

CORRELATION BETWEEN FUNCTIONAL ABILITIES AND AGILITY RESULTS IN CHILDREN WITH KYPHOTIC POSTURE

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Abstract. The aim of research was to determine statistically significant canonical relations between functional abilities and achieved agility results in children with kyphotic posture. The realization of such task would create possibility to come up with a more rational procedure for optimal planning, programming and control of the process of teaching corrective gymnastics. The research was conducted on a sample of 46 students of primary schools in Niš, all male, aged 12 (\pm 6 months), included in regular classes of PE and exercises in order to correct kyphosis three times a week for 45 minutes at Niš Health Center. The results of canonical relations with the results of the functional abilities of children with agility kyphotic posture were statistically processed in a way to provide answers to the research goal. We used the program "Statistica" 8.0 for Windows to calculate the descriptive statistical parameters and canonical correlation analysis. The results showed that there are statistically significant relations and influences between a set of variables for assessing functional ability, as a predictor system, and agility, as a criterion variable.

Keywords: *Functional tests, Agility, Cognitive psychology, Canonical correlation analysis, Children with kyphotic posture.*

1. INTRODUCTION

Numerous analyses prove that the volume and quality of physical exercise affects health. Insufficient mobility leads to a poor condition of the musculoskeletal and nervous systems. Consequently, there is a growing number of school children with disorders of locomotion, especially the joints and spine.

Kyphotic posture, or so called kyphosis is a postural disorder at the level of deformity, located on active and passive elements of the spinal column, expressed in the sagittal plane. The main characteristic a kyphotic bad posture is reflected in a specified curve, which is usually of partial (local) type, and is located in the

chest (thoracic) and is commonly referred to as stoop or slouch (Popović and Milenković, 2008; Duraković, 2008; Bogdanović and Koničanin, 2009; Bratovčić, et al., 2009).

The results of medical examinations for enrollment in the first grade of two primary schools in 2014. in Niš show that 23% of students have bad posture, and a deviation from the normal foot was found in 33% of boys and 30% girls. An early diagnosis of kyphotic posture and prevention exercises are of special importance for the prevention of the further development of this condition.

Functional capabilities have a major impact on the results of motor behavior of children, since in an appropriate relation to motor agility they positively contribute to the achievement of sports results (Marinković, 2012; Malacko and Popović 1997).

The aim of this study was to determine statistically significant canonical relations between functional abilities and achieved results in agility in children with kyphotic posture. The realization of such goal would create a possibility of forming more rational procedures for optimal planning, programming and control of the teaching process.

2. MATERIALS AND METHODS

The research was conducted on a sample of 46 students of primary schools in Niš, all male, aged 12 (\pm 6 months), included in regular classes of PE and exercises in order to correct kyphosis three times a week for 45 minutes at Niš Health Center.

Three tests were performed in order to assess the functional abilities. vital lung capacity (FVKPL), systolic blood pressure at rest (FSIKP) and diastolic blood pressure at rest (FDIKP). These tests were used in Heimar and Medved's research (1997). The assessment of motor agility was defined in the

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following tests: envelope test (MKOT), side steps (MKUS) and the figure “8” with bending (MOSS). The measurement characteristics of these tests have been validated in research by Kurelić and associates (1975). The data obtained in this study were analysed by canonical correlation analysis.

3. RESEARCH RESULTS

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

Var.	N	Mean	Min.	Max.	SD	Skewn.	Kurtos.
FVKPL	46	2824,622	2232,00	3154,00	2,62	0.154	2.67
FSIKP	46	113,45	103,00	120,00	3.54	0.516	1.48
FDIKP	46	75,87	59,00	89,00	2.28	0.631	2.36

Key: arithmetic mean (Mean), minimum (Min), maximum (Max), standard deviation (SD), skewness (Skewn.), kurtosis (Kurtos.).

Table 2. Basic statistical parameters for assessing agility

Var.	N	Mean	Min.	Max.	SD	Skewn.	Kurtos.
MKOT	46	19.28	14.72	21.94	2.16	0.413	0.326
MKUS	46	12.34	9.64	14.48	1.96	0.216	-0.158
MOSS	46	14.46	11.43	17.16	2.32	0.174	1.241

Key: arithmetic mean (Mean), minimum (Min), maximum (Max), standard deviation (SD), skewness (Skewn.), kurtosis (Kurtos.).

The results shown in Table 1 and 2 in the control group in the area of motor abilities at final measurements indicate that there is no statistically significant difference between the results and normal distribution, as confirmed by the results of the asymmetric distribution (skewness) not exceeding 1.00, which means that the tests are neither heavy (up to +1.00) nor easy (up to -1.00), but suitable for subject population and below one. Homogeneity of results (kurtosis) indicates that there is good sensitivity (test discrimination), since the obtained values are below 2.75.

Table 3. Canonical Correlation Analysis of functional abilities and success in motor agility

R	R ²	Chi-sqr.	Df	P-Level
.72	.54	72.46	37	.000

The results of canonical correlation analysis (Table 3) showed high correlation (R= .72) between the applied functional variables system and motor variables system in the segment motor agility. This correlation is confirmed by the results of Bartlett’s Chi-square test (Chi-sqr. 72.46), that the canonical correlation coefficients are statistically significant. The Established connection has

the appropriate size of the coefficient of determination (R²=.54) which indicates a statistically significant interaction effect of the variables. This explains the influence of functional abilities of 54%. The probability of error for the rejection of the hypothesis of whether the function is significant or not, was determined by the predictor and the criteria (P = .000) at the level of 99%.

Table 4. The structure of statistically significant canonical factor in the system of functional variables

Functional variables	Canonical factor Root 1
FVKPL	.65
FSIKP	.52
FDIKP	.44

After examining the structure of canonical factors it can be concluded that the size of the correlation coefficients of the canonical factor functional variables (Table 4), well define the general functional ability of the respondents. Also, this factor is more saturated with vital lung capacity tests (FVKP- .65) and systolic blood pressure at rest (FSIKP- .52), than the diastolic blood pressure at rest (FDIKP- .44).

Table 5. The structure of statistically significant canonical factors in the system of motor variables from the agility segment

Motor agility variables	Canonical factor Root 1
MKOT	-.71
MKUS	-.62
MOSS	-.46

Motor agility (Table 5), as one of the motor skills segments, is also well defined by all applied tests. They are good representatives of the general motor agility. In this case, two tests, envelope test (MKOT- .71) and side steps (MKUS- .62), also have a greater contribution to defining the general motor agility compared to the figure “8” with bending test (Moss .46).

4. DISCUSSION AND CONCLUSION

Based on the results of the canonical correlation analysis of respondents (Tables 3, 4 and 5), it was determined that functional abilities (vital lung capacity, systolic blood pressure at rest and diastolic blood pressure at rest), as a predictor system, have a statistically significant correlation with the achieved agility results (envelope test, side steps and the “8” with bending), as a criterion system,

in students.

Namely, those who have achieved better results on all performed tests with whom the first canonical factor of functional abilities was determined, at the same time achieved better results on the tests with whom the first canonical factor of motor skills was determined in the agility segment.

It can be seen from the negative marks of the test saturation coefficients: pulse rate after the load (FPPO) and pulse rate at rest (FPUM) and the "8" with bending (MOSS), as compared to the first canonical factor which is defined as general functional ability. In this sense, it is clear that the negative or lower results in tests FPPO, FPUM and MOSS are actually better results. Likewise, it is clear that positive results in the FVKP test are better.

Certainly, the reverse relations also apply to this interpretation, meaning that respondents with better motor skills in the agility segment, achieved better results in functional tests, and had better functional abilities that were evaluated with these tests.

The results of this study may contribute to the rationalization of the regular classes of physical education, since special attention could be paid to the training process aimed at the development of those functional ability variables in the context of the development of motor skills in the agility segment, which would provide for the achievement of better results in the teaching process with students.

Conflict of interests

Author declare no conflict of interest.

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