants are statistically significant associated with explosive strength.

Keywords: *functional tests, motor tests, testing, canonical correlation analysis, canonical factors*

INTRODUCTION

Monitoring the implementation and evaluation of results is important for improving the training process and encouraging teachers and coaches for responsible and creative attitude towards work. This approach ensures that reliable data takes possible corrective interventions in the practical implementation of the program of work (Zdanski & Gali, 2002, Visnjic, 2006; Bompa, 2006).

It is well known that the prediction of the quality of handball players, there are very important motor abilities - explosive power and functional abilities. Explosive power has great influence on the results in handball because the adequate relationship to functional abilities, contribute positively to the achievement of high sports results. It is mostly manifested in the activities such as different types of jumps and sprints, and make it short, i.e., the group spent a large number of explosive movements related to one entity (Kuleš & Šimenc, 1986).

In handball a high level of anaerobic potential functional capacity and explosive strength, are especially suited when necessary and needed in a timely manner to trigger muscle agonists and antagonists in short time intervals during the implementation of eccentric-concentric contraction in the attack on goal (Gardašević, 1989; Ilić, S.H, 1993; Ćavar, Glibić & Markota, 2009).

Integrated development of the overall anthropological status of young handball players is one of the main objectives of the training process. Achieving these goals is possible with a comprehensive knowledge of the relationships and the level of interdependence of a number of specific dimensions of man's human space. Knowledge of the internal structure, orientation and size of connections of specified dimensions, it is important to structure the content of training aimed at optimizing performance, and overall development of concerted series of anthropomorphic spaces.

This research was the subject of a number of authors on a sample of athletes and non-athletic students of a school age. The research results of these authors have shown that there is a statistically significant correlation with the results of functional abilities of motoric dimensions in high school students, included in regular physical education (Stojanović, Ilić, N., Momirović & Hošek, 1980; Stojiljković, 2005; Pavlović, 2006; Veličković, 2009)

The results of these studies allow the possibility of checking the anthropological development of young handball players, in regard to this and the desired training technology and updates of program content and the possibility of identifying meaningful projection of their future desired development (Malacko and Rađa, 2004). The aim of this research is to determine statistically significant canonical relations between some functional abilities and results in the explosive strength of the handball players of younger ages. The implementation of such a set goal would be achieved possibility of forming a rational procedure for optimal planning, programming and control of the training process in young handball players ages of 15 and 16 years.

METHODS

The study was conducted on 86 subjects, high school students in Nis, ages 15 and 16 ± 6 months, included in regular physical education and training processes in handball clubs in the Nis region.

To determine the functional capabilities, three tests were performed: pulse rate during rest (FPUM), pulse frequency after a heavy load (FPPO) and vital capacity of the lungs (FVKP). These tests were used in research and Heimar and Medveda (1997). Assessment of the motor segment of the explosive strength, defined by tests: standing long jump (MSDM), high jump (MSKV) and triple jump (MTRS). Measured characteristics of these tests are validated in the research of Kurelića and associates (1975).

The data obtained in our study was analyzed by canonical correlation analysis.

RESULTS

The results in tables 1 and 2 show that there is no statistically significant deviations from normal distribution between the results of tests of functional and motor abilities of segments of the explosive strength.

In table 3, which presents only the first statistically significant pair of canonical factors of methodologically reasonable conventional level of .01, a significant correlation (R = .76) is shown between the systems of the applied functional variables and systems of the motor variables from the segments of explosive power. This correlation has appropriate size of the coefficient of determination (R2 = .57) which indicates a statistically significant mutual influence of both the applied system of variables. More specifically, that influence is also defined with the data in tables 4 and 5. In these tables are shown in the structure of canonical factors in the system of functional variables and system variables of the motor segments explosive power. Presented in these tables is the structure of canonical factors in the system of functional variables and in the system of motor variables from the segment of explosive strength.

The strength of the correlation coefficients of the canonical factor of functional variables (Table 4), well defines general functional ability of subjects. In doing so, this factor is more saturated with tests: vital lung capacity (FVKP) and heart rate after loading (FPPO), then with the rest heart rate test (FPUM).

Explosive strength, as one of the segments of motor abilities, is just as equally good defined with all applied tests. They are good representatives of the general explosive strength. In this case, two tests: standing long jump (MSDM) and standing triple jump (MTRS), have a greater contribution in defining the overall explosive strength in comparison to standing vertical jump test(MSKV).

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

Variables	N	Mean	Min.	Max.	Std.dev.	Skewn.	Kurtos.
FPUM	86	86.32	83.00	90.00	2.34	0.314	2.410
FPPO	86	175.24	162.00	183.00	3.22	0.302	1.024
FVKP	86	3180.00	2860.00	3540.00	2.10	0.186	2.013

Table 2. Basic statistical parameters for evaluation of motor skills from explosive strength segments

Variables	N	Mean	Min.	Max.	Std.dev.	Skewn.	Kurtos.
MSDM	86	182.74	174.00	240.00	23.16	-0.316	0.214
MSKV	86	29.95	24.00	37.00	11.43	0.352	1.384
MTRS	86	510.63	468.00	580.00	14.52	0.286	2.015

Table 3: The characteristic root (Lambda) and the canonical correlation coefficient of the first statistically significant pairs of the canonical factors (Rc), chi-square test (Chi-sqr.)degrees of freedom (df), significant differences (P-level)

Determination (Lambda - R^2)	Correl-ation (Rc)	Chi-sqr.	Df	P-level
.57	.76	84.32	86	.003

Table 4. Structure of statistically significant canonicalfactor in the system of functional variables

Functional variables	Canonical factor 1
FPUM	-0.53
FPPO	-0.64
FVKP	0.75

Table 5: Structure of the statistically significant canonicalfactor in the system of motor variables fromthe explosive strength segment

Motor variables of the explosive strength	Canonical factor 1
MSDSM	0.63
MTRSK	0.57
MSKV	0.48

DISCUSSION AND CONCLUSION

Bearing in mind the results of tables 4 and 5, and the relation of the canonical correlation of the first canonical factor of the system of functional variables and the first canonical factor of the system of motor variables segment of explosive power, results in appropriate conclusions. Specifically, respondents who attained better results in all tests applied with whom he established the first canonical factor of functional abilities, at the same time achieve better results in tests with which it established the first canonical factor of motor abilities in the segment of explosive power.

It can be seen from the negative sign of the coefficient saturation tests: the pulse frequency after a heavy load (FPPO) and the pulse rate during rest (FPUM), as a sign of a positive test and the vital capacity of the lung (FVKP) relative to the first canonical factor which is defined as the functional abilities of the general. In this respect, it is clear that the negative, that is, in the test results below FPPO and FPUM, in fact, better results. Likewise, it is clear that the results of the test of positive FVKP, are better result.

Certainly, in this interpretation the reverse applications also apply, which consist of the fact that respondents with better motor abilities in the segment explosive strength, achieve better results in functional tests, and had better functional viability of which were evaluated with these tests.

Similar results of correlation functional capacity and motor abilities of the segment explosive strength, were obtained in other studies (Stojanovic, Ilic, Momirovic and Hosek (1980); Bojic, 2005; Djuraskovic, 2008; Ćavar, Glibic and Markota (2009) among quality athletes. Established results of a canonical correlation analysis in the study of these authors point to the high interconnection of functional capacity and motor abilities of explosive power.

Based on the obtained results it can be concluded and determined that the relation of functional ability with the results of the viability of the motor segment of explosive power, represents a fundamental and still very current practical and theoretical problem, which is of great importance, primarily due to the possibility of forming a rational procedure for optimal orientation and selection of young handball players, planning, control and programming training, and effective monitoring of the relevant anthropological characteristics (Stojanovic, et.al 1980).

The results of this study may contribute to streamlining the training process with handball players, so it will be in the training process, special attention is paid to the development of those variables, functional capabilities in the context of the development of motor abilities in the segment of explosive power, which would in the right degree be conditioned by the achievement of better results in handball.

In addition, the training work on the development of functional capacity and motor abilities in the segment of explosive power, can contribute in terms of programming, implementation and control of the teaching and training process in managing of quality handball players.

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