



Artery Research

ISSN (Online): 1876-4401

ISSN (Print): 1872-9312

Journal Home Page: <https://www.atlantis-press.com/journals/artres>

P.004: ETHNIC DIFFERENCES IN PULSE WAVE VELOCITY AND ITS RELATION TO BLOOD PRESSURE

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To cite this article: H.W. Huisman, A.E. Schutte, J.M. Van Rooyen, M. Reimann, L. Malan, N.T. Malan, R. Schutte (2007) P.004: ETHNIC DIFFERENCES IN PULSE WAVE VELOCITY AND ITS RELATION TO BLOOD PRESSURE, Artery Research 1:2, 53–54, DOI: <https://doi.org/10.1016/j.artres.2007.07.061>

To link to this article: <https://doi.org/10.1016/j.artres.2007.07.061>

Published online: 21 December 2019

Poster Presentations

P.001

ACUTE EFFECTS OF NICOTINE ON PERIPHERAL AND CORONARY VASCULAR FUNCTION IN YOUNG NON-SMOKERS

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Background: Despite overwhelming evidence associating cigarette smoking with arterial stiffening, the precise mechanisms involved in this relationship are not fully understood. The aim of this study was to test the hypothesis that nicotine could increase aortic wave reflection and that this would be accompanied by an alteration in skin blood flow reactivity and a reduction in myocardial perfusion.

Materials and methods: We conducted a prospective study, divided into two experimental settings, in 21 healthy, non-smoker, male subjects. In the first setting (n=11), subjects received a placebo and a 2 mg nicotine tab, according to a randomized, double-blind, cross-over design. Each subject underwent measurements at baseline and for 1 hour post-nicotine or placebo, using the augmentation index (AIx) of the aortic pressure waveform to assess wave reflection. Endothelial function was evaluated twice, at baseline and 40 minutes after nicotine or placebo intake, using two hyperemic tests: skin heating (SkBF-H) and acetylcholine iontophoresis (SkBF-Ach). In the second experimental setting (n=10), subjects underwent an N-13 positron emission tomography (PET) study before and 60 minutes after 2 mg of nicotine, in order to quantify myocardial perfusion.

Results: Nicotine administration was associated with an increase in heart rate (HR) (P<0.001) and AIx corrected for HR (p=0.013) throughout the study. No microcirculatory effects of nicotine were observed on endothelial function as assessed by SkBF-h or SkBF-Ach. The subendocardial viability ratio was decreased (p=0.006), suggesting an impairment in myocardial perfusion induced by nicotine. This was confirmed by the N-13 PET studies, which revealed a reduction in resting myocardial perfusion (from 0.96 ± 0.07 to 0.84 ± 0.06 ml/min/g, p<0.05).

Conclusions: Nicotine does not impair endothelium-dependent microvascular vasomotricity. Nevertheless, exposure to small amounts of nicotine increase aortic wave reflection and reduces resting myocardial perfusion in non-smokers.

P.002

HABITUAL ANTIOXIDANT VITAMIN INTAKE, AUGMENTATION INDEX AND FLOW MEDIATED DILATION IN HYPERTENSIVE PATIENTS AND NORMOTENSIVE CONTROLS

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Objective: We evaluated the association of daily dietary intake of antioxidants vitamins C and E with augmentation index and endothelial function in untreated essential hypertensive (HT) patients and normotensive (NT) subjects.

Methods: Dietary intake of major nutrients, total caloric intake and antioxidant vitamins were assessed with the Italian EPIC questionnaire in 200 untreated HT patients and 130 NT subjects. Augmentation index (AIx) was determined with radial applanation tonometry. Endothelium-dependent response was assessed as flow mediated dilation (FMD) of the brachial artery by high resolution ultrasounds and computerized analysis (automatic edge detection system) of brachial artery diameter modifications.

Results: AIx was significantly higher in HT patients ($26.9 \pm 9.6\%$) as compared to NT subjects ($20.4 \pm 11.3\%$), whereas FMD resulted significantly lower (5.0 ± 2.5 vs 6.2 ± 2.7 ; p<0.001). Calculated intake of vitamin C and E was similar in HT patients and in NT subjects (Vitamin C median 146.4 ± 68.7 mg/day and 149.1 ± 84.0 mg/day, Vitamin E median 8.68 ± 2.7 mg/day and 8.63 ± 2.9 mg/day, respectively). Multivariate analyses were controlled for smoking, physical activity status and total caloric intake. In both groups, levels of Vitamin C or E intake were not significant predictors for AIx. Finally, in both groups, levels of Vitamin C or E intake were not significant predictors for FMD.

Conclusions: No association exists between normal levels of regular food antioxidant intake, augmentation index and endothelial function in untreated essential hypertensive patients and normotensive subjects. This

suggests that supplementation with vitamin C and E is necessary to show an effect on vascular function in this population.

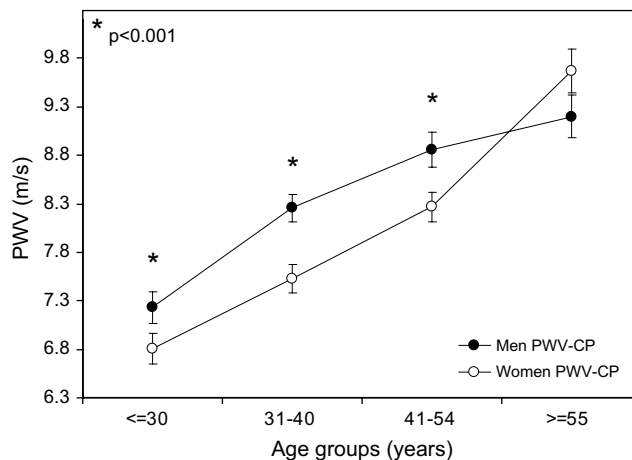
P.003

EFFECTS OF AGING ON PULSE WAVE VELOCITY IN AFRICAN MEN AND WOMEN

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Background: The pulse wave velocity (PWV) in Caucasian men and women is similar and show similar increases with aging. But women develop a greater pulse pressure (PP) with aging due to smaller body size (since the height, weight and DBP are higher in men)[1]. Africans have a smaller body size than Caucasians, and African women are shorter and usually more obese than men. **Aim:** To compare age-related changes in PWV of African men and women. **Methods:** In 182 African men and 192 women (aged 20 to 77 years), carotid-radialis (C-R) and carotid-dorsalis pedis (C-P) PWV determined with the Complior SP. Anthropometric measurements were also done.

Results: As expected women weighed significantly more than men and were shorter than men (p<0.001). Similar SBP, DBP and PP were shown for men and women (whole group), and in all age groups (except 31-40 yrs). PWV (adjusted for BP, obesity) was overall higher (p<0.001) in men than women, also in most age groups. Only the eldest female group showed a trend to have higher C-P PWV than men.



Conclusion: Africans show contrasting results compared to Caucasians, namely significant gender differences in distensibility of the peripheral arterial tree, which seems to disappear after menopause. [1] Smulyan et al. JACC 2001; 37:1374-80.

P.004

ETHNIC DIFFERENCES IN PULSE WAVE VELOCITY AND ITS RELATION TO BLOOD PRESSURE

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Introduction: It is known that African men suffer from high BP and vascular dysfunction. Normally a correlation exist between PWV and BP. However some studies show changes in PWV, independent of BP, possibly as a result of vascular remodeling [1].

Aim: To compare PWV in subjects of African and Caucasian ethnicity and its relation to BP.

Method: The study included 74 Caucasian and 64 African men from South Africa (aged 45-65 years). Cardiovascular parameters were recorded with the Finometer. The Complior SP was used to measure the carotid-radialis PWV.

Results: DBP and MAP were significantly higher in the Africans. SV and arterial compliance were significantly lower in the Africans but the TPR was significantly higher- an indication of vascular dysfunction. In the Africans the PWV was significantly higher than in the Caucasians (11.2 m/s vs 10.6 m/s). With the Bonferroni test (corrected for BP) the same results were found. In the

Caucasians there were significant positive correlations between DBP and MAP and PWV ($r=0.37$; $r=0.35$). This was not observed in the African group. When the groups were divided in tertiles according to SBP, the PWV was significantly higher in the third tertile in the Caucasians, but not in the Africans.

Conclusions: In the Caucasians the PWV increased with increasing BP, but no such increase was observed in Africans. Increased PWV in the Africans point to vascular changes independent of BP.

[1] Safar ME. *Hypertension*. 1998;156-161.

P.005

INCREASED ARTERIAL WALL STIFFNESS IN RESISTANT HYPERTENSIVE PATIENTS IN COMPARISON WITH ESSENTIAL HYPERTENSION

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Background/Aims: Arterial wall stiffness is considered as independent cardiovascular risk factor. Aim of this study was to compare arterial stiffness assessed by use of Pulse Wave Analysis (PWA) and carotid - femoral Pulse Wave Velocity (PWV) in resistant hypertensive patients to essential hypertensive patients and to normotensive control subjects (NCS).

Methods: 29 patients with resistant hypertension (RH), 35 patients with moderate to severe essential hypertension (EH) and 29 NCS were investigated. PWA and PWV were obtained using SphygmoCor applanation tonometer.

Results: PWV was significantly higher in RH group when compared to EH group and to NCS group while clinical blood pressure was comparable between RH and EH groups. However, 24h ABPM values were significantly higher in RH group than in EH group. There were no significant differences in age, duration of hypertension, body mass index (BMI), lipid profile, fasting glucose levels and creatinine levels between RH and EH groups. Carotid ultrasound and echocardiographical findings were comparable between RH and EH groups. PWV correlated with the presence of the diagnosis of RH, age, clinical SBP, brachial pulse pressure, mean 24h SBP, mean day SBP and mean night SBP. After multiple regression analysis, PWV remains significantly correlated only with the presence of the diagnosis of RH, age and with brachial pulse pressure. **Conclusions:** Patients with RH have increased arterial wall stiffness, represented by carotid-femoral PWV, when compared to EH patients. The greatest determinants of PWV are the presence of RH, age and brachial pulse pressure.

P.006

MEASUREMENT OF ARTERIAL PULSE WAVE VELOCITY SUPPORT THE SUSPICION OF ASYMPTOMATIC LEFT VENTRICULAR DYSFUNCTION IN HYPERTENSIVE PATIENTS WITH METABOLIC SYNDROME OR DIABETES MELLITUS

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Background: The aim of this study was to evaluate myocardial function and vascular wall elasticity using pulse wave velocity (PWV) between aorta and femoral artery in patients with hypertension and metabolic syndrome (MS) or type 2 diabetes mellitus (HT +DM).

Methods: Fifty – three patients (pts) with MS (age: 45,6 years body mass index (BMI): 31,75, blood pressure (BP) 150/94 mmHg and 57 pts with HT and DM type 2 (HT + DM) – (age: 62,9 years, BMI : 30,34, BP 156/101 mmHg and normal renal function were studied. LV function was assessed by brain natriuretic peptide plasma levels (BNP and NT pro BNP), echocardiographically detected ejection fraction (EF), pulsed doppler assessment of transmitral blood flow velocities (E, A, E/A ratio) and pulsed doppler tissue imaging (TDI) of velocities of mitral annular movements (Svm, Evm, Avm).

Results: Pts in both groups revealed normal systolic function of the LV (EF 65 % versus 61%) , pts with HT + DM had higher values of the LV mass than the group with MS (44,9 v.s. 54,0 g/height^{2,7}, $p=0.005$) Average values of PWV were lower in the group with MS than in HT + DM group (11,38m/s vs 12,79 m/s, $p=0.002$) as well as BNP (54,7 vs 141,12 pg/l, $p=0.005$) and NT pro BNP(66,5 vs 279,6 pg/l). In both groups of pts increased PWV was significantly correlated with TDI measurements indicating reduced diastolic function (PWV and E/Evm $r = 0,698$, $p<0,001$) and values of natriuretic peptides (PWV versus NT pro BNP $r = 0,776$, $p<0,001$).

Conclusions: Arterial stiffness in hypertensive pts revealed some relation to the LV dysfunction. The measurement of the PWV may contribute to the prediction of LV diastolic dysfunction in hypertensive pts with metabolic syndrome or diabetes mellitus.

P.007

REFERENCE VALUES FOR ARTERIAL STIFFNESS IN A SUB-SAHARAN AFRICAN POPULATION

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Objective: Unlike Caucasians, African subjects react with pronounced peripheral activation in response to stressors. To shed more light into the peripheral arterial characteristics of African people the current study was undertaken. Furthermore diagnostic thresholds for increased arterial stiffness were to be determined.

Methods and results: Pulse pressure (PP) and carotid-radial pulse wave velocity (PWV) was determined in normotensive men (N=383) and women (N=616) of African descent. PP and PWV was higher in men than women. Age had only a marginal effect on both parameters. Based on 95th prediction bands the following sex-specific thresholds for increased arterial stiffness at age 50 y were determined: men, 63 mmHg for PP and 16.5 m/s for PWV; women, 59 mmHg for PP and 14.9 m/s for PWV. These thresholds need adjustment by 0.7 mmHg and 0.2 m/s for men and 1.9 mmHg and 0.2 m/s for women for each decade that age differs from 50 years.

Conclusion: Normotensive men of African descent have stiffer arteries compared to their female counterparts. The determined thresholds can be used to diagnose increased arterial stiffness in middle-aged adults of African descent.

P.008

COMPARATIVE STUDY OF AUGMENTATION INDEX MEASURED BY TWO DIFFERENT DEVICES

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Background: Recent studies emphasize the significance of vessel wall properties estimations of large arteries not only for research purposes, but even in clinical practice already. The newly launched OMRON device measures the radial augmentation index (AIx) automatically. The aim of this study was to compare intra-individually this device to the long-term established Sphygmocor device in patients with manifest coronary heart disease and in addition to do an intra-device comparison of the OMRON device.

Methods: The investigated sample was one hundred randomly selected patients with manifest coronary heart disease, a random sub-sample of the Czech EuroAspire III study series. The measurements of the radial augmentation index were done in virtually similar conditions, in 60% twice using the HEM9000AI (OMRON) device and once the Sphygmocor (ATCor Systems) device, the rest of the sample was measured once by both devices.

Results: The OMRON device measured in average a higher AIx than the Sphygmocor device and this intraindividual difference is highly statistically significant. The median intraindividual difference between both devices was 17.4%. Both estimations significantly correlate, however, the correlation coefficient is for this kind of comparison rather low (about 0.44). In the OMRON intradevice comparison the median intraindividual difference was 1.9%.

Conclusion: The OMRON and Sphygmocor device estimations were in coronary patients not biologically equivalent. In conclusion, the OMRON device showed a very low variability and is applicable for estimation of the radial augmentation index in clinical use. However, the result from one device does not seem to be transferable to the other.

P.009

THE EFFECT OF SPIRONOLACTONE ON PULSE WAVE CHARACTERISTICS IN HYPERTENSION: INFLUENCE OF THE ALDOSTERONE TO RENIN RATIO (ARR)

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Background: Several lines of evidence suggest that aldosterone can have an adverse blood pressure independent effect on heart and blood vessels