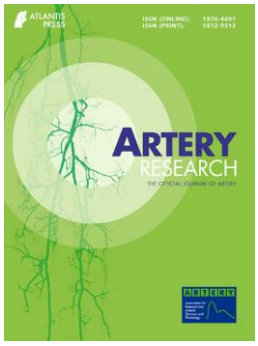

Artery Research

ISSN (Online): 1876-4401 **ISSN (Print): 1872-9312**
Journal Home Page: https://www.atlantis-press.com/journals/artres

P1.15: ASSESSING THE CORRELATES OF ARTERIAL STRUCTURE AND FUNCTION IN HEALTHY ADOLESCENTS

T.J. Bradley, C. Slorach, C. Manlhiot, W. Hui, T. Sarkola, E.T. Jaeggi, L. Mertens

To cite this article: T.J. Bradley, C. Slorach, C. Manlhiot, W. Hui, T. Sarkola, E.T. Jaeggi, L. Mertens (2012) P1.15: ASSESSING THE CORRELATES OF ARTERIAL STRUCTURE AND FUNCTION IN HEALTHY ADOLESCENTS, Artery Research6:4, 155–155, DOI: https://doi.org/10.1016/j.artres.2012.09.052

To link to this article: https://doi.org/10.1016/j.artres.2012.09.052

Published online: 21 December 2019

P1.14

NON-INVASIVE ASSESSMENT OF CARDIAC HEMODYNAMIC IN COPD

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Introduction: Chronic obstructive pulmonary disease (COPD) is a systemic disease associated with impaired cardiac function. A reduction in stroke volume and cardiac output can be present even with normal ejection fraction in these patients. The non-invasive cardiac output measurement (NICOM) is a simple tool to measure stroke volume (SV) and cardiac output (CO). The aim of this study is to examine the reproducibility of the NICOM in patients with COPD.
Method: The Assessment of Risk in Chronic Airways Disease Evaluation (ARCADE) is a longitudinal study of up to 1500 patients with COPD confirmed with spirometry. Thirty patients with no previous CVD were recruited and underwent height and weight measurements before SV and CO. A bio-reactance technique was used to measure CO and SV. These were repeated after mean (range) 7(1) days.
Results: Mean ±SD age of patients was 67±7 years, height 165±9.9 cm, weight 74.8±18.2 kg and BMI 27.2±4.7 Kg/m2. Mean SV was 83.6±20.6 ml and 81.6± 20.3 ml at visit 1 and 2 and CO was 5.7±1.1 was 5.7± 1.1 L/min respectively. Repeated measures ANOVA showed no significant difference between subject measurements (Both p-values >0.05). The interclass correlation coefficients (ICC's) were 0.93 and 0.99 respectively. The Bland and Altman plot shows no systematic bias with slight random error in both measures (Figure1 &2)
Conclusion: These data indicate that CO and SV are reproducible measured using the NICOM device in patients with COPD and maybe appropriate to assess cardiac function in clinical practice.

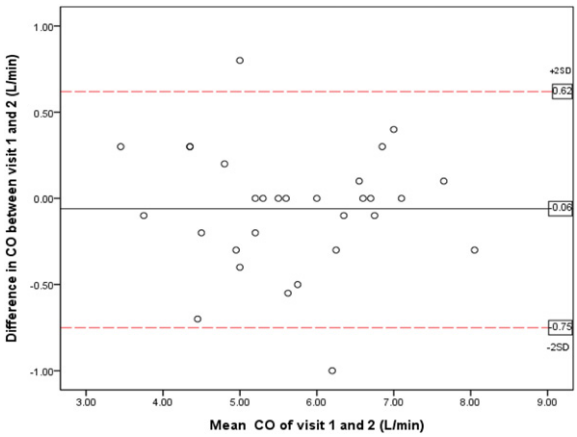

Figure 1 Bland and Altman plot for CO.

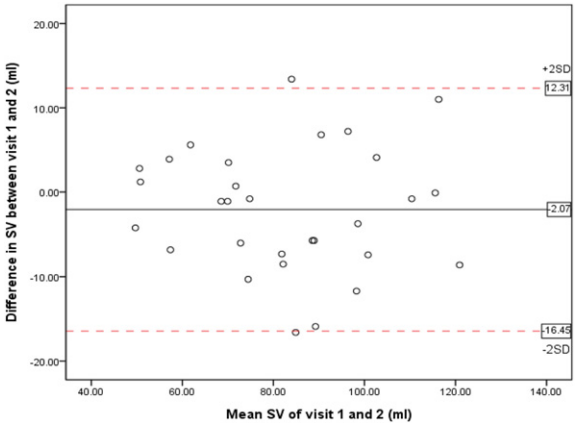

Figure 2 Bland and Altman plot for SV.

P1.15

ASSESSING THE CORRELATES OF ARTERIAL STRUCTURE AND FUNCTION IN HEALTHY ADOLESCENTS

T. J. Bradley, C. Slorach, C. Manlhiot, W. Hui, T. Sarkola, E. T. Jaeggi, L. Mertens
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Background: Abnormal measures of arterial structure and function are increasingly used in adolescent disease populations to predict cardiovascular risk. Limited information is available in healthy adolescents of the correlates of these measures when obtained by different non-invasive methods on the same occasion.
Methods: In 113 healthy adolescents (57 females, aged 10-18 years), carotid intima-media thickness (CIMT), flow-mediated dilatation (FMD), aortic pulse wave velocity (PWV) by applanation tonometry, central PWV by echo-Doppler and distension coefficients of the ascending aorta (DCaao) and common carotid artery (DCcca) were measured. Sample characteristics were assessed against a standard normal distribution. Relationships were tested with gender, age, body surface area (BSA), brachial systolic blood pressure (SBP) and heart rate (HR) using Pearson's correlations. Statistical significance was considered at $p<0.05$. Reproducibility studies (n=20), for intra-, inter-observer and test-retest coefficients of variation were respectively for CIMT 3.0, 7.4 and 4.6%, FMD baseline 1.4, 2.9 and 5.1%, and PWV 5.1, 6.0 and 8.8%.
Results: All vascular measures were normally distributed. Significant positive correlations (see Table) were found for: CIMT with BSA; aortic PWV with age, BSA and SBP; central PWV with age, BSA, HR and SBP; and DCaao with male gender. Significant negative correlations were found for: FMD with SBP; and DCaao and DCcca with age and BSA.
Conclusions: This normative dataset can now be used to determine abnormal arterial structure and function in adolescent disease populations. Of these vascular measures, aortic PWV appears to be the most dependent on increasing age, BSA, and SBP during adolescence.

Variable	CIMT	FMD	Aortic PWV	Central PWV	DCaao	DCcca
Mean±SD	0.431±0.046 mm	7.4±3.1 %	5.0±0.9 m/s	4.5±1.1 m/s	351±113 10^{-3} $mmHg^{-1}$	439±107 10^{-3} $mmHg^{-1}$
Gender 57F:56M	r=-0.03, p=0.73	r=+0.17, p=0.09	r=+0.07, p=0.46	r=-0.09, p=0.35	**r=+0.22, p=0.02**	r=+0.10, p=0.29
Age 14.4±2.1 yrs	r=+0.07, p=0.49	r=-0.08, p=0.43	**r=+0.51, p<0.001**	**r=+0.22, p=0.02**	**r=-0.28, p<0.001**	**r=-0.34, p<0.001**
BSA 1.58±0.25 m^2	**r=+0.25, p<0.01**	r=-0.04, p=0.69	**r=+0.45, p<0.001**	**r=+0.32, p<0.001**	**r=-0.31, p<0.001**	**r=-0.32, p<0.001**
HR 69±13 bpm	r=+0.11, p=0.27	r=+0.03, p=0.77	r=+0.16, p=0.11	**r=+0.24, p=0.01**	r=-0.06, p=0.54	r=-0.08, p=0.31
SBP 109±10 mmHg	r=+0.14, p=0.15	**r=-0.20, p=0.04**	**r=+0.36, p<0.001**	**r=+0.23, p=0.02**	-	-

P1.16

CLINICOPATHOLOGICAL FACTORS ASSOCIATED TO CENTRAL AORTIC PRESSURE PARAMETERS IN PATIENTS WITH HYPERTENSION

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Aim: To investigate association of central aortic pressure (CAP) parameters — augmentation index (AIx), augmentation index, normalized for heart rate 75/min (AIx75), augmentation pressure (AP), central systolic (SPa) and pulse pressure (PPa) with some clinical, laboratory and hemodynamic characteristics of patients with hypertension.

Material-Methods: 100 hypertensive patients at the age of 22—73 years (mean age 54±10,8) were examined, 43% men. Investigation included electrocardiography, echocardiography, determination of serum lipids, creatinine, creatinine clearance (CrCl) calculation, CAP registration using SphygmoCor device.

Results: AIx, AIx75, AP, PPa in women were higher than in men (30% vs. 20%; 28% vs. 17%; 14,5 vs. 8,7mmHg ($p<0,001$); 46,7 vs. 40,6mmHg ($p<0,05$); respectively), increased with older age ($r=0,28$; $r=0,23$; $r=0,36$; $r=0,33$ respectively; $p<0,05$), negatively correlated with CrCl ($r=-0,55$; $r=-0,56$; $r=-0,53$; $r=-0,34$ respectively; $p<0,05$). AIx, AIx75, AP negatively correlated with height and waist circumference ($r=-0,48$; $r=-0,61$; $r=-0,41$ and $r=-0,32$; $r=-0,36$; $r=-0,21$ respectively; $p<0,05$), positively - with LDL cholesterol ($r=0,22$; $r=0,22$; $r=0,24$ respectively; $p<0,05$). AIx, AIx75, AP, SPa correlated positively with late ventricular filling velocity ($r=0,23$; $r=0,29$; $r=0,26$; $r=0,27$ respectively; $p<0,05$). SPa correlated positively with myocardial mass ($r=0,24$; $p<0,05$), interventricular septum and posterior wall thickness ($r=0,36$ and $r=0,34$ respectively; $p<0,05$), negatively — with ratio between early and late ventricular filling velocity ($r=-0,28$; $p<0,05$). AIx and AIx75 negatively correlated with diameter of left atrium and end-diastolic diameter of left ventricle (LV) ($r=-0,23$; $r=-0,28$ and $r=-0,2$; $r=-0,29$ respectively; $p<0,05$).

Conclusions: As a result, parameters of CAP were associated with gender, age, anthropometric characteristics, renal disease, dyslipoproteinemia, LV hypertrophy and diastolic dysfunction.

P1.17

ARTERIAL STIFFNESS PARAMETERS AND AMBULATORY BLOOD PRESSURE MONITORING IN PATIENTS WITH HYPERTENSION

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Aim: To investigate correlation between ambulatory blood pressure monitoring (ABPM) parameters and central aortic pressure (CAP) parameters (which are the main indicators of arterial stiffness), such as: augmentation index (AIx); augmentation index, normalized for heart rate 75/min (AIx75); augmentation pressure (AP); central systolic (SPa) and pulse pressure (PPa) in patients with hypertension.

Material-Methods: 100 hypertensive patients at the age of 22—73 years (mean age 54±10,8) were examined, 57% women. Investigation included electrocardiography, echocardiography, ABPM, determination of serum lipids and creatinine. CAP was measured with applanation tonometry of radial artery using SphygmoCor device.

Results: Mean levels of AP, SPa, PPa positively correlated with 24h systolic BP (SBP) ($r=0,23$; $r=0,63$; $r=0,5$ respectively; $p<0,05$), 24h PP ($r=0,35$; $r=0,52$; $r=0,66$ respectively; $p<0,05$), daytime and nighttime SBP ($r=0,21$; $r=0,67$; $r=0,5$ and $r=0,19$; $r=0,5$; $r=0,44$ respectively; $p<0,05$), high BP load (HIdx) and area under curve (HIpt) of SBP ($r=0,19$; $r=0,6$; $r=0,47$ and $r=0,23$; $r=0,61$; $r=0,48$ respectively; $p<0,05$). AIx, AP, PPa negatively correlated with heart rate (HR) ($r=-0,22$, $p<0,05$). AIx, AIx75, AP, SPa correlated positively with the diurnal variability (SD) of SBP ($r=0,19$; $r=0,24$; $r=0,25$; $r=0,31$ respectively; $p<0,05$). SPa had positive correlation with 24h diastolic BP (DBP) ($r=0,44$; $p<0,05$), daytime and nighttime DBP ($r=0,48$ and $r=0,37$ respectively; $p<0,05$), HIdx and HIpt of DBP ($r=0,42$ and $r=0,45$ respectively; $p<0,05$), SD of DBP ($r=0,24$; $p<0,05$).

Conclusions: According to our study results, parameters of CAP positively correlates with all parameters of ABPM, except HR. Arterial wall stiffness increases in response to lower HR and/or higher BP during 24h.

P1.18

STATE OF TARGET-ORGANS IN GEORGIAN OBESE AND OVERWEIGHT HYPERTENSIVE SUBJECTS

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Obesity and hypertension (AH) are the most important related risk-factors of cardiovascular disease (CVD),so we examined differences in target-organ injury between obese and overweight hypertensive individuals. We studied 102 patients with mild to moderate AH (67males/35females, mean age 51,3±2,4years, BMI 30,9±1,9kg/m^2, duration of AH 4,6±1,4years). Examination included: ultrasound evaluation of left ventricular mass index (LVMMI), carotid artery IMT, of endothelial function of brachial artery; 24-hour BP monitoring. 49 overweight patients (25<BMI< 29,9kg/m^2) were assigned to group 1 and 53 obese patients (30kg/m^2) to gr 2.The groups were comparable by the age, duration of AH, daily mean BP values. Mean values of LVMMI (gr1:140,4±8,7gr/m; gr2:146,8±6,9gr/m) and IMT (gr1:1,02±0,03mm;gr2: 1,08±0,04mm) were certainly increased in obese patients compared with overweight ones ($p<0,001$). Prevalence of carotid atherosclerosis was higher in gr2 (79%vs67%). Endothelium — dependent vasodilatation (EDVD) (gr1:7,6±0,5;gr2:7,01±0,3%) was significantly reduced in obese patients ($p<0,01$), but occurrence of endothelial dysfunction was almost equal (gr1:59;gr2:60%). Occurrence of left ventricular hypertrophy (LVH) and especially of eccentric type was higher in gr2 (86vs81%; 38vs22 %, respectively), of concentric hypertrophy in gr1 (59vs48%). Normal geometry occurred only in gr1(4%). Number of *Non-Dippers* was higher in gr2(72vs67 %),of *Dippers* in gr1(30vs14 %). BMI positively correlated with IMT ($r = 0,25$, $p<0,02$) and LVMMI ($r = 0,41$, $p<0,01$) and negatively with EDVD ($r = -0,4$, $p<0,05$).Thus, in Georgian obese hypertensive subjects we detected more pronounced and frequent target-organ injury (mostly eccentric LVH, carotid artery affection - IMC thickening, endothelial dysfunction) and disorders of BP circadian profile comparing with overweight ones.

P1.19

FAMILY HISTORY OF CARDIOVASCULAR EVENTS, ARTERIAL STIFFNESS AND CENTRAL BLOOD PRESSURE: THE GUIMARÃES STUDY (STUDY TO DETERMINE THE CARDIOVASCULAR RISK OF THE POPULATION OF GUIMARÃES/VIZELA: PREVALENCE OF ARTERIAL STIFFNESS AND EARLY VASCULAR AGING SYNDROME)

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We observed 2123 subjects from two adjacent cities in the north of Portugal (Guimarães/Vizela) randomly selected from the population to include a cohort representative of age and gender distribution. We evaluated their clinical and metabolic characteristics. Relevant family history (FH) of cardiovascular events (CVE), Pulse Wave Velocity (PWV) and Central Blood Pressure measurements were collected. We considered positive FH (PFH) for CVE whenever one subject had two first degree family members with positive CVE history or one first degree relative with a premature CVE. Our goal is to understand if a PFH of CVE influences arterial stiffness (AS) / central hemodynamic parameters, increasing CV risk.

We found 227 subjects with strong PFH for CVE (61.2% females; mean global age of 65.5 years); they presented the following global mean values: PWV — 9.0 m/sec; Central SBP (cSBP) 134.0 mmHg; Central DBP (cDBP) — 79.6 mmHg; Central Pulse Pressure (cPP) — 54.5 mmHg; Augmentation Index (AI) — 34.1. When comparing these mean values with the ones of the remaining study population, we could find significant difference concerning PWV/ cSBP/ cDBP/ cPP / AI. When analysing the differences (concerning these variables) between the general population and the PFH population after dividing them by age classes, we could see that