

Effect of blood pressure on carotid stiffness in children with white coat and essential hypertension

Jurko A. Jr. (1), Jurko T. (2), Jurko A.(1), Mestanik M.(3), Mestanikova A. (3), Visnovcova Z. (4), Tonhajzerova I. (3,4)

Paediatric Cardiology, Martin, Slovak Republic (1); Clinic of Neonatology, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, Slovak Republic (2); Comenius University in Bratislava, Jessenius Faculty of Medicine in Martin (JFM CU), Department of Physiology JFM CU, Martin, Slovak Republic (3); Comenius University in Bratislava, Jessenius Faculty of Medicine in Martin (JFM CU), Biomedical Center Martin JFM CU, Martin, Slovak Republic (4)

Introduction: The term „arterial stiffness“ denotes alterations in the mechanical properties of arteries, which may represent higher cardiovascular risk in middle-aged and older adults. Recently, the question regarding the arterial stiffness in patients with risk factors for the early progression of systemic atherosclerosis in vulnerable adolescent age-period are rare. Thus, the aim of this study was to evaluate the carotid stiffness and early atherosclerotic changes in adolescents suffering from essential and white coat hypertension using noninvasive markers.

Methods: One hundred thirty eight children – 46 (23 boys) children suffering from WCH, 46 (23 boys) patients with essential hypertension (EH) and 46 age/gender-matched healthy controls – were examined under standard conditions. The age-period of all children ranged from 14 to 18 years. Ultrasonography combined with echo-tracking system (Prosound F75 Aloka) on common carotid artery (CCA) was used to analyse of local arterial stiffness. In the 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: Statistical analysis revealed significant differences in parameters β , Ep, AC and PWV β between the both hypertensive groups (WCH, EH) and control group (Tab 1). Significant differences were not found in the index AI between EH, WCH and control groups. No significant differences were found between WCH and essential hypertensive groups.

Conclusions: Study revealed significantly increased carotid stiffness in children suffering from white coat and essential hypertension. This finding could help to understand hypertension atherosclerosis interaction. We suggest that further research regarding the potential atherosclerotic changes using the sensitive noninvasive parameters in pediatric hypertension is important. Support: VEGA 1/0087/14, project “Biomedical Center Martin” ITMS code [26220220187] co-financed from EU sources

Table 1. Parameters of carotid stiffness in children with white coat hypertension (WCH), essential hypertension (EH) and control group (C group)

	WCH n=46	EH n=46	C group n=46
β	6,14 ± 0,9 ^{***}	6,01 ± 1,01 ^{***}	4,8 ± 0,9
Ep (kPa)	85,4±14,4 ^{***}	85,2 ± 16,4 ^{***}	56,1 ± 9,7
AC (mm ² /kPa)	0,84 ± 0,2 ^{***}	0,84 ± 0,18 ^{***}	1,10 ± 0,24
AI	5,06 ± 37 ^{NS}	6,7± 32 ^{NS}	-6,1 ± 6,7
PWV β (m/s)	5,3 ± 0,5 ^{***}	5,3 ± 0,6 ^{***}	4,4 ± 0,4

β , mean stiffness index; Ep, elastic modulus; AC, arterial compliance; AI, augmentation index; PWV β , pulse wave velocity^{***}, $p < 0,001$ compared to control group