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# Non-traditional risk factors and biomarkers for cardiovascular disease in adolescents

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**Background:** Epidemiological studies have shown that the cardiovascular disease as evidenced by functional and morphological changes in the heart and blood vessels begins early in childhood. The clinical and mechanistic roles of non-traditional cardiovascular risk factors during childhood are currently being investigated.

**Purpose:** The main goals of the present study were to assess the relationship between non-traditional risk factors and biomarkers for cardiovascular disease and traditional cardiovascular risk factors in presence of obesity.

**Methods:** 224 randomly selected high-school students. In 53 (mean age 17.67±1.34) obese and overweight subjects and 171 (mean age 17.74±1.16) lean controls, fasting plasma glucose, insulin, lipid profile, liver enzyme tests and UA, growth hormone (GH) and insulin-like growth factor (IGF) -1, adipokines were measured.

**Results:** In overweight/obese students there were significant changes in selected nontraditional risk factors and biomarkers: basal GH and adiponectin were lower; leptin level and UA were significantly higher. Simple linear analysis showed a significant negative correlation between basal GH level and body weight (BW), body mass index (BMI), BMI percentile, UA, triacylglyceride (TAG), insulin and HOMA index. Basal GH positively correlated high-density lipoprotein (HDL) cholesterol, IGF-1. Simple linear analysis showed a significant negative correlation between adiponectin and BW, BMI, BMI percentile, UA, alanine aminotransferase (ALT) and significant positive correlation between adiponectin and HDL cholesterol, basal GH, ghrelin. Resistin positively correlated with BMI, TAG, insulin, HOMA index, leptin and negatively with IGF-1. Significant positive correlation was found between serum leptin level and BW, BMI, BMI percentile, serum glucose level, total cholesterol, high-sensitivity C-reactive protein (hsCRP), insulin, HOMA index and resistin. Ghrelin negatively correlated with BMI percentile, TAG, insulin, HOMA index and positively with HDL cholesterol, basal GH and adiponectin.

**Conclusion:** The current study emphasizes the importance of stratification of nontraditional CV risk factors and biomarkers in the paediatric population. Obesity-related GH deficiency is present in adolescents and unfavorable cardiometabolic risk factors including uric acid correlated well with GH in this age. GH - IGF-1 is involved in pathways of IR and glucose metabolism. Future studies are required to elucidate this complex relationship.

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