

## The Cardiovascular System Adaptation to Physical Load in Scholars of Industrial Region

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**Background:** The urbanization of modern society, features of lifestyle and food quality are associated with cardiovascular health worsening in adolescents. The sudden cardiac death risk may increase during physical exertion. The cardiac functional adaptation is the important part of children population health due to the study of the cardiovascular system as an integral health indicator.

**Objective:** To learn the cardiovascular system adaptation state to physical load in adolescents.

**Methods:** 699 schoolchildren (320 girls and 379 boys) of big industrial city were examined. Heart rate (HR), systolic and diastolic blood pressure (SBP and DBP) were assessed at rest (baseline), after physical load (increasing level) and on the third minute after test (decreasing level).

**Results:** Baseline SBP was  $115.91 \pm 14.91$  mmHg, DBP –  $71.29 \pm 9.59$  mmHg, HR was  $86.27 \pm 13.87$  bpm. Girls had higher DBP ( $p=0.000036$ ) and HR ( $p=0.000011$ ). After physical load vital signs were assessed again: increase of SBP was  $15.87 \pm 1.51\%$ ; DBP –  $10.69 \pm 0.62\%$ ; HR was  $31.78 \pm 0.87\%$  (no statistical significance between sexes). During the rest period the level of SBP decreased on  $6.31 \pm 10.55\%$ , DBP on  $5.33 \pm 0.58\%$ , HR on  $21.51 \pm 1.11\%$ . Boys had bigger decrease of SBP and DBP compared with girls ( $p=0.04$ ,  $p=0.01$  respectively). The level of SBP 3 minutes after test were bigger than baseline level on  $7.38 \pm 1.51\%$  ( $p0.05$ ) and DBP on  $3.37 \pm 0.54\%$  ( $p0.05$ ). HR decreased more effectively in girls ( $p 0,00045$ ).

The level of DBP restoration ( $MR=0.51$ ,  $F=30.40$ ,  $p=0.001$ ) statistically correlates with sex ( $p=0.008$ ), baseline DBP ( $p=0.0001$ ) and HR ( $p=0.0001$ ). The HR increase correlates with age, baseline HR, sex and BMI ( $MR=0,44$ ,  $F=21,77$ ,  $p=0,001$ ).

**Conclusions:** The cardiovascular system adaptation of the modern schoolchildren population is associated with anthropometric measurements (height, BMI), baseline levels of vital signs, as well as gender. Low levels of BP and HR are associated with bigger increase and lower decrease of vital signs in restoration period.