European Heart Journal (2025) 46 (Suppl 1)
Cardiovascular Disease in Special Populations – Cardiovascular Disease in Special Populations: Paediatric Cardiology

Interrelationship of cardiovascular risk factors in early adulthood. The role of endothelial glycocalyx

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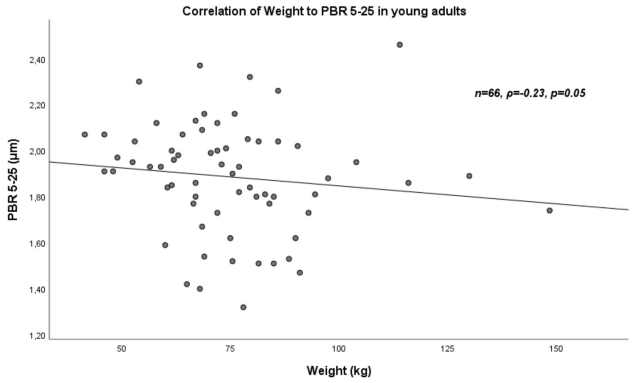
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Funding Acknowledgements: None.

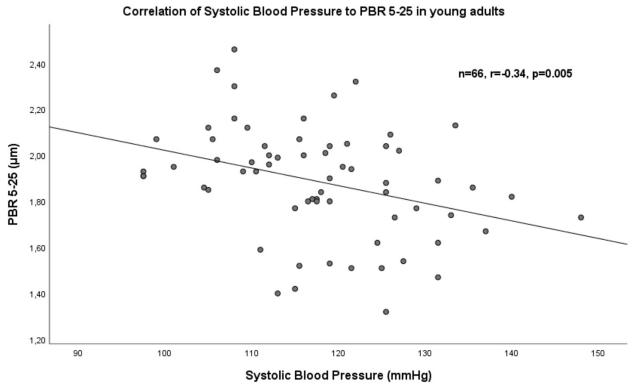
Baseline: The presence of obesity or/and arterial hypertension in young adults represent well recognized risk factors for later cardiovascular (CV) events during adult life. Obesity and arterial hypertension contribute to increased arterial stiffness, another important CV risk factor. The integrity of endothelial glycocalyx (EG), as part of the endothelium, plays a vital role in vascular permeability, inflammation, and elasticity and finally to CV disease. We investigated the relationship between obesity and arterial hypertension to target organ damage (TOD) as arterial stiffness and endothelial function in young adults.

Methods: A group of 66 healthy young adults, 16-26 years old, was evaluated regarding the presence of CV risk factors [obesity, systolic (SBP) and diastolic (DBP) blood pressure] and TOD (arterial stiffness, EG integrity). Carotid-femoral arterial stiffness (PWV) was measured by Complior apparatus. Increased perfusion boundary region (PBR) of the sublingual arterial microvessels (5-25 micrometers) was measured as a non-invasive accurate index of reduced EG thickness and subsequent endothelial dysfunction.

Results: Population was divided in Group A (young males, n=33, 20+2 years, BMI=27+5) and Group B (young females, n=33, 20+2 years, BMI=24+4). Young males had increased BMI (27+5 vs. 24+4, p=0.02), elevated SBP (124+9 vs. 111+8, p<0.001), increased PWV (8+1 vs. 7 +1m/sec, p=0.002) and reduced PBR5-25 (1.79+0.2 vs. 1.98+2μm, p=0.001) compared to young females. In the whole population, i. weight was related to PBR5-25 (ρ=-0.23, p=0.05), SBP (r=0.60, p<0.001), DBP (ρ=0.27, p=0.03) and PWV (r=.33, p=0.007) and ii. SBP was related to PBR5-25 (r=-0.34, p=0.005) and PWV (r=0.57, p<0.001). In a multiple regression analysis (age, weight and SBP were inserted as independent variables), we found that PBR5-9 was independently associated with SBP (beta=-0.59, p<0.001) and weight (beta=0.43, p=0.004) while PWV was independently associated with SBP (beta=0.56, p<0.001)

Conclusions: In early adulthood, independent associations between CV risk factors (obesity and arterial hypertension), and TOD (arterial stiffness and endothelial function) already exist. However, endothelial glycocalyx integrity remains despite weight and blood pressure increase. Our results underscore the need of primary prevention of future CV events by keeping body weight and BP within optimal levels, even in young adults.





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