PECULIARITIES OF THE ASSESSMENT OF THE FUNCTIONAL RESERVE OF THE HEART IN CHILDREN OF ALL AGES

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Background: An analysis of the literature on the topic showed that three quarters of adolescents do not follow the recommendations for physical activity, and insufficient physical activity, according to the WHO, is one of the main risk factors for non-infectious diseases such as cardiovascular disease, cancer and diabetes [1, 2]. In Ukraine government provides medical and pedagogical control (MPC) of health according to the Order of the Ministry of Health of Ukraine from 20.07.2009 №518 / 674 "On ensuring medical and pedagogical control over physical education of students in secondary schools". MPC is conducted at the level of primary care. The purpose of MPC is to determine the level of health, functional capabilities of the body and the level of development of motor skills of the child, to identify functional disorders and early symptoms of the disease that occur during exercise [3, 4, 5].

The main component of the MPC is the estimation of the functional reserve of the heart (FRH) as the main indicator of the cardiovascular system in children of different ages and their division into groups of physical education in accordance with the FRH. Ruffier's functional test as a representative, inexpensive and simple method is a tool for determining the FRH in our country and many countries around the world. [6, 7, 8]

The aim of the study: to determine and assess the level of functional reserve of the heart of school children aged 7 to 17 years using the Ruffier test and compare the Fed's performance among children of different age groups depending on gender.

Materials and methods. The study involved 82 children aged 7 to 17 years, 43 persons were boys (52%) and 39 were girls (48%). All children underwent general clinical examinations, functional capabilities of the cardiovascular system were determined using the Ruffier test, with subsequent division into subgroups according to the level of the FRH [5].

Inclusion criteria: children aged 7 to 17, somatic well-being, no complaints.

Exclusion criteria: children with musculoskeletal disorders that interfere conducting of Ruffier test.

The actual study met the bioethics requirements of the Helsinki Declaration of Human Rights. All patients and their parents received informed consent to conduct the study and use the results and print them.

Statistical analysis of the study results was performed using parametric and nonparametric methods of statistics. For the calculation we used Microsoft Excel and statistical analysis package SPSS 22.0.

Results and discussion. The children were divided into groups according to the periods of childhood. Namely, the first group consisted of children from 7 to 10 years (Me = 9 (Q25% = 7; Q75% = 9) - primary school age (n = 26): boys - 42.3% (11 people), girls - 57.7% (15 people). The second group of middle school age included children from 11 to 14 years (Me = 13 (Q25% = 12; Q75% = 14)), (n = 41), boys - 51 % (21 people), 49% - girls (20 people), the third group included children aged 15 to 17 (Me = 16 (Q25% = 15; Q75% = 16)) - senior school age (n = 15), boys - 73.3% (11 people) girls - 26.7% (4 people).

Initially, the Ruffier test among all groups was analyzed, the average Ruffier test in children of group I (n = 26 children) was 8.9 (± 1.9); in group II (n = 41) - 8.9 (± 2); Group III (n = 15 people) - 8.8 (± 1.9). According to the average Ruffier samples, the groups did not differ statistically (p = 0.085).

According to the study, the FRH rates of children among all age groups ranged from above average to below average. According to the standardization of the Ruffier test results at the Fed level, children with above-average and average FRH scores are not at risk for children with possible health problems.

Further assessment was conducted among individuals who did not have FRH violations (control group) and the group that had below-average FRH (main group). The control group included 61% of people (n = 50), the main group had health risks of 39% (n = 32). For further analysis, comparisons of children were made by existing age groups.

The data show that in group I among 26 children of primary school age almost half (n = 12; 46.2%) had FRH below average. In group II of middle school children, 39% (16 of 41 children) had FRH below average. In group III, out of 15 high school children, 26.6% (4 children) had FRH below average.

After comparing the FRH in the roups among girls and boys, no significant difference was observed (Table 1).

Table 1.

Proportion of boys and girls with normal and low FRH rates among age comparison groups

№ group	Boys n (% of the number of boys in the group)		Girls n (% of number of girls in group)		p
	FRH above average and average	FRH below average	FRH above average and average	FRH below average	
I group	8(72,7%)	3 (27%)	6 (40%)	9 (60%)	p=0,102

II group	11(52,4%)	10(47,6%)	14(70%)	6(30%)	P=0,254
III group	8 (67%)	4 (27%)	3(75%)	1(25%)	P=0,932

Comparative analysis of the FRH in children who had a level below the mean depending on age using Pearson's criterion x^2, did not reveal a statistically significant difference ($p > 0.05$). That is, the number of children with FRH level below the average does not differ significantly depending on age among certain age groups.

Conclusions.

1. In the cohort of children aged 7 to 17, 42.6% of children among primary school children, 39% - among the middle school age group, 26.6% - senior school age have a below-average functional reserve of the heart.

2. It has been confirmed that the Ruffier test and the FRH assessment are a valid tool in the practice of family physicians to detect abnormalities in health.

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