

Health status and morbidity of children 11-14 years of age during school

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Abstract

The aim of the study was to investigate the dynamics of health status and morbidity of children aged 11-14 years during school year. In this study, the following methods were used: methods for assessing somatic health, data extraction from medical records, methods for the assessment of morbidity, and methods of mathematical statistics. The study involved 176 children at 11 to 14 years of age. Results: The health status and indicators of morbidity were assessed. There was found a high morbidity rate with a predominance of acute respiratory viral infections and respiratory diseases. Most of the children had low and lower than average health levels.

Keywords: health level, school children, morbidity, adolescents.

Introduction

The health of children is reasonably regarded as a special humanitarian asset and the most promising resource of the country's economy and security. Comprehensive assessment of the child's health is an integrated indicator of the impact of both positive and negative factors on their bodies [3, 4, 6, 8]. Characterization of child's health status is more complex compared to the characterization of the adult's health. It includes the assessment of the level of physical, mental, and functional development in different age periods. Therefore, the child's health should be considered as a status of vital functions that corresponds to the biological age, the harmonious unity of physical and intellectual qualities determined by genetic factors, influence of the environment, and the formation of adaptive reactions in the growth process [1, 5, 16, 18].

The issues of improving the health status of children and adolescents and promotion of healthy lifestyles have become of particular importance in the context of socio-economic transformations of modern Ukraine. Based on the results of scientific studies conducted by the researchers of research institutions of Ukraine, the prevalence of diseases among school-age children far exceeds official statistics. In the opinion of the researchers, this is due to significant changes in general secondary education, which involved first of all an increase in the number of academic hours (classes) per day and per week for pupils of all age groups, an increase in the number of compulsory courses, and an increase in classroom time. By constantly increasing the volume and intensity of educational loads, the school has increasingly exacerbated the problem of difficulty in accomplishment of educational tasks by students, thus turning into a "diseased school". According to the published data (Gozak S.V., Polka N.S., 2011), the number of children with chronic diseases in the modern school increases from 30-35% for first-graders to 47-75% for school graduates. The proportion of children with low levels of physical health increases from 30.5-38.0% in primary grades to 53.1-65.9% in upper school. Such adverse dynamics of morphofunctional state indicators and adaptive abilities of school children necessitates the development and implementation of measures aimed at improving the health level of school children and reducing their morbidity.

The problem of maintaining school children's health is also relevant for other countries and is widely discussed in European and World forums. The researchers have identified the common problems for all countries in the European region as follows: low effectiveness of physical education in schools, deterioration of mental health in students, inadequate training of medical and pedagogical staff on health-preserving technologies. The foregoing emphasizes the long-term benefits, necessity and relevance of scientific research on the development of approaches for building up, maintenance, and improvement of the health of children in general education institutions.

Methods

The study involved 176 children and adolescents from 5th-9th grades of gymnasium No5 in Chernivtsi, Ukraine. The health status and morbidity of school children aged 11-14 years was assessed to identify the health index, morbidity indices and number of days missed due to illness during the school year. Estimation of morbidity, determination of health group, and disease resistance of school children were performed on the basis of the data extracted from the primary medical records of the educational institution (form 026/O). Additionally,

the number of days missed due to illness was estimated along with the duration of the disease, the number of morphofunctional abnormalities per student, and the health index. Analysis of morbidity in school children was performed according to "International statistical classification of diseases and related health problems" (ICD-10) [6]. On the basis of the data on morbidity and morphofunctional state of students, a comprehensive assessment of the health status of each child was carried out by referring it to one of the health groups according to the methodology developed by the Scientific Center of Children and Adolescent Health Care. When determining the methods for assessing the health status in this study, we preferred the most adequate, informative, non-invasive, and time-efficient ones that allow us to assess a group of children for a short period of time. Therefore, the assessment of the health level was carried out using the express-method for assessing the level of somatic health by Apanasenko G. L. [7], which includes the measurement of the following parameters: strength index, vital capacity, Robinson index, body mass index, and Ruffier index (heart rate recovery). Testing of hand muscle strength were carried out using a hand-held dynamometer. Vital capacity of the lungs was measured using a dry spirometer according to the generally accepted method. The functional state of the body was assessed using the indices of Ruffier and Robinson, which reflect cardiovascular function. Systematization and primary analysis of the data were performed with excel spreadsheets (Excel 2010, Microsoft).

Results

Displacement of the problem into the field of pedagogy and psychology did not end with the creation of a technology for organization of health-enhancing activities in an educational institution, which is reduced to a set of more or less justified, poorly systematized, weakly interrelated, and therefore ineffective measures. Thus, it is possible to state the existence of a scientific problem, which consists in the lack of methodological and especially technological elaboration of the organization of recreational and health-enhancing activity in school.

As a result of the study, we found a significant percentage of children with pathological conditions (Table 1).

Table 1

The percentage of children with pathological conditions in different age groups (n=176)

Age group	The percentage of children with pathological conditions, %
11 years (n=32)	48.1
12 years (n=38)	69.8
13 years (n=42)	51.7
14 years (n=64)	28.5

The diseases prevailing among the 11 year-old children included: visual impairments, platypodia, postural abnormalities, chronic allergic dermatitis, heart diseases, excess body weight, umbilical hernia, bronchial asthma, and nephropathy; among 12 year-old children, heart diseases, postural abnormalities, goitre, visual impairments, platypodia, tuberculosis, deflected nasal septum, scoliosis, kyphosis, adenoids, and umbilical hernia prevailed; among 13 year-old children, visual impairments, postural abnormalities, bronchial asthma, platypodia, gastritis, obesity, umbilical hernia, heart disease, degenerative disc disease, and leukemia prevailed; among 14 year-old children, scoliosis, visual impairments, heart diseases, postural abnormalities, chronic gastritis, deflected nasal septum, impaired functions of the nervous system, chronic tonsillitis, and deformation of the chest prevailed.

The level of the child's body tolerance to unfavorable environmental conditions is determined by the number and duration of acute (and exacerbated chronic) diseases in the previous year. Acute respiratory viral infections (ARVI and ARI) are most common among children and adolescents. The other acute diseases that have been found in school children include acute pediatric infectious diseases (varicella, epidemic parotitis, scarlet fever, measles, and rubella), acute gastrointestinal diseases, as well as allergic diseases and reactions. The children were divided into three groups according to the number of acute disease cases over a year: the first one included the children who were never ill, the second included those who were ill episodically (1-3 times during the year), and the third included those who were often ill (4 times or more). The absence of acute diseases during the year or their episodic occurrence indicates good disease resistance of the child's body, high ability to respond adequately to changing living conditions and maintain tolerance to the influence of adverse factors or pathogenic microorganisms. Frequent acute diseases, even the "easiest", indicate a reduction in the adaptive capacity of the child's body.

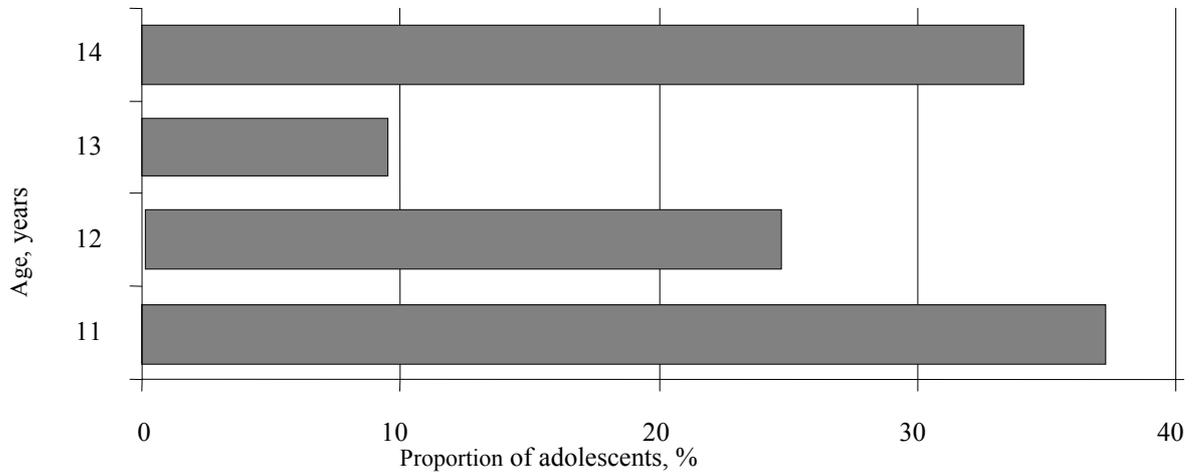
The incidence of acute diseases in children is influenced by the climatic and geographical conditions, the season of the year, air pollution, living conditions, environmental conditions in educational institution, age and gender of the student, quality of medical care, etc.

Among the school children, the following most common diseases were identified: viral infection of unspecified site (B34), in addition, in 11 year-old children, 3 cases of surgical operations (Y60.0), 2 cases of disorders of eye and adnexa (H55-H59), 3 cases of diseases of the respiratory system (J95-J99), 2 cases of disorders of central nervous system (G96), and 1 case of acute bronchitis (J20) were found. The diseases of 12 year-old children included, in addition to viral infection of unspecified site (B34), 6 cases of chronic inflammatory diseases of orbit (H05.1) and 2 cases of diseases of the respiratory system (J95-J99). Adolescents

aged 13 years were ill with acute bronchitis (J20), 1 case; and surgical operation (Y60.0), 1 case; The diseases of students aged 14 years included surgical operations (Y60.0), 8 cases; disorders of eye and adnexa (H55-H59), 2 cases; diseases of the respiratory system (J95-J99), 2 cases; and 1 case of acute bronchitis (J20).

In the study, we determined the group indicators of morbidity using the methodology for calculating the main indicators of acute morbidity (Fig. 2). The analysis of indicators of morbidity was carried out by comparing with the data for the previous year and calculating percentage change.

Fig. 2. The percentage of adolescents who were ill with diseases of the respiratory system (J95-J99) during



2016-2017 school year.

In a number of children and adolescents, functional disorders may occur in the absence of any disease. The reasons for the formation of these disorders are various, as follows: rapid growth and development in certain age periods (at 11-13 years in girls and at 13-15 years in boys); the impact of high educational and sporting loads that are inappropriate for children and adolescents; unfavorable family and living conditions, etc.

School children were divided into five health groups on the basis of the indicators of morbidity, functional state of the main systems of the body, and the ability to resist the impact of adverse factors. Group I included healthy children with normal physical and mental development, who do not have chronic diseases and were rarely ill. Group II included healthy children with impaired posture, flattening of the feet, fallen arches, and mild myopia, who were often ill, etc. The group III was formed of the children with chronic diseases in the state of compensation. These children, despite the presence of a chronic disease, rarely suffered from acute illnesses, felt good and had high work capacity. Group IV included children with chronic diseases in the stage of subcompensation, who were often ill and had reduced work capacity. Children from the group V had chronic diseases in the state of decompensation. They substantially do not attend educational institutions because they are forced to stay in special medical or educational institutions for health reasons.

We determined the health index in the school children (Fig. 4). In children aged 13 years, the highest level of the health index was found, which was 92.5% of the total. Moreover, it should be noted that in this age group, only 13.3% of children belonged to the main medical group, while the rest was in the preparatory (66.7%) or in the special (20.0%) groups. 11-year-old school children showed a health index of 81.4%, which was the lowest of these age groups. However, the number of children aged 11 years, who belonged to the main medical group was 39.7%, to the preparatory group - 44.8%, and to the special group - 17.3%. Children aged 12 years had health index of 87%, 25% of them were in the main group, 50% were in preparatory group, and 25% were in special group. Adolescents aged 14 years were found to have health index of 83%. Of these, 28% belonged to the main group, 60% were in the preparatory and 12% were in the special group.

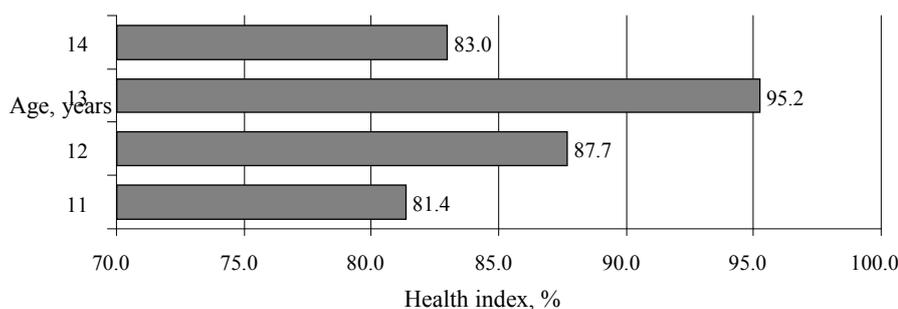


Fig. 3. Health index of the students of gymnasium No5 in Chernivtsi in 2016-2017 school year.

Thus, we must acknowledge the national problem not only of a social and medical, but also, and primarily, of a pedagogical nature, that consists in a decrease in the number of students in the main medical group for physical culture classes and a significant increase in the preparatory and special medical groups as a result of the sharp deterioration of their health.

We carried out an assessment of the severity of morbidity among the adolescents. The duration of illness was determined in the students of grades 5-9 during the school year (Fig. 4).

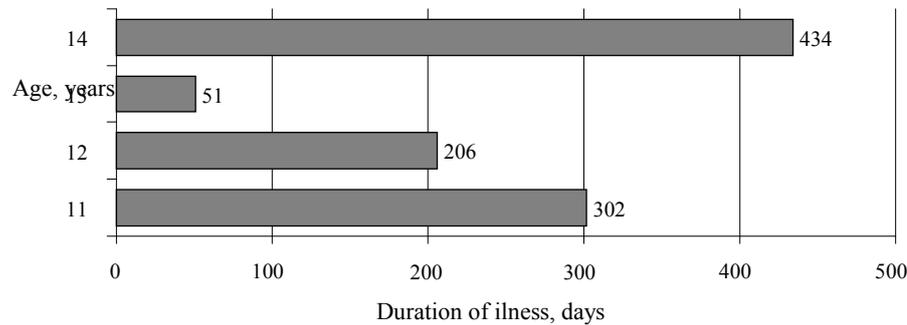


Fig. 4. The duration of illness in the students of grades 5-9 of gymnasium No5 in Chernivtsi in 2016-2017 school year.

Taking into account the high morbidity rate among the school children, the state of physical health was assessed (Table 2).

Table 2

The state of physical health of the school children as assessed with the Apanasenko method (n=176), %

Health level	11 years (n=32)	12 years (n=38)	13 years (n=42)	14 years (n=64)
Low	15.6	26.3	16.7	10.9
Lower than average	12.5	21.1	28.6	31.3
Average	43.8	26.3	38.1	21.9
Higher than average	18.7	18.4	11.9	23.4
High	9.4	10.5	4.8	12.5

It was found that only 9.4% (n=3) of 11-year-old students had the high level of health, whereas 15.6% (n=5) and 12.5% (n=4) of them had the low and lower than average health levels, respectively. The rest of the children have the average and higher than average health levels. Among the 12-year-olds, only 10.5% (n=4) had the high level of health, while 26.3% (n=10) had the low health level. Most of the 13-year-old adolescents (38.1%, n=16) had the average health level, 16.7% (n=7) and 28.6% of them (n=12) have the low and lower than average health levels. Large proportion of 14-year-old adolescents (31.3%, n=20) had the lower than average health level, but in this age group was also the highest percentage of students with the high health level of 12.5% (n=8). According to the summarized data, only 22.4% of school students aged 11-14 years had the safe level of health that requires the development of adequate prevention and health-enhancing programs.

Discussion

Most authors emphasize the alarming situation regarding the health status of Ukrainian children and adolescents. In a modern school, the high intensification of the educational process is observed as a result of significant sophistication of the content of educational programs, forms and methods of training, the creation of new models of general education institutions. Furthermore, as the research shows, educational activity generally does not accommodate the characteristics of the development and health of modern school children. Teachers are not well prepared for activities on the development and maintenance of students' health. Children and their parents remain passive regarding their health status [2, 9, 11, 13-14].

Due to the worsening of the health of children and adolescents of school age in most countries of the world that is evidenced by the results of screening studies, researchers are paying attention to the problem of adaptation of children and young people to the conditions of studying both in school and in higher school [10, 13, 19, 20]. According to N. Dolbysheva research, only 1.1% of children are practically healthy, and, on average, there are 2.5 diseases per one child [10]. S.L. Nyankovsky gives in his work an analysis of the prevalence of all diseases among Ukrainian adolescents during the period of independence: it has increased by 10 thousand children, and the rate of growth is 10.4% [17]. V.O.Kashuba noticed that, as a rule, one adolescent has several diseases. According to the data of the State Medical Statistics, the prevalence of all diseases has been increased among all adolescents of school age, but diseases of the respiratory, digestive, musculoskeletal, and genitourinary system are in the first place [14].

Many modern researchers in the field of physical education and sports encourage youth for systematic physical activity for health. The studies of N. Goncharova and M. Rodionenko are focused on the implementation of health-developing technologies in the education system for children that are based on involving children in recreational and health-enhancing activities throughout the period of study. V. Kashuba, N. Goncharova, and G. Butenko suggest organizational and methodological conditions for the inclusion of recreational and health-enhancing activities in the process of physical education to improve the health and wellbeing of schoolchildren. The study of N. Moskalenko and D. Yelisieiev is focused on research into the influence of individual physical exercises on the physical fitness of upper school students. O. Andrieieva and M. Chernyavsky have studied the problems and prospects for the implementation of recreational and health-enhancing activities in general schools. O. Andrieieva and N. Kovaleva addressed the problems of organization of leisure time as a condition for the development of recreational activity of upper school students.

At the present stage of development of our society, one of the key issues is the search for factors influencing the health state of school students. The alarming trends of increasing the number of students in special medical groups reflects not only the problem of their further harmonious development, but also the prospects for the growth of the number of young people with a reduced work capacity and early-onset disability [12, 15, 19-20].

The health status of school students is directly related to their physical activity. Physical activity plays various roles throughout human life. In childhood, it determines normal growth and development of the body, ensures the most complete realization of genetic potential, and increases resistance to disease. It is during the period of growth that the body is most susceptible to the impact of various adverse factors. The results of research have revealed the mechanisms of the relationship between physical activity and functional capabilities of the developing body.

In recent years, the attention of researchers, who consider it necessary to further develop and improve recreational and health-enhancing activities of school students, has been focused on the issue of optimization of normative requirements in order to increase the effectiveness of motor abilities development in children and adolescents. For example, S. Kirilenko conducted a study of physical condition of school children and found that the most effective for the development of physical fitness is the high level of physical activity, which is achieved using a mix of various means of physical culture and sports [15].

Thus, as it is clear from the above, it is low health status, frequent diseases, low level of physical activity, inappropriate use of leisure time, low motivation, and lack of programs for organized recreation for adolescents that is the problem that can be addressed through proper organization of recreational and health-enhancing activities. Implementation of recreational and health-enhancing activities, mass sports events in educational institutions, involvement of school students in systematic physical exercises at school and out of school for the improvement of health status of the younger generation remain relevant.

Conclusion

The existing system of physical education in general educational institutions does not ensure maintenance of students' health during the educational process. There was found a high morbidity rate with a predominance of viral infections of unspecified site (B34) and diseases of the respiratory system (J95-J99). Most of the children had low and lower than average health levels. Priority classes of diseases were identified as follows: acute respiratory viral diseases (26.25%), diseases of the nervous system (14%) and sensory organs (9%).

Today, it is very important to teach the child to take care of their own health while studying at school and to develop an attitude for maintenance of their health status without the use of medicines. To improve the health status and the level of physical activity of students, in addition to attending physical education classes, it is necessary to use recreational forms of physical education and implement health-developing technologies, which include execution of gymnastic exercises before the classes and within the classes, physical exercises and active games during long breaks between classes, daily exercises in prolonged-day groups, individual physical exercises during out-of-school time, physical activities at the place of residence, etc.

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Conflict of interests

The authors declare that there is no conflict of interests.

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