

APPROACH TO EVALUATING HEALTH LEVEL AND ADAPTATION POSSIBILITIES IN SCHOOLCHILDREN

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Annotation. *Purpose:* substantiate the results of theoretical and practical investigations aimed at improving the health of students. *Material:* the study involved 187 children including 103 boys and 84 girls aged 7-10 years. *Results:* through a rapid assessment of physical health it was found that pupils of primary school age have an average level of the functional state of the organism, with a minimum resistance to risk factors (chronic non-infective diseases, etc.). For the first time, a technique for determining the level of adaptation and reserve capacity of school students proposed by Ukrainian hygienists was used in physical culture and sports practice. *Conclusions:* the technique reveals strain in adaptation mechanisms that corresponds to donozological condition. An idea is proposed that Nordic walking, through the positive impact on the body of aerobic mode of energy supply, is able to increase the reserve-adaptive capabilities of primary school students by improvement of their health as well as to solve the problems of health formation and health care in the physical education of youth.

Keywords: Nordic, walking, schoolchildren, adaptation, health.

Introduction

Generation that was born and is growing now in difficult technology related situation, increased by anthropogenic problems, shall have much more reserve of health for resisting to stressful challenges of society. Junior school age is the period of socialization's completion, when a child adapts to interaction with external factors and, on this base, starts to form internal beliefs. It is not occasional that physical culture specialists determine this age as "dynamic state, characterized by reserve of functions and systems and is the base of individual's fulfillment of his (her) biological and social functions. Integral indicator of reserves of organs' and systems' functions is energetic potential of bio-system (reserve of energy creation)" [6, Pg. 17]. The problem of formation of positive and, what is the most important, efficient attitude of junior schoolchild to valueological values of physical culture acquires special importance; here great attention shall be paid to formation of dominant, even biased belief that it is impossible to have good health without own efforts and personal motion functioning. In family and on first school (pre-school) lessons of physical culture it is necessary to educate children's wish to endure physical loads, cognitively supporting it by knowledge about usefulness of such motion functioning.

It is not occasional that foreign specialists call physical inactivity a leading risk factor in global prevalence of diseases [15]. To day not infectious diseases together with hypodynamia are the most serious problem in developed countries of the world, because their after effects undermine the strength of country. Owing to absence of sufficient motion activity of mature people they start suffering from chronic diseases, reducing efficiency of their labor and worsen quality of life. Competitiveness of a person also reduces and adding to this factor mass character of this problem, we receive economic stagnations. Some countries, UN and WHPO understood this fact very well and recent decades they have been investing recommendations and practical measures just in struggle with non infectious diseases.

At ninth European conference of Ministers of health protection, devoted to health protection in countries – members of EU a declaration was adopted, according to which investments in children's health and welfare ensure improvement of results during all life and can reduce the burden, endured now by health protection and social provisioning authorities. It was conditioned by the fact that a lot of physical and social-psychological problems could have been avoided, because their roots are in baby and infant age. [Information about ninth European conference of Ministers of health protection of EU, devoted to health protection problems//Modern pediatrics.– 2011. – № 5(39). – Pg. 13].

However, no positive results are possible without orientating of children on axio-sphere of physical culture [8]. G.L. Apanasenko considers physical loads to be the best mean for increasing of health's reserve potentials [2]. It means that health level, stress-resistance, ability to endure psychic problems depend on charge and quantity of mitochondrion, deposited in the process of physical trainings.

M.M. Bogen, basing on literature data and own practice formulates a hypothesis: "Mitochondrion component of energy generation, ensuring energy supply for life functioning and, consequently, for cells' work in alive organism, - is an essential mechanism of development of general endurance and a form of its manifestation – special endurance" [3, Pg. 71-72.].

Profound foreign researches [9] found that under condition of purposeful (pedagogic) physical loads (with active muscles' work, resulting in tiredness) mitochondrion in tissue of skeleton muscles are quickly and specifically change; owing to this fact mitochondrion volume can reach up to 50% during several weeks and even more in organisms of not trained earlier persons.

Aerobic loads "charge" cells in the best way, creating efficient reserve of health, while practicing of Scandinavian walking is the best way for solution of health related tasks.

The work has been fulfilled as per combined plan of scientific-research work of Ministry of Ukraine of family, youth and sports for 2011-2015, by topic 3.1. "Improvement of program-normative principles of physical education in educational establishments (state registration number 0111U001733).

Purpose, tasks of the work, material and methods

The purpose of the work – is to determine the level of health and adaptation-reserve abilities of junior schoolchildren and to ground uniqueness of Scandinavian walking in physical education and health strengthening of schoolchildren.

Methods and organization of the research. Theoretical methods: analysis and generalization of scientific literature on topic of the research. Empirical methods: anthropological measurements, express evaluation of somatic health by G.L. Apanasenko, evaluation of adaptation-reserve abilities of children’s organisms by S.V. Gozak, O.T. Yelizarova, pedagogic observation.

The research was carried out on base of school №225 in Kiyev with 187 schoolchildren’s participation (from them 103 boys and 84 girls).

Results of the research

Objective evaluation of somatic health for medical and physical culture sphere is rather a problematic task and it is conditioned by the fact that physical health’s indicators can include quite different characteristics, required for exact characteristic of health. These properties can be both external, which can be measured (anthropological, physical data), and internal – body’s sensing of own organism. We used two approaches, which, with combining of indices, can help to determine health level of junior schoolchildren (express evaluation by G.L. Apanasenko) and level of adaptation-reserve abilities of these children (S.V. Gozak, O.T. Yelizarova, 2012). It will permit to analyze in more detail reserve of systems and functions of children’s organisms, i.e. their health.

As per express-evaluation of somatic health of junior schoolchildren (see table 1-2) we determined middle level of boys from all forms and of girls from 2nd and 4th forms. The lower than middle level was registered among 9 years old girls (third form) and it was connected with decreased responsiveness of their cardio-vascular systems to physical loads. Evaluation of indices, according to which health level was determined, shows at extremely low functioning of different systems of children’s organisms.

Table 1

Level of physical health (according to indicators) of girls from 2 - 4 forms

Indicators	Form (age)								
	2 (8 years)			3 (9 years)			4 (10 years)		
	\bar{x}	S	points	\bar{x}	S	points	\bar{x}	S	points
Vital index	51.8	8.8	2	50.6	10.7	2	50.1	9.1	2
Power index, conv.un.	40.0	10.6	0	45.0	12.6	1	48.2	17.6	2
Robinson’s index	85.4	11.9	2	91.1	15.9	1	90.3	12.4	2
Weigh-height correlation (WH index)	Norm		0	Norm		0	Norm		0
Ruffiet’s index	5.8	3.2	2	10.8	16.3	-1	5.7	3.7	2
Total of points	6			3			8		
Evaluation of physical health	middle			Lower than middle			middle		

Total of boys’ points is higher than girls’, because their cardio vascular system is more responsive. In contrast to girls, whose best mark for physical workability (Ruffiet’s index) was two points (for 8 and 10 years old girls), the same best mark of all age boys (8-10 years old) was 5 points. Only this test with dozed physical load of boys witnesses about optimal responsiveness of cardio-vascular system, while the girls’ one was reduced. Then, in rest state, by Robinson’s index, both boys and girls showed moderate results of cardio-vascular system’s functioning (the best mark was 2 points for girls of 9-10 years old and for 8 year’ boys).

Points for respiratory system of all age girls (vital index) witness that its functional level was middle. As per vital index, middle level of boys’ functioning was showed only by 9 years old boys, the rest – eight and 10 years old pupils had functional level lower than middle.

Power index of boys of all three age groups was registered as lower than middle. Concerning girls, we registered dynamic of this index and qualitative changes from low level (8 years old girls) to middle (10 years old). Thus, the received by us middle level of functional state of most of junior schoolchildren can be regarded as critical one. It was connected with the fact that “safe level of health” starts from higher than middle level. Concerning 3rd form girls (nine years old), who had health level lower than middle, their functional state is on critical level, which is diseases

hazard. The obtained by us health level permits to affirm that all junior schoolchildren, especially girls of nine years old age, have bents to chronic not infectious diseases and endogenous factors. Energy efficiency of organism with such level of somatic health is sensitive for diseases, because resistance to risk factors is minimal.

Таблиця 2

Рівень фізичного здоров'я (згідно значення індексів) хлопчиків 2-4 класів

Indicators	Form (age)								
	2 (8 years)			3 (9 years)			4 (10 years)		
	\bar{x}	S	points	\bar{x}	S	points	\bar{x}	S	points
Vital index	50.1	8.7	1	50.6	9.1	2	48.0	8.2	1
Power index, conv.un.	45.6	9.4	1	47.3	11.4	1	50.2	19.4	1
Robinson's index	89.6	12.6	2	96.9	13.1	1	90.7	13.7	1
Weigh-height correlation (WH index)	Norm		0	norm		0	norm		0
Rufiet's index	5.2	3.0	5	5.5	3.7	5	5.4	3,3	5
Total of points	9			9			8		
Evaluation of physical health	middle			middle			middle		

B.Kh. Landa remarks that “4th-5th levels of health belong only to those persons, who regularly practice health related trainings (running as a rule). Safe level of somatic (physical) health, which guarantees absence of diseases, belongs only to persons with high level of functional state. Its reduction is followed by progressing of morbidity and reducing of organism's functional reserves up to dangerous level, bordering with pathology” [7, Pg. 96.]. G.L. Apanasenko calls phenomenon of “safe” health level a “scientific base of primary prophylaxis of chronic, non infectious diseases – preventive rehabilitation (turning individual back in “safe” zone of health). Level of safe of Ukrainian population decreased from 8% in 1985 to 1% in 2000. As a result mortality only from cardio-vascular pathologies increased by 21.2% during 1996 – 2000” [2, Pg. 91.].

Basing on obtained “critical” mark of somatic health level of junior schoolchildren, we determined adaptation abilities of these children in order to determine the reserves of their health, stages of adaptation to environmental conditions. For realization of this aim we used new methodic approach to integral evaluation of junior schoolchildren's adaptation-reserve abilities, which was developed on the base of physiological-hygienic researches by specialists of DU “Institute of hygiene and medical ecology, named after O.M. Marzeyev, NAMS of Ukraine” S.V. Gozak and O.T. Yelizarov, 2012 [4, Pg. 291]. In the base of evaluation of organism's adaptation-reserve abilities there are indices, which indirectly characterize aerobic abilities, regulating mechanisms and metabolism, i.e. those processes, which ensure adaptation process: Robinson's index, index of Rorer and Index of Kerdo. Application of this methodic permits to timely find groups of risk concerning possible disorders of adaptation processes, permits to work out individual and collective programs of improvement of pupils' health reserves and to correct factors of school environment, influencing on this indicator.

As per scale of evaluation of adaptation-reserve abilities of junior schoolchildren we determined some tension of adaptation mechanisms, which correspond to pre-nosological state (see table 3). Functional abilities of organism in state of rest are not reduced, nevertheless, we recommended examination with functional tests with loads, monitoring of adaptation-reserve abilities 2-3 times a year as well as working out of individual and collective program for preservation of health and increasing of its level. Thus, both approaches lead to one: junior schoolchildren are in group of risk, they are balancing on the edge of disease, their adaptation reserves are minimal that requires proper attention to them and their physical fitness.

Researches, fulfilled by S.V. Gozak and O.T. Yelizarova also prove the level of ARA (adaptation reserve abilities) depends on “conditions of organization of physical education at school -10,3 % (p≤0.05), level and distribution of academic load – 13.6 % (p≤0.05), quality of physical culture lesson– 15.8 % (p≤ 0.05)» [4, Pg. 291].

So, scientists again prove that potential of physical culture influences on health level of population, formation of adaptation reserves of human organism. In case with pupils physical culture lessons are especially important: their correct organization influences on formation of health related technology and creation of individual settings for healthy active future life. As far as the best influence on health strengthening and improvement of organism's adaptation-reserve abilities is rendered by aerobic means, we experimentally implemented Scandinavian walking's in physical education of junior schoolchildren.

Interest to this kind of motion functioning recent decade has significantly grown and it is proved by appropriate scientific publications, which elucidate energetic losses during walking with sticks, influence on different organism's

functions and systems, on operation of appropriate muscular groups [1,10-15]. From it we can make conclusion that there is a process of re-understanding and turning to the most effective means – natural locomotion. Modern young generation is more particular, concerning forms and means of physical education, it choose non standard approaches in building of trainings. Scandinavian walking practiced with junior schoolchildren is just such not ordinary mean that permits to involve pupils in motion activity and for teacher to solve health related tasks in educational process.

Table 3

Junior schoolchildren's adaptation-reserve abilities, evaluated by indices

Indicators	Form											
	2 form				3 form				4 form			
	boys (n=31)		girls (n=30)		boys (n=32)		girls (n=26)		boys (n=40)		girls (n=28)	
	result	points	result	points	result	points	result	points	result	points	result	points
Rorer's index	12.3	3	12.4	3	12.7	3	12.5	3	12.8	3	12.1	3
Robinson's index	89.6	1	85.4	1	96.9	1	91.1	1	90.7	1	90.3	1
Kerdo's index	21	1	20	3	20	3	24	1	23	1	21	1
∑ points	5		7		7		5		5		5	
Points	1.67		2.33		2.33		1.67		1.67		1.67	
Evaluative of ARA indicator	middle		middle		middle		middle		middle		middle	

Conclusions:

Thus, one of main tasks of teaching process in educational establishment is strengthening of pupils' health, education of children's culture of health, personality's qualities, which would facilitate health preservation and improvement, formation of healthy life style principles. However, recent years there have been noticed low effectiveness of health related orientation of educational process, which is characterized by increasing of number of children with reduced organism's resistivity, with too early tiredness and vegetative-vascular disorders, i.e. with reduced adaptation-reserve organism's abilities. As a result of our researches it was determined that junior schoolchildren show reduction of organism's functional abilities and regulating mechanisms; there were not found pupils with high level of health and ARA that requires special attention to pupils and correcting of quality and conditions of organization of physical education at school. For increasing of effectiveness of junior schoolchildren's physical education we offered program of trainings of Scandinavian walking as commonly accessible, highly effective, emotional system of targeted trainings, which permits to upgrade traditional methodic, programs, to increase schoolchildren's interest to regular motion functioning, which would facilitate solution of health related tasks of educational process.

The prospects of further researches will be oriented on implementation of recreational-health related program of Scandinavian walking in physical education process and evaluation of its effectiveness.

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Cite this article as: Andriieva O.V., Sainchuk O.M. Approach to evaluating health level and adaptation possibilities in schoolchildren. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2014, vol.2, pp. 3-8. doi:10.6084/m9.figshare.923507

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Received: 11.12.2013
Published: 28.12.2013