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Heart Rate Variability in 12- to 13-Year-Old Adolescents

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Estimation of age and gender peculiarities of heart rate variability (HRV) in adolescents will help researchers to predict the potential abilities of the adaptation mechanisms, to evaluate the risk of cardiovascular diseases, and to select the dosage of physical activity in sporting and rehabilitation in this population. The respective data may improve our understanding of the age and sex characteristics of the autonomic nervous system during the puberty period of ontogenesis. We examined an extensive sampling (n = 812) of 12- and 13-year-old schoolchildren of both sexes. Estimation of the HRV parameters was based on the results of 5-min-long recording of electrocardiogram; generally accepted standards for the respective calculations were used. The predominance of parasympathetic regulatory influences on HRV (reflected in the RMSSD, pNN50, and HF values) was found in 12-year-old boys compared to 13-year boys and 12-year girls ($P < 0.05$). Among the examined girls, the predominance of parasympathetic regulation (reflected in %HF) in the HR modulation was observed in 12-year-old ones ($P < 0.05$), while the predominance of sympathetic regulation (%VLF) was noticeable in 13-year-old girls ($P < 0.05$). Thus, younger (12-year) boys are characterized by a lower tension in the central regulatory mechanisms affecting the cardiovascular system, as compared with that in older (13-year) boys and girls of both examined ages. Considering the existence of noticeable controversies between the respective data of different authors and the necessity to obtain the corresponding normative values, further studies of the dynamics of the HRV parameters in more strictly limited age and gender groups of children and adolescents are expedient.

Keywords: adolescents, heart rate variability (HRV), time and spectral domains, age-related and gender differences, normative values, autonomic regulation.