

UDC 612

Assessment of External Respiratory Function in Schoolchildren, Studying at Schools of Innovative Type

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ABSTRACT. External respiratory function in schoolchildren of the 7th and 9th grades of innovative schools was studied. Deviations from the proper values of respiratory parameters should be considered as changes caused by uncontrolled hypodynamia and extrapulmonary component of respiration.

Keywords: spirometry; external respiratory function; schoolchildren; school education; health of students.

INTRODUCTION. Maintaining the health of the younger generation is actual problem of modern medicine and education. Most studies reveal the negative trends in the structure of health of young people [1]. In conditions of modern reforms and modernization of system of school education health of students causes anxiety. Significant intensification of the educational process, new forms and methods of teaching, new emotional experiences, changing of regime of work, rest, sleep and food, the need to adapt to a new collective, shows increased requirements to the state of the organism of the students of schools of new type and causes high physiological cost of adaptation to learning.

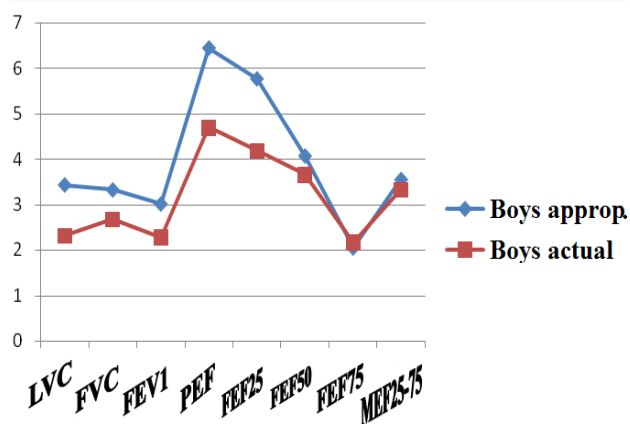
At this age morphological and functional changes are observed, the puberty is stabilized [2, 3]. State of health senior pupils is a barometer of social well-being and medical provision of the previous period, as well as a harbinger of change in public health in the following years. According to the data of number of authors, in the last decade decrease of youth health [4], high level of prevalence of functional deviations [5] and chronic diseases is observed. In connection with the foregoing, the study of the state of the functional systems of schoolchildren, studying by new technologies, becomes actual.

MATERIALS AND METHODS. We have conducted anthropometric research and assessment of external respiratory function (ERF) in schoolchildren of gymnasium for gifted children of Karaganda City, where learning takes place from the 7th to 11th grades (school "Daryn"). The group consisted of 48 practically healthy students aged 13 to 16, among which there were 26 boys and 22 girls. Study of ERF was conducted with a portable microprocessor spiograph

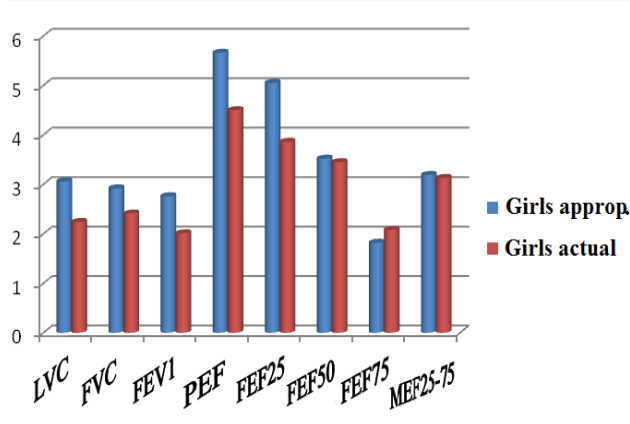
NSC - 21/01 - «R - D». Assessment of indicators was conducted on degree of their deviation from the appropriate values.

Statistical processing of results was conducted using the application package Microsoft Excel 2007. The received results were subjected to the parametric analysis. The arithmetic mean (M) and the average error of the arithmetic mean (m) were determined. Reliability of differences between mean quantities was estimated by Student's t-test. Reliability of the criterion was denoted by p symbol. The differences between the samples were considered significant at $p < 0.05$.

DISCUSSION. In the study of the state of ERF in schoolchildren of the 7th grade of both sexes reduction of most of basic parameters in comparison with the appropriate values was registered. The largest deviations from appropriate values in boys showed LVC (67.21 + 5.42 %), PEF (72.52 + 5.85 %), FEF25 (71.98 + 12.69 %), FEV1 (79.14 + 10.56 %) and FVC (80.60 + 9.98 %) (Pic. 1). Among girls significant deviations were found in indicators of LVC, FEV1, FEF25, PEF (Pic. 2).



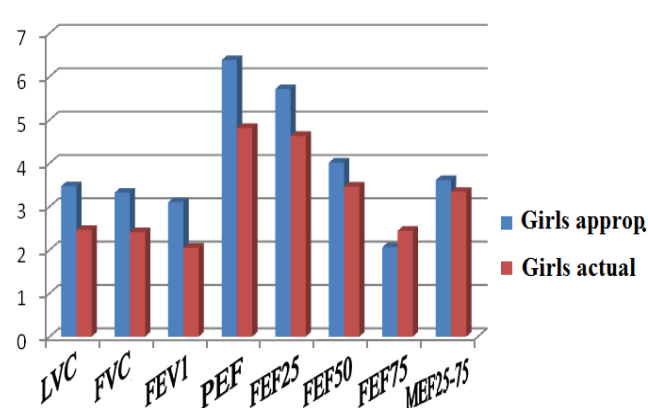
Pic. 1. Parameters of external respiratory function among boys of the 7th grade.



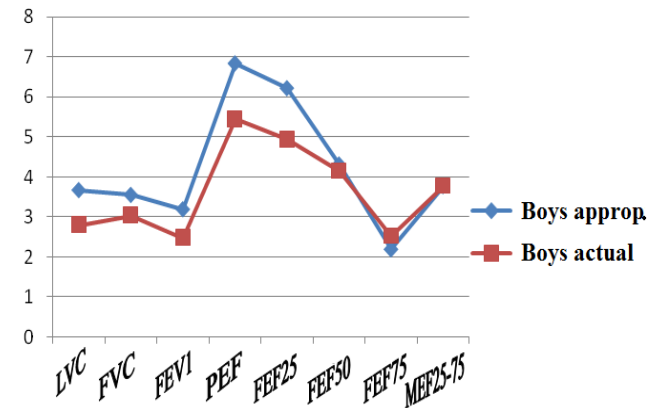
Pic. 2. Parameters of external respiratory function among girls of the 7th grade.

According to the results of spirometry deviations in external respiratory function were observed in 80 % of boys and 70 % of girls with reduced LVC combined with a decrease in peak expiratory flow, forced expiratory volume in the first second and forced expiratory flow after exhalation of 25 % of FVC. Among the examined schoolchildren of the 7th grade with deviations of external respiratory function the boys, who were not prone to smoking, dominated.

Results of spirometry in schoolchildren of the 9th grade allowed to reveal reduction in LVC and FVC indicators, more expressed in girls (71.47 + 8.1 % and 72.56 + 10.72 %, respectively) than in boys (77.08 + 7.93 and 85.14 % + 7.34 %). In combination with LVC were reduced FEV1, PEF, FEF25 in girls (Pic.3), which amounted to 68.28 + 12.02 %, 75.50 + 15.49 %, 81.11 + 17.16 %, respectively. In boys these parameters corresponded 81.60 + 14.11 %, 80.31 + 15.22 %, 79.54 + 15.22 % (Pic. 4).



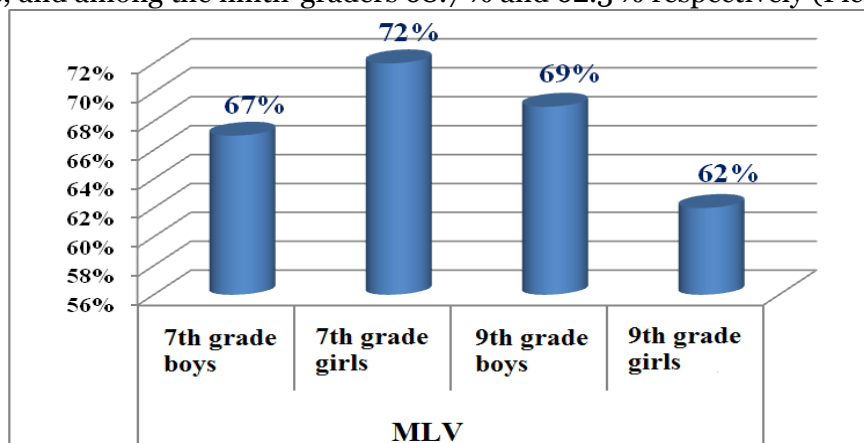
Pic. 3. Parameters of external respiratory function among girls of the 9th grade



Pic. 4. Parameters of external respiratory function among boys of the 9th grade

Parameters allowing to estimate degree of disorder of ventilatory capacity of the lungs FVC, FEV₁ are moderately reduced but FEV₁/FVC ratio, reflecting ventilatory capacity of the lungs, is in the normal range, both among girls and boys of the 7th grade. This indicates the absence of obstructive disorders. Along with this, actual indicators of LVC, FVC, FEV₁ in girls of the 9th grade have smaller values in comparison with indicators of the other surveyed. Moreover, FEV₁/LVC ratio in girls of the 9th grade is below the accepted lower limit of normal for children.

To clarify the situation, we investigated the maximum voluntary lung ventilation (MVV), which characterizes the function of the respiratory system, including muscle strength. In schoolchildren of the 7th grade actual MVV amounted 67 % among boys and 72 % among girls from appropriate values, and among the ninth-graders 68.7 % and 62.3 % respectively (Pic. 5).



Pic. 5. Indicators of maximum lung ventilation in schoolchildren

Considering fact that all of the surveyed students were practically healthy and had no clinical signs or complaints about diseases of respiratory organs found deviations of the parameters of external respiratory function from the appropriate values should be regarded as functional changes due, apparently, by extrapulmonary component: function of the chest and respiratory muscles. The latter is apparently due to low physical activity schoolchildren, prolonged stay in school (up to 7-8 hours), large amount of homework (3-4 hours), which limits the possibility of active rest and sports activities of schoolchildren.

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Оценка функции внешнего дыхания у школьников, обучающихся в школах инновационного типа

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Магистрант

Аннотация. Изучена функция внешнего дыхания у учеников 7 и 9 классов, обучающихся в инновационных школах. Отклонения от должных величин дыхательных параметров следует рассматривать как изменения, вызванные неконтролируемой гиподинамией и внелегочным компонентом дыхания.

Ключевые слова: спирометрия; функция внешнего дыхания; школьники; школьное образование; здоровье школьников.