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Original Article

Monitoring the physical condition of 13-year-old schoolchildren during the process of physical education

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Abstract:
The article presents the results of monitoring of the physical condition of schoolchildren. In this study, 281 subjects who consisted of 13-year-old boys (n=145) and girls (n=136) were enrolled. For health reasons they are referred to the main and preparatory medical group. According to the stated purpose, in the process of physical education, we studied 30 indicators characterizing physical development, the functional state of the cardiovascular and respiratory system, the level of physical health, the level of physical performance, the level of basic motor qualities development and the level of morbidity by the main classes of diseases. The results obtained during the monitoring of the physical condition of schoolchildren testified that the average statistical parameters of body weight and chest circumference in girls are significantly lower ($p<0.05$) than the anthropometric standards. In boys, the average statistical values of body length, body weight and chest circumference are also significantly lower ($p<0.001$) than the anthropometric standards. Analysis of the functional state of the cardiovascular system in 13-year-old schoolchildren displayed that individual results of the heart rate at rest corresponded to the age norms in 30.9 % (n=42) of girls, while there were only 19.3 % (n=28) of boys whose results corresponded to the age standards. The statistically average result of the level of physical health in girls and boys corresponds to the average level. According to the results of the Ruffier index, the largest percentage of the girls under study 51.5 % (n=70) had an average reaction level for dynamic load, the overwhelming majority of boys - 66.2 % (n = 96) - had a satisfactory level. Disorders of the musculoskeletal system predominated among the diseases, and in the most of the girls and boys are related.
Key words: monitoring, physical condition, schoolchildren.

Introduction

The modernization processes of education in Ukraine, which directly affect all educational institutions, have a significant negative impact on the health of pupils and student youth (Yarmak, 2017; Galan, 2017; Hakman, 2017; Andrieieva, 2017).

Analysis of recent publications highlighted that over the past 10 years, the pace of decline in the level of children's health accelerated in Ukraine (Lazareva, 2017), including adolescents (Bodnar, 2015; Galan, 2017; Tomenko, 2017; Nakonechnyi, 2017). According to the data of the Ministry of Health, almost 90 % of children of middle school age have various deviations in the state of health, more than 59 % have unsatisfactory physical fitness. Over the past 5 years, the number of young students belonging to a special medical group has increased by 41 % (Mlynko, 2014; Blagiy, 2015). According to data of Peresypkina T.V. (2012), 89.1 % of schoolchildren have a low and lower than the average level of physical health. This fact points to the need for pedagogical monitoring with a view to continuous observation, evaluation and analysis of the results obtained. Monitoring is interpreted by many authors (Izaak, 2003; Yarmak, 2009) as a component of pedagogical activity with its own purpose, objectives, principles and structure. The obtained monitoring results of are aimed at correcting the content component of the educational process in secondary schools. According to many researchers (Yarmak, 2009; Kashuba, 2010), monitoring of the physical condition of schoolchildren is an important aspect of the pedagogical management system, as it is a method of observation, evaluating, correcting and forecasting of the educational process.

In the context of our research, it is relevant to monitor the physical condition of schoolchildren aged 13 years in the process of physical education. We determined the following components of the structure of monitoring of the physical condition of schoolchildren: indicators of physical development, the functional state of the cardiovascular, respiratory and central nervous systems, the level of physical performance, physical fitness and morbidity.

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Materials and Methods

Analysis and generalization of special scientific and methodological literature and documentary materials, pedagogical research methods, anthropometric and physiological methods, methods of mathematical statistics.

For the purpose of determining the indicators of the physical development of the schoolchildren of middle school age, the anthropometric measurements which reflect the level of morphological features, were performed: body length (BL) and body weight (BW), chest girth (ChG), the sum of five skin-fat folds, hand grip dynamometry. The physiological methods of the study were used to assess the state of the cardiovascular system: heart rate at rest (HR_{rest}), systolic blood pressure (SBP) and diastolic blood pressure (DBP), and to assess the state the respiratory system of schoolchildren (vital capacity of lungs (VC), Shtange and Genchi breathing tests). Psychophysiological research methods were used to determine the speed of a complex visual-motor reaction (SCVMR)**,** the information processing speed (IPS), the level of attention and memory, mental performance and static coordination. The evaluation of the physical health of the children's contingent was carried out by using the system developed by H.L. Apanasenko and supplemented by T. Yu. Krutsevych. This system consists in the calculation of the homeostatic integral indices: the Ruffier-Dicson index; the Robinson index; life index (LI); force index (FI); speed index (SI); speed-force index (SFI), endurance index (EI). The incidence of schoolchildren was determined by the method of extracting from medical records with an assessment of the disease class (according to the International Statistical Classification of Diseases and Related Health Problems, WHO), the frequency and severity of the diseases.

The obtained results were investigated using the methods of mathematical statistics. The research work was carried out on the basis of the Chernivtsi Specialized School of the I-III stages of the physical and mathematical profile No. 6, Chernivtsi Specialized School of the I-II stages No. 22, Chernivtsi secondary school of the I-III stages No. 27 and the Secondary School of the I-III stages No. 23 of Vasyl Stefanyk Precarpathian National University of the city of Ivano-Frankivsk. The students of the 7th and 8th grades took part in the summative experiment. The study covered 281 schoolchildren of which (n=145) boys and (n=136) girls of 13 years old.

Results

The study involved schoolchildren of the middle school age, students of the 7^{th} grade, which for the health reasons are referred to the main and preparatory medical groups.

According to the purpose of the scientific work, we conducted study of the components of the physical condition of schoolchildren of 13 years old, including: physical development, functional state, physical performance, development of basic motor qualities, and morbidity.

Physical development is interpreted as one of the components of the physical state. Minor deviations from the norm in physical development testify to the relative unaffordability of the state of health, but the genetic factor that can influence the length and weight of the body should be taken into account.

Considering the fact that in the organization of the educational process in educational institutions, pedagogical influence is carried out according to the grades, and not according to the age groups, the further analysis of indicators of the physical state of schoolchildren was carried out taking into account the distribution of students by grades.

From characteristics of the morphological status BL and BW, ChG, dynamometry of the right and left hand, thickness and the sum of five skin-fat folds were determined. The results are shown in Table 1.

Table 1. Average statistical indicators of the physical development of girls and boys of the 7th grade (n= 281)

Indicators under study	$\bar{x}$	S	Me	25 %	75 %	V, %
Girls (n=136)						
BL, cm	159.2	4.51	159.0	155.5	164.0	2.8
BW, kg	43.1	4.38	43.0	38.5	47.5	10.2
Chest girth, cm	69.8	2.96	69.0	67.0	70.5	4.2
Sum of five skin-fat folds, cm	1.9	0.65	1.8	1.3	2.4	34.2
Dynamometry right, kg	18.4	3.21	18.0	15.0	21.0	17.4
Dynamometry left, kg	17.1	3.25	17.0	14.0	20.0	19.0
Boys (n= 145)						
BL, cm	162.1	3.98	162.0	158.0	166.5	2.5
BW, kg	45.1	5.33	44.5	41.0	49.5	11.8
Chest girth, cm	72.9	6.21	72.0	69.5	78.5	8.5
Sum of five skin-fat folds, cm	2.4	0.63	2.2	1.8	3.2	26.3
Dynamometry right, kg	21.9	3.18	22.0	19.5	25.5	14.5
Dynamometry left, kg	19.5	3.21	19.0	17.5	21.5	16.5

The data of the anthropometric standards table developed by a group of authors during the study of the contingent of Ukrainian schoolchildren (Arefiev, 2009), served as standards for the analysis of the anthropometric data of schoolchildren of the 7th grade.

The mean group BW values of the boys of the 7th grade of our sample did not have any significant differences from the given standards of physical development of children and adolescents. We found out that the average statistical parameters of BL and ChG in children of the 7th grade were significantly lower ($p<0.05$) from the anthropometric standards, and it was found that in the girls of the 7th grade indicators of BW and ChG were also significantly lower ($p <0.05$) than the anthropometric standards.

The minimum and maximum values of BL in the girls of the 7th grade were 152 cm and 169 cm; in the boys of the 7th grade these values were within 150 cm and 171 cm, respectively. The data obtained during the anthropometric study indicate that the BL of the boys of the 7th grade is significantly higher ($p <0.05$) than BL of the girls of the 7 th grade. The range of the minimum and maximum BW values in the girls of the 7 th grade was 36.0 kg and 55.0 kg, in boys - 36.0 kg and 56.0 kg, respectively; while analysing this indicator, the significant difference ($p>0.05$) between girls and boys of the 7th grade was not found. According to the data of Table 1, it can be stated that ChG in boys is significantly higher ($p<0.05$) than ChG in girls; the minimum and maximum values of this indicator are as follows: in girls - 59.0 cm and 81.0 cm, in boys - 68.0 cm and 91.0 cm respectively.

The functional state of the cardiovascular system of adolescents is one of the most significant characteristics of physical health. It plays an important role in the adaptation of the body to physical loads and is one of the main indicators of the functional capabilities of the body.

As a result of assessing the functional state of the cardiovascular system of the students of the 7th grade (Table 2), it was found that the mean group values of heart rate at rest in girls and boys of the 7th grade is significantly higher ($p<0.05$). It is worth noting that the heart rate can vary under different circumstances, including emotional ones.

Table 2. The indicators of the cardiovascular and respiratory systems of students of the 7th grade (n= 281)

Indicators under study	$\bar{x}$	S	Me	25 %	75 %	V, %
Girls (n=136)						
HR_{rest}, beats /min-1	89.9	9.21	90.0	80.5	99.5	10.2
SBP, mmHg	104.2	5.41	105.0	100.5	109.0	5.2
DBP, mmHg	68.3	8.24	66.0	62.5	69.5	12.1
VC, l	2.1	0.54	2.0	1.8	2.0	25.7
Shtange test, sec	43.1	8.25	43.0	35.0	48.0	19.1
Genchi test, sec	22.1	1.28	22.0	17.0	23.0	5.8
Boys (n=145)						
HR_{rest}, beats /min-1	90.1	7.31	89.0	85.0	101.0	8.1
SBP, mmHg	106.9	7.09	105.0	101.0	117.0	6.6
DBP, mmHg	72.0	11.00	69.5	62.0	81.0	15.3
VC,. l	2.2	0.28	2.1	1.9	2.4	12.7
Shtange test, sec	44.8	8.32	45.0	38.0	47.0	18.6
Genchi test, sec	26.2	1.33	26.0	24.0	28.0	5.1

As the result of our research, it was found that among the girls of the 7th grade, only 30.9 % (n=42) had an individual indicator of heart rate at rest, which corresponded to the age norm (74 beats per minute - 80 beats per minute), and among the boys of the 7th grade, only 19.3 % (n = 28) had individual results corresponding to the age standards (72 beats per minute - 83 beats per minute). The minimum and maximum values of the heart rate at rest in girls and boys of the 7th grade were in the following ranges: in girls – from 74 beats· min-1 to 120 beats min-1, in boys - from 75 beats min-1 to 109 beats min -1.

In the course of our study, we found out that the mean group values of the indicator of the DBP in schoolchildren of the 7th grade, exceed the upper limit of the established norms of 64 mm Hg, testifying about an increase of DBP in schoolchildren over the last couple of decades. The range of minimum and maximum values of SBP in girls and boys from the 7th grade was 97mm Hg and 120 mmHg. We found that in the girls of the 7th grade the indicator of SBP was significantly lower ($p<0.05$) than in the boys of the 7th grade. The range of minimum and maximum values of SBP in the girls of the 7th grade was within the following limits: 59 mm Hg and 91 mm Hg, in boys, respectively, 59 mm Hg and 95 mm Hg.

The average statistical values of VC in the schoolchildren of the 7th grade correspond to the age standards. In girls of the 7th grade, the minimum and maximum values of VC are 1.2 litres and 2.9 litres, in boys - 1.2 litres and 3.9 litres, respectively. In the process of analysing the results of breath holding tests, in the schoolchildren of the 7th grade, there are no significant differences from the age standards. In girls of the 7th grade, the minimum and maximum results of the Shtange test were in the following ranges: 25.0 seconds and 1

minute 01 s, in boys - 27.0 s and 1 min 04 s, respectively. The analysis of the Genchi test results in the schoolchildren of the 7 th form revealed that in boys the indicator is significantly higher ($p < 0.01$) than in girls, the minimum and maximum values were in the following ranges: 15.0 seconds and 29.0 seconds - in girls, and 20.0 s and 29.0 s – in boys.

The analysis of the average statistical results characterizing the somatic health of schoolchildren of the 7 th grade are presented in Table 3.

The results of the reaction of the cardiovascular system to the dynamic load (the Ruffier index) allowed assessing the level of physical performance of the students being studied. According to the results of the Ruffier index of the girls of the 7th grade, 51.5 % (n=70) had an average reaction level for the dynamic load, 42.6 % (n=58) had a satisfactory level and 5.9 % (n=8) had an unsatisfactory level of reaction. In boys of the 7th grade, 25.5 % (n=37) had an average level of response to dynamic load, 66.2 % (n=96) had satisfactory level and 8.3 % had an unsatisfactory level of response. As it can be seen from Table 3, in girls the average result of the Ruffier index is significantly lower ($p < 0.01$) than in boys of the 7th grade. The range of the minimum and maximum values is as follows: in girls - 7.5 nominal units and 15,5 nominal units, and in boys - 9.0 nominal units and 16,0 nominal units. We can conclude that the average level of physical working capacity dominate in the girls of the 7th grade, and a satisfactory level dominates in the boys of the 7th grade.

Table 3. The indicators of the somatic health of schoolchildren of the 7th grade (n=281)

Indicators under study	$\bar{x}$	S	Me	25 %	75 %	V %
Girls (n=136)						
Ruffier index, nominal units	9.8	1.22	9.5	9.2	10.5	12.4
Robinson index, nominal units	95.2	10.18	94.0	85.1	100.5	10.7
LI, ml·kg^{-1}	43.2	9.23	43.0	32.0	51.5	21.4
FI, %	48.1	9.35	48.0	43.0	54.0	19.4
SI, nominal units	3.8	0.29	3.6	3.5	3.9	7.6
EI, m·sec^{-1}	1.3	0.19	1.3	1.1	1.4	14.6
SFI, nominal units	0.82	0.21	0.81	0.71	1.00	25.6
Boys (n=145)						
Ruffier index, nominal units	10.2	1.75	10.1	9.1	11.5	17.2
Robinson index, nominal units	98.3	10.26	98.0	87.0	117.0	10.4
LI, ml·kg^{-1}	47.2	10.84	48.0	34.5	53.0	23.0
FI, %	52.1	8.66	52.0	43.0	58.0	16.6
SI, nominal units	3.6	0.43	3.4	3.3	3.7	11.9
EI, m·sec^{-1}	1.5	0.18	1.5	1.3	1.6	12.0
SFI, nominal units	1.01	0.08	1.00	0.91	1.02	7.9

The analysis of the average statistical results of girls of the 7th grade demonstrates that the body's aerobic capacity is below the average. In the boys of the 7th grade, the average statistical result of the Robinson index corresponded to the low level of aerobic capacity of the organism. The range of data from the minimum to the maximum values was as follows: in the girls from 76.2 nominal units to 131.0 nominal units; in the boys from 77.4 nominal units to 126.0 nominal units, respectively. The analysis of the average statistical results of LI showed that in the girls of the 7th grade these indicators correspond to a level below the average, and in boys of the 7th grade they correspond to a low level; the range of values from the minimum to the maximum values was as follows: in girls - from 24.0 ml kg^{-1} to 67.5 ml kg^{-1}; in boys - from 30.0 ml kg^{-1} to 89.0 ml kg^{-1}, respectively.

The analysis of the average statistical results of FI of girls and boys of the 7th grade corresponds to the average level; the range of values from the minimum to the maximum values was as follows: in the girls from 28.0 % to 72.0 %; in boys from 36.0 % to 75.0 %, respectively. The analysis of the average statistical results of the speed index of the girls of the 7th grade showed that they correspond to the level above the average, and in the boys - to the average level; the range of values from the minimum to the maximum values was as follows: in the girls - from 3.2 nominal units up to 4.4 nominal units; in the boys - from 3.1 nominal units up to 6.8 nominal units respectively. The analysis of the average statistical results of the endurance index of girls and boys of the 7th grade revealed that this indicator corresponds to a high level; the range of values from the minimum to the maximum values was as follows: in the girls - from 0.9 nominal units up to 1.7 nominal units; in the boys - from 1.0 nominal units up to 2.1 nominal units, respectively.

Assessment of the level of physical health of schoolchildren by the method of H.L. Apanasenko and T. Yu. Krutsevych, made it possible to establish that in the 7th grade students the average statistical result corresponds to the average level of physical health. The distribution of the girls of the 7th grade according to the levels of physical health was as follows: a low level was observed in 9.6 % (n=13); 32.4 % (n=44) of girls had a level below the average; 47.8 % (n=65) had the average level; the level above the average was observed only in 10.2 % (n=14) of the girls; girls who had a high level of physical health were not found. In the boys of the 7th

grade, the distribution according to the physical health levels was as follows: a low level is observed in 8.3 % (n=12) of boys; below average - in 30.3 % (n=44); 40.0 % (n=58) of boys had the average level; the level above the average was observed in 15.9 % (n=23) of the boys; 5.5 % (n=8) of the boys had a high level of physical health.

The next stage of our study was the determination of the mental status of schoolchildren of the 7th grade. The average statistical results obtained in the study of the mental status of the schoolchildren of the 7th grade are presented in Table 4. The results of the research with application of the "Simple visual-motor reaction" technique make it possible to draw a conclusion about the properties and the current functional state of the central nervous system, which, in its turn, indicates the operability of the examinee, the presence or absence of pathological changes of a neurological nature, etc.

Table 4. The psychophysiological indicators of the schoolchildren of the 7th grade (n = 281)

Indicators under study	$\overline{x}$	S	Me	25 %	75 %	V %
Girls (n=136)						
Simple visual-motor reaction to light, millisecond	366.2	29.22	370.0	342.0	384.0	8.0
Simple visual-motor to sound, millisecond	363.4	24.18	360.5	345.0	381.0	6.7
Complex choice reaction, millisecond	482.8	38.12	480.0	475.0	496.0	7.9
Information processing speed,IPS bit·sec^{-1}	7.8	0.28	7.8	7.7	8.1	3.6
Romberg test, second	10.4	4.12	10.0	5.0	11.5	39.6
Short-term memory capacity (STMC),%	28.5	10.4	28.0	25.5	42.6	36.5
Volume of the processed information (VPI), bit	425.1	28.33	426.0	415.0	455.0	6.7
Boys (n=145)						
Simple visual-motor reaction to light, millisecond	384.8	35.11	385.0	346.0	425.0	9.1
Simple visual-motor to sound, millisecond	364.9	26.13	364.0	356.0	377.0	7.2
Complex choice reaction, millisecond	488.6	17.11	487.0	494.0	499.0	3.5
Information processing speed, IPS bit·sec^{-1}	8.1	0.28	8.0	7.8	8.4	3.5
Romberg test, second	7.4	3.22	7.0	5.5	11.5	43.5
Short-term memory capacity (STMC),%	29.1	10.12	29.0	16.2	40.5	34.8
Volume of the processed information (VPI), bit	359.7	48.12	360.0	301.5	398.5	13.4

The average statistical results of a simple visual-motor reaction to light and sound in girls of the 7th grade are higher than the average age standards; the range of values from the minimum to the maximum values was as follows: reaction to light 320 ms to 430 ms; reaction to sound from 320 ms to 400 ms. In the boys of the 7th grade, the average results of a simple visual-motor reaction to light and sound were also higher than the average age standards; the minimum and maximum results of the reaction to light and sound were as follows: reaction to light 300 ms and 450 ms, reaction to sound from 240 ms to 530 ms. We found out that in the girls of the 7th grade, the average statistical result of a simple visual-motor reaction to light is significantly lower ($p<0.01$) than in the boys of the 7th grade.

Analysing the average statistical results of the information processing speed in girls and boys of the 7th grade, we found out that they are above average age standards. It was found that in the girls the average statistical rate of the information processing speed is significantly lower ($p <0.01$) than in the boys. The range of values from the minimum to the maximum values was as follows: in the girls - from 7.3 ms to 9.0 ms; in the boys - from 7.5 ms to 10.2 ms. In the study of the static coordination in the schoolchildren of the 7th grade, we used the Romberg test. The students' average statistical results were below the norm. Among the girls of the 7th grade, only 27.2 % (n=37) had an individual result that corresponded to the standard; 22.1 % (n=32) of the boys had such results. The minimum and maximum results of schoolchildren were in the following ranges: in the girls of the 7th grade - from 2s to 19 s; in the boys of the 7th grade - from 2s to 18s, respectively.

The memory function was examined with application of a short-term memory test. Analysing the obtained results of the schoolchildren of the 7th grade, we found out that in the girls of the 7th grade, the average statistical result of STMC is higher than in the boys. The minimum and maximum values were in the following ranges: in the girls of the 7th grade - from 0% to 66.7 %; in the boys of the 7th grade - 7 from 0% to 58.3 %.

In the course of our study, we found out that in girls the average statistical result of VPI is significantly higher ($p <0.05$) than the boys.

The next stage of our monitoring was to determine the incidence rate of the schoolchildren of the 7th grade.

During our research, the data of medical cards of 281 pupils of the 7th grade were analysed and it was established that the health status of schoolchildren is characterized by a high incidence rate and by a tendency to increase in the main classes of diseases.

The obtained data of our study indicate a significant deviation in posture in both girls and boys. The most common pathology was lesions of the spine: scoliosis of I and II degree is observed in 76.5 % of girls (n=104) and in 80.7 % of boys (n=117); pathology of the arch of the foot, in particular platypodia - in 12.5 % of the girls (n=17) and in 19.3 % of the boys (n=28); clubfoot was found in 3.7 % of the girls (n=5) and in 10.3 % of the boys (n=15); deformation of the thoracic cage - in 9.6 % of the girls (n=13) and in 12.4 % of the boys

(n=18); the residual phenomena of rachitis - in 3.7 % of the girls(n=5) and in 4,8 % of the boys (n=7). The increase in the number of deviations in posture is explained by the sitting, sedentary way of life of modern schoolchildren and specific nutrition with low calcium content. Hours spent sitting at the computer and during school hours lead to the formation of deviations of the spine in the sagittal and frontal plane.

The most common among schoolchildren of the 7th grade are respiratory diseases, in particular: 68.4 % of the girls (n=93) and 66.2 % of the boys (n=96) were sick during the year. A significant role in the formation of the magnitude of incidence rates of this type is played by acute respiratory diseases. In the second place - diseases of the digestive system, so among schoolchildren of the 7th grade, 15.4 % of girls (n = 21) and 16.6 % of boys (n=24) were sick. Among the diseases of this type, the greatest attention is attracted to gastritis, duodenitis and cholecystitis. The pathology of the ENT organs is observed in 25.7 % of the girls (n=35) and in 29.7 % of the boys (n=43); the pathology of the visual organs is observed in 38.2 % of the girls (n=52) and in 37.2 % of the boys (n=54). The number of missed days for sickness in girls of the 7th grade was $\bar{x}$ =5,7; S=3,7 days, in the girls $\bar{x}$ =5,3; S=2,8 days, the maximum number of missed days: in the girls – 16, in the boys -15. It is known that various functional disorders of organs and systems, including vegetative disorders, not only are risk factors for the formation of somatic pathology, but also affect the physical and the mental development of children; especially in children of the primary and middle school age, when the physiological changes in the child's body coincide with the changes in the social. This is often associated with violations of the child's adaptive reactions, the so-called "school disadaptation" syndrome, which is the result of the interaction of biological, psychological and social factors (Tiazhka, 2015).).

Discussion

In the conducted scientific research the issue of monitoring of the physical condition of the 13- year-old schoolchildren was considered with the aim of improving the quality of the physical education process. The main purpose of assessing the physical condition is to obtain information about the status of the physical condition of schoolchildren with the subsequent use of these data for the correct planning of trainings, preservation and strengthening of health, timely correction of the educational process

At the current stage of the development of national school there is a high intensification of the educational process due to a significant update of the content of educational programs, forms and methods of teaching, the creation of new models of general educational institutions. At the same time, educational activity, as studies show, remains unadapted to the specifics of the development and state of health of modern schoolchildren. Teachers are not adequately trained for the practice of forming and preserving the health of students. The passive attitude of the children themselves and their parents regarding their own health is preserved. The effectiveness of the process of physical education of school-age children is largely determined by the adequacy of physical exertion and the individual peculiarities of schoolchildren. The health improving effect, positive dynamics of the morpho-functional indices and physical qualities could only be achieved with such approach. (Makarov, 2017)

Monitoring is the most productive tool of observation, analysis and control of the physical condition of schoolchildren in the process of physical education. Determination of the individual level of the physical condition of schoolchildren should be carried out not only for the purpose of diagnostics, but also for correction of the forms and content of the trainings, testing the effectiveness of the means and methods of pedagogical influence. For monitoring of the physical condition of students, it is necessary to have simple informative indicators which are accessible to each user: a doctor, a nurse, a teacher of physical education, and a coach. They should not be based on complex diagnostic equipment, time-consuming and preliminary training (Yarmak, 2017). The results of the conducted research confirmed and supplemented already known aspects of development of the researched issue. The results of our study confirm the data on the structure of the incidence among student youth (Kashuba, 2017) and among students aged 13-14 (Tiazhka, 2015), according to which the nosology of diseases of the musculoskeletal system prevails among a certain contingent. The results of our research supplement the data on the level of somatic health of schoolchildren of 13 years (Duhina, 2011), and on the insufficient level of adaptive reserves of the cardiovascular and respiratory systems (Azhippo, 2016).

Conclusions

Analysing the anthropometric indicators of schoolchildren, we found out that the average statistical values of BW and ChG in girls are significantly lower ($p<0.05$) than the anthropometric standards; in boys the average statistical values of the week BL, BW and ChG are also significantly lower ($p<0.001$) than the anthropometric standards. The analysis of the functional state in girls and boys indicates a deviation from age standards in the indicators of HR_{rest} and DBP. The overwhelming majority of schoolchildren have significant deviations in posture, in particular, the curvature of the spine in the sagittal and frontal plane: in the girls - 76.5 % (n=104), and the boys - 80.7 % (n=117). In the monitoring process we discovered the significant variability of the parameters (the sum of the skin-fat folds, Romberg's sample, the volume of the short-term memory), in which the variation coefficients were in the range from V=26.3 % to V = 43.5 %, which indicates the heterogeneity of the samples.

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