

## VARIABLES OF THE CARDIOVASCULAR SYSTEM OF THE SPORTSMEN DURING THE MIXED TYPE PHYSICAL EXERCISES

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The analysis of the functional status of the sportsmen bodies is important for the selection of effective means and methods of physical exercises that is especially important for the Olympic reserve schools (ORS).

The aim of the research is to assess hemodynamics and resistance to hypoxia of the students of various ages and sports specialization from ORS.

**Material and methods.** 48 students from “Vitebsk State Olympic reserve school” took part in the research. The subjects did mixed type physical exercises (various types of martial arts). Indicators of the cardiovascular system were studied according to age and gender. The following indicators were used to assess the functional status of the cardiovascular system: heart rate (HR), systolic pressure (SP), diastolic pressure (DP). The coefficients and indices were calculated on the basis of the results [1, 2]: pulse pressure (PP), average arterial tension, THP (total hemodynamic parameter), DP (double product), ER (endurance ratio), CBCE (coefficient of blood circulation efficiency). Anoxia tolerance was estimated by the results of the timed expiratory capacity and based on the heart rate per 30 seconds after the timed expiratory capacity to the breath holding time.

**Findings and their discussion.** The results of the research are in the table.

Such indicator values of the boys of teenage years and of young adulthood as AT, PP, AAT, THP were lower than the average, 6,6% and 3,4%, respectively, that denotes the training level of the body, high elasticity of blood vessels, the development of endurance and the habit of doing physical exercises. The rate of DP was higher (26,1% and 23,1%, respectively) that indicates about a significant physical activity on the heart muscle. The index of timed expiratory capacity shows that the organisms consume right amount of oxygen in these age groups. At the same time, the value of endurance ratio shows a weakening of the functional capacities of the cardiovascular system: AP (satisfactory level of adaptative potential) and CBCE (uneconomical using of the cardiovascular system reserves). There were no significant differences in comparison with the similar indicators of a group of 21-23 year-old men except for the indicator of endurance ratio that shows an increase in the functional capacities of the cardiovascular system at this age. According to the results of the research it is recommended to reduce emotional, power, speed-power loads and increase aerobic loads in the group of adolescent boys.

Table – Hemodynamic parameters and anoxia tolerance of the sportsmen

| Indicators                              | Children (boys)<br>13-15 years;<br>n=14 | Teenagers<br>16-20 years;<br>n=12 | Young adults<br>21-23 years;<br>n=5 |
|---|---|-----------------------------------|-------------------------------------|
| HR, bpm.                                | 77,13±12,39                             | 69,3±8,02                         | 83±7,01                             |
| AT, mm of mercury.                      | 113,8/72,5±7,44/8,86                    | 116,6/76,6±<br>10,33/13,6         | 140,3/80,2±12,31/11,5               |
| PP, mm of mercury.                      | 41,3±3,54                               | 38,33±4,1                         | 60,1±6,1                            |
| AAT, mm of mercury.                     | 86,3±8,25                               | 89,4±12,55                        | 100±10,52                           |
| THP, c.u.                               | 163,4±15,73                             | 158,8±6,07                        | 183±7,13                            |
| DP, c.u.                                | 88,0±16,36                              | 80,4±6,07                         | 88±7,11                             |
| Timed expiratory capacity, s.           | 38,8±22,06                              | 43,7±24,17                        | 45±20,07                            |
| HR over 30 s after breath holdind, bpm. | 44,0±17,09                              | 34,3±4,13                         | 40±6,07                             |
| HR over 30 s /time of breath holding    | 1,5±0,80                                | 0,9±0,42                          | 1,488±0,52                          |
| ER, c.u.                                | 18,61±2,64                              | 18,17±1,875                       | 13,8±1,34                           |
| PP, c.u.                                | 1,9±0,28                                | 2,04±0,23                         | 2,73±0,26                           |
| CBCE, c.u.                              | 3205,0±753,64                           | 2935,0±842,9                      | 4980±752,99                         |

**Conclusion.** Exercise helps to increase the adaptive capability of the cardiovascular system of the sportsmen of these age groups. At the same time a decrease and non-economical use of the stores of the cardiovascular system in the group of adolescent sportsmen may indicate that the volume of physical exercises does not correspond to this age which can be a serious obstacle to improving their sports mastery.

1. Zagorodny, G.M., Azarenko, O.I. Assessment of the types of reactions of the cardiovascular system to physical activity / G.M. Zagorodny, O.I. Azarenko // Sports medicine. – 2000. – №2. – P. 19–23.
2. Makarova, G.A. Sports medicine / G.A. Makarova. – M.: Soviet Sport, 2003. – 480 p.

## TOPICAL PROBLEMS OF STUDENT YOUTH

**Alena Mikhalenok**

VSU named after P.M. Masherov, Vitebsk, Belarus

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