

Carotid stiffness in healthy children and adolescents –reference values in Slovak population

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Introduction: Carotid stiffness represents an important marker of early vascular aging which seems promising for evaluation of the initial atherosclerotic changes and prediction of later cardiovascular events. We aimed to determine the physiological values of carotid stiffness in healthy children and adolescents, which are necessary for interpretation of carotid stiffness values in pathological states and later identification of specific cut-offs for clinical practice. The second aim was to assess the influence of age and sex on carotid stiffness in distinct developmental periods of childhood and adolescence.

Methods: We examined 520 healthy Slovak children aged 7 to 19 years (260 boys) without clinically observed cardiovascular risk factors. Ultrasonography combined with echo-tracking system (Prosound F75 Aloka) on common carotid artery (CCA) was used to analyse the local arterial stiffness. In this study, five physiological parameters of the CCA were analysed – mean stiffness index (β), elastic modulus (Ep), arterial compliance (AC), augmentation index (AI), and pulse wave velocity (PWV β).

Results: The physiological values of carotid stiffness are presented in graphical form for total group, and separately for boys and girls. Index β , Ep, AI and PWV β of the common carotid artery increased with age in healthy Slovak children, while in contrast, AC decreased with age. Statistical analysis did not show significant differences of the evaluated parameters between boys and girls. Correlation analysis revealed the best correlation between four indicators of the CCA elasticity (β , Ep, PWV β , and AC), whereas AI had relatively poor correlation with the other parameters. All the indices of carotid stiffness were dependent on blood pressure at the time of evaluation.

Conclusions: Our study firstly presented the physiological values of the parameters of carotid stiffness for Slovak population of children and adolescents aged 7 to 19 years. All the evaluated parameters (index β , Ep, AI, PWV β , AC) were characterised by significant effect of age, but not sex, during this developmental period. These reference values of carotid stiffness can be used for detection of early atherosclerotic changes in children with various pathological states.