CORRELATIONS BETWEEN THE COMPONENTS OF PHYSICAL READINESS AND PHYSICAL DEVELOPMENT OF THE OLDER PRESCHOOLERS

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Annotation. The indices of interdependence of physical fitness and physical development of children by means of correlation and factor analysis. The study involved 276 children aged 5-6 years. Found that in early childhood education important place occupied by the study of the physical condition of children. Reflected the degree of the relationship between the results of measurements of body length, body weight, volume of the chest, heart rate, blood pressure, lung capacity, breath-holding time (Stange's Genchi test) and measures of the level of development of basic physical properties (strength, speed, flexibility, endurance and coordination abilities). Research indicates the presence of interaction between the indices motor fitness and physical development of preschool children. The most significant effect on the physical health of the ability to provide coordination, speed and power capacity, speed and endurance.
Keywords: children, preschool age, physical education, physical fitness, physical development, relationship.

Introduction

Recent time studying of pre-school age children's physical condition has acquired high theoretical and practical significance. Alongside with the level of organism system's functioning, one of main indicators of general health is human physical condition, which is characterized by complex of somatic and somatically manifested symptoms [1; 2]. Organization of control over children's physical condition determines demand in solution of tasks, connected with estimation of their physical condition and motion abilities, studying of interconnection between indicators of anthropometric parameters, functional state and level of children's main motion abilities' development [5; 6; 9; 10].

Early beginning of pre-school systemic education, total computerization and intensifying of learning-cognitive children's activity in conditions of constantly progressing motion activity's deficit increase their mental and nervous loads, which negatively influence on children's health [5; 8; 11-15]. In this connection it is necessary to ensure such pedagogic conditions, which would permit to prepare a child for increased intellectual loads, with it not reducing the scope of their motion functioning.

That is why at modern stage of educational system's development, most of pre-school establishments try to move aside from traditional educational systems, to partially change their forms and content, to point educational process at demands and interests of children for their health improvement and health protection. I.e., there exists a transition to innovative type of educational process, which requires children physical education's improvement by means of development and introduction of new methods, means, forms, pedagogical technologies and so on in educational work with pre-school age children [3; 4; 8]. In our opinion it is necessary and urgent to study interconnection and interdependence of components, which ensure optimal realization of pre-school children's motion functioning, and permit to determine the most rational means and methods of pedagogic influence, oriented on comprehensive, harmonious development of a child in the process of physical education. This fact has conditioned our choice of the topic of this research.

The work has been fulfilled in compliance with plan of scientific-complex topic of theory and methodic of physical culture department of Physical culture institute of Sumy state pedagogic university, named after A.S. Makarenko "Optimization of teaching and education's process of different population groups by means of physical culture and sports" (state registration number 0107 U 002255).

Purpose, tasks of the work, material and methods

The purpose of the research is determination of interaction degree of parameters of 5-6 years old children's physical condition and motion functioning.

Studying of components of child organism's functioning as a holistic system is possible with the help of mathematical statistics, videlicet: factor and correlation analysis, which permit to determine correlation of pedagogic actions' components.

Methodic of the research. The research was carried out on the base of Sumy pre-school establishments: "Koamicheskiy" No.8, "Kupava" No.13 and establishments in Shostka (Sumy region): "Kolokolchik" No.1, "Medvezhonok" No.3. The research embraced 276 children of 5-6 years old age: 5 years old children (104 girls and 1000 boys) and 6 years old – (42 girls and 30 boys). By the data of medical records all children related to main health group of physical education.

We have fulfilled factor analysis of indicators of physical condition and physical preparedness of 5-6 years old children (n=276). Correlation and factor analysis of physical condition and physical preparedness's indicators was carried out with the help of mathematical statistic computer program Statistic 6 [7].

Results of the research

doi: 10.6084/m9.figshare.815874

The fulfilled correlation analysis showed that 5-6 years old girls have confident influence of motion functioning's indicators on indicators of physical condition. It was proved by factor analysis (see table 1), which revealed 4 groups of factors.

In group of first factor we included indicators of tests No.7 and No.6 – long jump from the spot. Contribution in total dispersion of the first factor is 2.347 6that is 10.67%. as per results of correlation analysis test No.7 has correlation interconnection ($p<0.05$) with indicators of length (r=0.20) and mass of body (r=0.17), Shtange's test (r=0.26), HBF in rest (r=-0.26), 90 meters run (r=-0.18) and still closer interconnection ($p<0.01$) with indicators of long jump (r=0.36) and test № 6 (r=0.83). Results of test № 6, are connected with 10 meters run (r=0.22) and 90 meters run (r=-0.17), with long jump (r=0.19) and HBF (r=-0.27). Long jump from the spot, which also was included in group of first factor has close interconnection ($p<0.01$) with indicators of forward torsi bending (r=0.30) and test № 7 (r=0.36). Efficiency of 5-6 years old girls' long jump from the sport was influenced ($p<0.05$) by indicators of body length (r=0.20) and body mass (r=0.26), by cardio-vascular system's functioning (r=0.18; 0.20; 0.19), by passing of obstacle course (r=-0.18), test № 6 (r=0.19) and 90 meters run (r=-0.19).

The group of second factor included indicators of BP. Contribution of second factor in total dispersion of factorial structure of 5-6 years old girls is 1.709 that is 7.77%. Correlation dependences of cardio-vascular system's functioning of 5-6 years old girls were represented by examination of HBF in rest, systolic and diastolic BP, which witnessed about influence of test № 7 (r=-0.26) and № 6 (r=-0.27) on HBF; of long jump form the spot on BP_s (r=0.20) иand BP_d (r=019), of 10 meter run – on BP_s (r=-0.17).

Table 1

Factor analysis of physical condition and motion functioning of 5-6 years old children (n=276)

Description of factor, % of dispersion	**Indicators**	**Factors**			
		F_1	**F_2**	**F_3**	**F_4**
5–6 years old girls (n=146)					
Coordination abilities and speed power level, 10,67%	Test №7, sec	0.8065	–	–	–
	Тест №6, sec	0.6827	–	–	–
	Long jump, sec.	0.4208	–	–	–
Cardio-vascular system, ,7,77%	BP_s mm.p.merc.col.	–	0.7645	–	–
	BP_d mm.p.merc.col.	–	0.8508	–	–
Anthropometric parameters, 7,06%	Length of body, cm	–	–	-0.6077	–
	Mass of body, kg	–	–	-0.7906	–
Respiratory system, coordination abilities, endurance, 7,92%	VCL, l	–	–	–	0.4199
	10 m, run, sec.	–	–	–	-0.4970
	30 m run, sec.	–	–	–	-0.5742
	Obstacle course, sec.	–	–	–	-0.5027
	90 m run, sec.	–	–	–	-0.4522
5–6 years old boys (n=130)					
Cardio-vascular system, aped-power abilities, endurance, 11,54%	HBF in rest b.p.m.$^{-1}$	-0.5358	–	–	–
	BP_s mm.p.merc.col.	-0.4587	–	–	–
	Long jump, sec.	0.6140	–	–	–
	90 m run, sec.	-0.5234	–	–	–
Quickness, coordination, , 8,13%	10 m, run, sec.	–	0.5486	–	–
	30 m run, sec.	–	0.5438	–	–
	Test №7, sec	–	0.4999	–	–
	Test №6, sec	–	0.4010	–	–
	Obstacle course, sec.	–	0.4155	–	–
Anthropometric parameters, 6,98%	Length of body, cm	–	–	0.7691	–
	Mass of body, kg	–	–	0.6728	–
	Chest circumference, cm	–	–	0.4850	–

Notes: level of confidence is $p < 0.05$.Calculation criterion $k > 0.4000$

Besides, we determined connection ($p<0.05$) of cardio-vascular system's functioning of 5-6 years girls with indicators of respiratory system: HBF, BP_s, BP_d, VCL (r=0.23; 0.29; 0.24), Shtange's test and BP_s (r=0.17), Genchy's test and BP_d (r=0.19).

The group of third factor included indicators of body length and body mass of 5-6 years old girls, which, by results of correlation dependence, have close connection ($p<0.01$; 0.05) with other somatic indicators: chest circumference (r=0.39; 0.40), results of long jump from the spot (r=0.20; 0.26) and test № 7 (r=0.20; 0.17).

The group of forth factor included main indicators of physical condition, which influence on development of cardio-respiratory system of 5-6 years old girls' organism by 7.92%. We determined interconnection ($p<0.05$) with 10 meters run's indicators and VCL (r=-0.23), Shtange's test (r=-0.17), BP_s (r=-0.17), test № 6 (r=0.22) and close interconnection ($p<0.01$) with 30 meters run (r=0.40) and passing obstacle course (r=0.40). #o meters run, which also characterizes 5-6 years old girls' quickness, is in close interconnection ($p<0.01$) with 10 meters run's indicators (r=0.40) and 90 meters run's indicators (r=0.49) and depends ($p<0.05$) on VCL indicators (r=-0.17) and time of obstacle course's passing (r=0.22). Coordination abilities of 5-6 years old girls were reflected in group of first factor by tests № 7 and № 6, and presented in group of the forth factor as time of obstacle course's passing. Results of obstacle course's passing of 5-6 years old girls are interconnected ($p<0.05$) with 30meters run (r=0.28), forward torso bending from sitting position (r=-0.26), with long jump (r=-0.18) and, besides. Are in close interconnection ($p<0.01$) with 10 meters run indicators (r=0.40) and 90 meters run indicators (r=0.33). Endurance of 5-6 years old girls was determined with the help of 90 meters run, indicators of which are in interconnection ($p<0.01$) with 10 meters run (r=0,49) with time of obstacle course's passing (r=0.33) and influence ($p<0,05$) on coordination abilities (r=-0.24; -0.17) and long jump from the spot (r=-0.19).

Regarding the obtained results of 5-6 years old boys, it should be noted that we determined three groups of factors, which have the highest degree of inter-influence (see table 1) The group of first factor, which was named "Cardio-vascular system, speed-power abilities and endurance" included indicators of cardio-vascular system's functioning and long jump from the spot. The first factor contributes to total dispersion of indicators at level of 2.539 that is 11.54%.

Correlation analysis of indicators, which were included in group of the first factor, witness about close interconnection ($p<0,01$) of HBF and Shtange's test (r=-0,21), BP_s and BP_d (r=0.39; 0.29) , 90 meters run (r=0.24), and long jumps (r=-0.38) and high jumps (r=-0,28) from the spot as well there is interconnection between BP_s and long jumps (r=-0.25 and high jumps (r=-0,20) from the spot. Speed-power indicators of 5-6 years old boys are presented by long jumps from the spot and are, like in case with girls, in significant inter-influence ($p<0.01$) with HBF results (r=-0.38), 90 meters run (r=-0.33), and with indicators ($p<0.05$) of body length (r=0.22), body mass (r=0.27), BP_s and BP_d (r=-0.25; -0.23), 10 meters run (r=0.20), forward torso bending (r=0.19). It should also be noted that boys' indicators of endurance are more significant than girls' ones. I.e. results of 90 meters run have interconnection ($p<0.05$) with indicators of body length (r=-0.19), HBF (r=0.24), 30 meters run (r=0.21), forward torso bending (r=-0.18), obstacle course's passing (r=0.23), long jump (r=-0.33) and high jump (r=-0.21) from the spot.

Coordination abilities of 5-6 years boys were included in group of the second factor, in contrast to girls. Second factor "Quickness and coordination abilities" is 8.13% form total factors' dispersion and included 10 and 30 meters run and tests, reflecting coordination abilities: test № 7, test № 6 and obstacle course. Correlation analysis also proves the presence of close interconnection ($p<0.01$) between 10 meter run indicators and 30 meters run indicators (r=0,53) and between obstacle course's passing (r=0.46); with 30 meters run б (r=0.45); between test № 7 and test № 6 (r=0.81). Besides, there is dependence ($p<0.05$) between indicators of respiratory system's functioning and 30 meters run (r=-0.26) as well as with obstacle course's passing (r=-0.21); 90 meters run and 30 meters run (r=0.21), obstacle course passing (r=0.23); obstacle course's passing with throwing of little ball (r=-0.25).

Correlation groups of interconnections of boys are less close than the same of girls that, in its turn, influenced on marking out of only three groups of factors, which influence on physical condition and physical functioning of 5-6 years old boys. Group of third factor included indicators of anthropometric parameters: length and mass of body, chest circumference, which are closely interconnected in the middle of third factor ($p<0.01$). Among all correlation matrixes the most prominent are those, which have close clusters of results in respect to direct correlation. Indicators of body length and mass are also interconnected ($p<0.05$) with 90 meters run results (r=-0.19), rising of torso in sitting position from lying one (r=0.23) and long jump from the spot (r=0.27).

Conclusions:

1. Results of fulfilled research witness about presence of inter-influence between indicators of motion functioning and physical condition of 5-6 years old children, which are, mainly, reflected, in average, with degree of interconnection.

2. Coordination, speed-power abilities, quickness and endurance influence the most significantly on general health indicators. Flexibility and strength influence selectively, not systemically.

3. Inter-influence of the researched parameters depends on sex: girls have more expressed inter-influence than boys.

The prospects of further researches can be realized by determination of interconnection of motion functioning and physical condition's components of junior pupils.

References:

1 Bal'sevich V. K. Teoretiko-metodologicheskoe obosnovanie koncepcii formirovaniia fizicheskoj kul'tury cheloveka v doshkol'nom vozraste [Theoretical and methodological basis of the concept of human development, physical culture in the preschool years]. *Zdorovyj obraz zhizni* [Healthy lifestyle], Tomsk, 1996, pp. 9–13.

2 Bal'sevich V. K., Lubysheva L. I. *Fizicheskaia kul'tura: vospitanie, obrazovanie, trenirovka* [Physical culture: education, education and training], 2005, vol.5, vol.50–53.

3 Boginich O. *Fizichne vikhovannia doshkil'nikiv zasobami gri* [Physical education means pregame], Kiev, School World, 2007, 120 p.

4 Vil'chkovs'kij E. S., Kurok O. I. *Teoriia i metodika fizichnogo vikhovannia ditej doshkil'nogo viku* [Theory and methodology of physical education preschool children], Sumy, University Book, 2004, 428 p.

5 Dolbisheva N. *Sportivnij visnik Pridniprov'ia* [Dnipro Sports Bulletin], 2010, vol.2, pp. 178–181.

6 Masliak I. P. *Slobozhans'kij naukovo-sportivnij visnik* [Slobozhansky scientific and sport bulletin], 2004, vol.7, pp. 14–16.

7 Novikov D. M. *Statisticheskie metody v pedagogicheskikh issledovaniiakh* [Statistical methods in educational research], Moscow, Press, 2004, 67 p.

8 Pangelova N. E., Palatnij A. L. *Gumanitarnij visnik Pereiaslav-Khmel'nic'kogo DPU* [Humanitarian Bulletin Pereyaslav-Khmelnitsky GPU], 2004, vol.1, pp. 150–154.

9 Pivovar A. *Moloda sportivna nauka Ukrayini* [Young sport science of Ukraine], 2006, vol.1, pp. 15–20.

10 Sagunova I. *Sportivnij visnik Pridniprov'ia* [Dnipro Sports Bulletin], 2010, vol.2, pp. 110–112.

11 Chopik M. *Moloda sportivna nauka Ukrayini* [Young sport science of Ukraine], 2003, vol.2, pp. 114–117.

12 Bornstein D.B., Beets M.W., Byun W., McIver K. Accelerometer-derived physical activity levels of preschoolers: A meta-analysis. *Journal of Science and Medicine in Sport*. 2011, vol.14(6), pp. 504–511. doi:10.1016/j.jsams.2011.05.007.

13 Hodges E.A., Smith C., Tidwell S., Berry D. Promoting Physical Activity in Preschoolers to Prevent Obesity: A Review of the Literature. *Journal of Pediatric Nursing*. 2013, vol.28(1), pp. 3–19. doi:10.1016/j.pedn.2012.01.002.

14 Iivonen S., Sääkslahti A., Nissinen K. The development of fundamental motor skills of four- to five-year-old preschool children and the effects of a preschool physical education curriculum. *Early Child Development and Care*. 2009, vol.181(3), pp. 335–343. doi:10.1080/03004430903387461.

15 Sun S.-H., Sun H.-L., Zhu Y.-C., Huang L., Hsieh Y.-L. Concurrent validity of Preschooler Gross Motor Quality Scale with Test of Gross Motor Development-2. *Research in Developmental Disabilities*. 2011, vol.32(3), pp. 1163–1168. doi:10.1016/j.ridd.2011.01.007.

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Cite this article as: Kulyk N. A., Maslyak I. P. Correlations between the components of physical readiness and physical development of the older preschoolers. *Pedagogics, psychology, medical-biological problems of physical training and sports,* 2013, vol.11, pp. 52-56. doi:10.6084/m9.figshare.815874

The electronic version of this article is the complete one and can be found online at: http://www.sportpedagogy.org.ua/html/arhive-e.html

Received: 23.08.2013
Published: 05.11.2013