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Use of physical education means in younger school-aged pupils after acute seasonal viral infections of the upper respiratory tract

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Abstract

The purpose of this scientific work is to define the dependency level of knowledge in the period of health promotion, the peculiarities of life style, pupils' state of health at the age of 7 – 9 after recovering from respiratory diseases against the background of seasonal viral infections of upper respiratory tracts. The parents' opinions, some indicators of the state of the circulatory system and the respiratory system and the medical documentation of 553 pupils from different Kyiv secondary schools (Obolon district) were analyzed and 538 pupils in cities of Szczecin (West Pomerania province) and Konin (Wielkopolska province). The dependence's assessment of

some indicators of the respiratory system and elements of children's life style at the age of 7 – 9, using the Spearman's rank correlation coefficient (the confidence level p <0,05000, n = 1091), showed that a strong direct dependence exists only between the using of hardening procedures and the size of the chest circumference. Researches show that there is the necessity of a new understanding of the situation and the development of effective approaches for increasing physical activity, maintaining and strengthening the somatic children's health recovered from respiratory diseases. Also, we need to solve the problem of training of professionals who will implement it.

Introduction. Respiratory diseases are the most important maladies of the modern world. It is connected with increasing number of numerous micro-organisms, allergens and toxic factors. Today, chronic obstructive pulmonary disease, cancer, tuberculosis and infections are ranked as the second leading cause of death, only yielding to cardiovascular diseases [1, 3]. According to the mentioned above, viral respiratory infection as one of the causes of acute respiratory diseases at the younger age of pupils is the fundamental problem of the prevalence of respiratory illnesses [4]. According to the statistics 2-4 times per year in the period of spring-winter respiratory viral infections occur in children at the age of 7-9 years [17]. And for that the adjustment of means and basic health – educational methods to the level of those children's health is the question number one for professionals in the field of physical education, and the promotion of health and pedagogy in general [9, 12, 14].

In Poland the subject of physical education is conducted for pupils at the age of 7 – 9 according to the regulation of the Minister of National Education on 23 December 2008 in the case of the basis curriculum of pre-school education or general education in the particular types of schools (the regulation was published in the Journal of Laws on 15 January 2009 No 4, item 17) (appendix No 2). There are 3 types of groups during lessons of physical education to which are classified children depending on their motor ability or state of health. Children are classified to the

group A if they are fit for physical education without any restrictions, going in for sports at school or outside school (subgroup As). To the group B are classified children with some restrictions and/or require special attention of the teacher. The subgroup Bk includes children who are fit for physical education and require additional physically corrective lessons. Unfitted for lessons of physical education pupils are classified to the group C, whose state of health makes impossible temporarily or long-term participation in physical education's lessons with pupils from the subgroup C1, who are unfit for physical education, and participating in rehabilitation lessons. Pupils with chronic respiratory tract infections are classified to the group B (restrictions of activity in poor atmospheric conditions, low temperature, a polluted gym, dust). Here, there also are pupils with sinusitis (prohibition of swimming, water sports, and hangings head – down). Pupils with the infection of upper and lower respiratory tracts are temporarily classified to the group C [10, 13, 15, 16].

In Ukraine, the physical education as a subject at secondary schools and higher educational institutions is conducted according to the standards of the Ministry of Education and Science, Youth and Sports of Ukraine in three groups of education: primary, preparatory, special medical. Unscheduled classes are conducted twice a week 45 minutes for pupils of the special medical group [5].

We should take into account the sensitivity of child's organism to the influence of the environment and high meteorolability of sick children, their low level of adaptation to the conditions of the residence. We have the necessity of addressed physical efforts' attitude, exactly, according to the functional ability of the organism using therapeutic exercises, in our case, traditional and non-traditional respiratory exercises.

Therefore this direction of research is current and hasn't been researched yet by the field of physical education till now, namely, the correction and the methodology's justification of using means of health corrective adjustment depending on lifestyle and children's state of health at the age of 7-9 years after recovering from respiratory diseases and using them with the prophylactic purpose.

The ***purpose of this scientific work*** is to define the dependency state of knowledge in the period of health promotion, the peculiarities of life style, pupils' state of health at the age of 7-9 after recovering from respiratory diseases. On the basis of received results, we have to work out the practical recommendations about the content's correction of didactic classes of physical education for these children in Poland and Ukraine.

Methodology of the research.

The parents' opinions, the morphofunctional state and the medical documentation of 553 pupils from different Kyiv secondary schools (Obolon district) were analyzed and 538 pupils in cities of Szczecin (West Pomerania province) and Konin (Wielkopolska province). The parents of all children gave their written consent to the carrying out of researches and access to the medical records of their children.

To achieve the purpose of this scientific work it was worked out the complex of diagnostics to test the individual state of health and students' physical condition at the age of 7-9 (evaluation of the possible succession of illnesses recovered from upper respiratory tract diseases against the background of seasonal viral infections). The complex was consisted of the survey which includes parents' answers to 38 questions about their child's schedule for the day, their physical activity level. Besides, there were performed 7 basic measurements (body weight, height, time of breath-holding during exhalation and inhalation, chest circumference during exhalation and inhalation, heart rate, arterial systolic and diastolic pressure, and on their basis there were calculated 3 parameters which characterize the functional state of respiratory system.

Appropriate lung vital capacity was calculated according to the formula:

For girls - [height * 0,041 – age * 0,018]-3,7

For boys - [height * 0,052 – age * 0.022]-4,6

Body mass index BMI (kg/m^2) was calculated according to the formula:

BMI = Body weight, $kg/height^2$, m^2.

For statistical processing of received results it was used the mean-value method, as well as Spearman's rank correlation coefficient (according to L. Poliakov, 1971

[11]). It is a non-parametric measure of statistical dependence between two variables. In this case, the actual degree of parallelism is defined between two quantitative rows of studied characteristics and is assessed the tightness of the formed connection with the help of quantitatively expressed coefficient.

When using Spearman's rank correlation coefficient one estimates the tightness relationships between characteristics conditionally, considering the coefficient values equal 0,3 or less, figures of lax tightness of relationships; the value more than 0,4, but less than 0,7 are values of moderate tightness of relationships, and the value 0,7 or more are indicators of high tightness of relationships.

The results of our own research.

Analysis of the studied parameters showed that passport data and the anthropometric indicators of examined children from Poland and Ukraine practically did not differ significantly (table. 1.). But some differences were observed in assessing the level of indicators such as: time of breath-holding during inhalation, and heart rate at rest, that children from Poland had the tendency more closer to normal values than their peers from Ukraine (see Table. 1).

Table 1. Passport data and functional state of the cardiovascular and respiratory systems of examined children.

Researched indicators	Poland	Ukraine	All examined
The number of examined children	553	538	1091
Sex, male/female, %	62,41/37,4	58,0/52,0	62,4/37,4
Age, years	7,985±1,148	8,054±0,926	8,325±1,124
Height, cm	133,9583± ±10,63848	134,9394± ±9,669344	134,2093± ±10,37099
Body weight, kg	32,1340± ±7,79874	33,3438± ±7,69981	32,4341± ±7,68988
BMI kg/m^2	17,9007±1,2014	18,31024±1,2411	18,01987±1,3514
Lung vital capacity, l	1,524±0,2451	1,4896±0,2785	1,4824±0,2425
Breath-holding (inhalation), sec	28,00000± ±14,65122	23,32743± ± 14,52365	25,51515± ±7,84666
Breath-holding (exhalation), sec	20,93805± ±11,65829	12,00000± ±4,63006	19,05000± ±12,46555
Chest circumference during inhalation, cm	67,8024±3,6147	68,8714±3,8002	67,3654± 4,2904
Chest circumference during exhalation, cm	57,0247±2,7014	59,6012±3,3741	58,6658±2,6521
Heart rate, bpm	76,02500± ±12,11232	92,21212± ±14,80447	80,75221± ± 14,8579
Systolic blood pressure, mmHg	105,45±10,45	98,12±9,57	99,97±11,01
Diastolic blood pressure, mmHg	65,74±6,57	60,47±1,24	63,45±5,71

The analysis of children's sleep regime showed that only 32,75% of Ukrainian children and 36,02% of Polish children have sufficient duration of night sleep for their age according to sanitary standards (10 hours). Other children (from the words

of their parents) sleep less than 8 hours (35,67% - in Poland; 29,26% - in Ukraine) and 9 hours (20,02% - in Poland; 23,64% - in Ukraine). While 70,26% of Polish children's parents and 72,51% of Ukrainian children's parents consider that their children's sleep duration is sufficient.

Rate of children who do morning hygienic gymnastics is tragic (MHG) (8,32% - in Poland; 8,15% - in Ukraine). As the primary reason that children do not do MHG, their parents indicate a lack of self-discipline (39,85% - in Poland; 33,09% - in Ukraine).

The main hardening procedures for children according to their parents are: swimming in the pool (20,42% - in Poland; 16,24% - in Ukraine), swimming in the river or in the lake during warm period of the year (9,84% - in Poland; 10,89% - in Ukraine) and lying on the beach in summer, nearly every day (8,99% - in Poland; 11,25% - in Ukraine). On average, 25% of the Polish and Ukrainian children spend outdoors from 1 to 4 hours every day.

Didactic classes occupy most of the time of modern young pupils. On average, there are 4-5-6 lessons per day, except Friday, where approximately 75% of parents declared 4-5 lessons classes. In addition, 23,54% of Ukrainian children's parents and 20,34% of Polish children's parents indicated their participation in extracurricular activities on Saturdays.

Domestic work also takes on average 1-2 hours a day for Ukrainian children (47,68% and 36,79%, respectively) and for Polish peers (32,58% and 52,36%, respectively).

Traditional preparation of homework on the exact sciences occupies the greatest amount of time in both examined groups (48,97% - in Poland; 40,98 – in Ukraine). 82,70% of all interviewed parents consider the level of mental workload for their children is moderate, and only 3,63% of Polish children's parents and 5,32% of Ukrainian children's parents say it is excessive.

Unfortunately, physical activity in the form of sports is only 17,05% of free time from the total number of respondents. As noted previously, 25,13% of Polish children and 24,58% of Ukrainian children spend their free time walking in the fresh air, communicating with peers. However, a significant part of the free time of examined children is watching television (23,44% - in Poland; 19,56% - in Ukraine) and computer games (8,65% - in Poland; 6,08% - in Ukraine). Also this activity occupies most of children's time at weekends. If watching television at weekends takes 13,48% of free time of examined children on average (14,97% - in Poland; 12,59% - in Ukraine), then only 6,37% of all questioned parents declare sporting activity as the main way of spending free time at the weekends. At the same time, parents of examined children (90,97%) consider that the level of physical activity of their children is basically normal for their age. Limiting the level of motor activity of examined children takes place only on doctor's advice - 69,70%. In Poland, the parents themselves restrict their children's motor activity only in 12,12% of cases, on the recommendation of physical education teacher - in 12,12% of cases. In most cases, it was difficult for parents of Ukrainian children to answer to what extent and when they limit the motor activity of their children after recovering from diseases of the respiratory system.

The most popular sports among the examined children were swimming (28,7% - in Poland; 14,98% - in Ukraine), football (22,22% - in Poland; 20,98% - in Ukraine), athletics (14,97% - in Poland; 20,99% - in Ukraine), martial arts (11,7% - in Poland; 13,69% - in Ukraine).

During physical exercises, 65,41% of children did not feel any discomfort. On average, physical activity of 4,51% of children causes shortness of breath (3,98% -in Poland; 4,87% - in Ukraine), and of 4,59% - cough (4,54% - in Poland; 3,99% - in Ukraine). Other violations related directly to the functioning of the respiratory system's organs in conditions of physical activity were not reported.

The average duration of the disease has ranged from 4 to 7 days. 28,56% of children have been sick for 6-7 days (28,04% - in Poland, 29,33% - in Ukraine). On average, 19,54% of children have been sick for 5 days (19,99% - in Poland, 18,70% -

in Ukraine). 10,52% of children have been sick for 4 days (11,69% - in Poland, 9,95% - in Ukraine).

There is a beneficial effect of using special physical exercises after recovering from respiratory diseases. Also, parents of ill children do not know enough about them both in Poland and in Ukraine. Thus, 54,89% of all respondents do not know about the positive effects of using of respiratory exercises after recovering from respiratory diseases among children (53,66% - in Poland, 55,02% - in Ukraine). Only one third of respondents indicated that their children are able to perform basic breathing exercises (32,00% - in Poland, 33,30% - in Ukraine).

81,21% of respondents would like their children are able to perform breathing exercises. However, most parents would like them to be the dynamic respiratory exercises (31,47% - in Poland, 30,03% - in Ukraine), sound gymnastics and elements of singing (24,89% - in Poland, 29,27% - in Ukraine), static respiratory exercises (19,09% - in Poland, 21,99% - in Ukraine) and elements of Yoga (15,69% - in Poland, 17,98% - in Ukraine).

The dependence‘s assessment of some indicators of the respiratory system and elements of children’s life style at the age of 7 – 9, using the Spearman’s rank correlation coefficient (the confidence level $p < 0,05000$, $n = 1091$), showed that a strong direct dependence exists only between the using of hardening procedures and the size of the chest circumference during inhalation (Table 4). Discomfort during physical exercises and the frequency of respiratory diseases – on the one hand, and holding the breathing during exhalation – on the other hand, were back moderately closely related (see table 4). When a child has the ability to perform basic breathing exercises it is positively moderately closely related to the length of holding the breathing during inhalation and the chest circumference during inhalation (see Table. 2).

Table 2. The dependence‘s assessment of some indicators of the respiratory system and elements of children’s life style at the age of 7 – 9, using the Spearman’s rank correlation coefficient when the confidence level is p <0,05000, n = 1091.

	The application of hardening procedures	The frequency of respiratory diseases	The children’s ability to perform breathing exercises	Discomfort during physical exercises
Breath-holding during exhalation, sec	-	- 0,493162	0,303063	- 0,610480
The chest circumference during inhalation, cm	0,758235		0,500870	-

Discussion of the study’s results.

The main value of society is a human life and health. Without health no one can be happy. Health can only be formed, obtained by means of focused hard work on oneself and acquiring knowledge. It is the knowledge of the principles of a healthy lifestyle that is the order of vital activity which would maintain and even multiply health, but not destroy it. Children are the future of every country, the prospects for its economic, social and spiritual development. School is a children's living space, where they spend about 70% of their time, so that the school must provide knowledge and skills to organize life, to diagnose, to protect and improve the children’s health. We should take into account socio-economic, ecological, climatic and other regional and individual characteristics, in which a child is brought up [15].

As our researches showed that an inadequate rest, reducing motor activity, reducing daily physical activity have a close relationship with children’s diseases of the respiratory system. According to the Ministry of Health of Ukraine, currently, 90% of pupils have deviations in the health and more than 50% - poor physical preparation. Over the past five years, the disease incidence of children at the age 7-14 increased by nearly 35%. There is a reduction of the number of healthy

schoolchildren from 33% (the first grade) to 6 – 9% (among seniors). The total child disability is increasing. [5].

In the structure of general children's morbidity in the world, respiratory diseases take the second place – 22,7%. The analysis of children's state of health in Ukraine and European community confirms that search for methods of education, forms of its organization to maintain and strengthen the health of the young generation of the state are particularly important. Successful achievement of this goal is only possible in a methodical, complex and coordinated work of parents, teachers, doctors, lawyers and sociologists. There are various definitions of health and approaches to its preservation and strengthening in the ethno pedagogy.

When we accept conditionally the level of health for 100%, 20% depends on hereditary factors, 20% - on socio-economic and ecological conditions, 10% - on the activity of the National Health Service, 50% depends on the person, on its lifestyle [6, 7, 8].

Lifestyle is a biosocial category that characterizes human activity, his work, life, the form of satisfaction the material and spiritual needs, rules of individual and social behavior. That is to say, the lifestyle is the "face" of the individual that reflects the level of social progress. [5]

According to modern concepts, the term "healthy lifestyle" includes the following: optimal motor regime; rational nutrition; hardening; personal hygiene; positive emotions; rejection of bad habits (smoking, alcohol and drugs). An adult's health is formed in childhood and largely depends on a healthy lifestyle. As our studies showed that the level of motor activity of most children in Ukraine and Poland did not meet the necessary parameters to ensure proper physical health. The situation is exacerbated by the increasing popularization in childhood and youth of attractive activities not related to physical activity (slot machines, computer games, etc.).

The correlation of 28 hours of lessons from general subjects to 2 hours of physical education a week in schools indicates the failure of physiological regulation of mental and physical activity during the growth and development of children's

organism. Lack of physical activity of the young organism at the age of 7-17 is 60-75% of needed for preservation the health and development of physical conditions [5, 16].

The analysis of the received data showed a significant number of children with deviations in health. Unfortunately, only 2,8% to 11,9% of children can be attributed to the group of healthy children, 53-64% was with chronic pathology. Moreover, pathological processes grew from grade to grade. It should be noted that over 40% of children come to school with established chronic diseases already [5, 14, 16].

Based on all foregoing, according to the purpose of correction children's state of health after recovering from respiratory disease, we need to develop the adequate program of physical education. During regulation of physical loads we should take into account not only such components as: the duration of performing exercises, intensity, duration of rest's intervals between exercises, the character of rest, number of exercises' repetitions, but elements of medical physical culture (kinesiotherapy) would be included actively. The greatest attention should be paid to such types of motor activity that have the greatest therapeutic effect and also have the greatest popularity among parents and their children, that is to say, static and dynamic breathing exercises, sound gymnastics, and elements of yoga.

The scales of the problem determine the necessity of a new understanding of the situation and the development of effective approaches for increasing physical activity, maintaining and strengthening the somatic children's health. But the effectiveness of used measures has to depend not only on the nature of muscular activity, but also on the level of adaptive mechanisms' development and functional reserves of the major body systems.

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