

## The severity of lower extremity artery disease is associated with arterial stiffness parameters measured on the carotid artery

 **Majda Vrkić Kirhmajer**<sup>1\*</sup>,  
 **Ljiljana Banfić**<sup>1</sup>,  
 **Eduard Margetić**<sup>1</sup>,  
 **Irena Ivanac Vranešić**<sup>1</sup>,  
 **Milan Milošević**<sup>2</sup>

<sup>1</sup>University of Zagreb School of Medicine, University Hospital Centre Zagreb, Zagreb, Croatia

<sup>2</sup>University of Zagreb School of Medicine, Zagreb, Croatia

**KEYWORDS:** lower extremity artery disease, carotid stiffness.

**CITATION:** *Cardiol Croat.* 2017;12(9-10):384. | <https://doi.org/10.15836/ccar2017.384>

**\*ADDRESS FOR CORRESPONDENCE:** Majda Vrkić Kirhmajer, Klinički bolnički centar Zagreb, Kišpatićeva 12, HR-10000 Zagreb, Croatia. / Phone: +385-91-5273-592 / E-mail: [majda\\_vrkić@yahoo.com](mailto:majda_vrkić@yahoo.com)

**ORCID:** Majda Vrkić Kirhmajer <http://orcid.org/0000-0002-1340-1917> • Ljiljana Banfić <http://orcid.org/0000-0002-4538-8980>  
 Eduard Margetić <http://orcid.org/0000-0001-9224-363X> • Irena Ivanac Vranešić <http://orcid.org/0000-0002-6910-9720>  
 Milan Milošević <http://orcid.org/0000-0001-9008-7645>

**Background:** Previous studies have found interaction between lower extremity artery disease (LEAD) and systemic vascular effects.<sup>1-3</sup> Little is known about association of LEAD and carotid artery stiffness (AS). The aim of this study is to investigate the correlation between carotid stiffness parameters, intima-media thickness (IMT) and severity of LEAD.

**Patients and Methods:** Cross-sectional study of 120 patients with LEAD was performed (mean age 64.6 ± 8.6 years, 85 males, mean ABI 0.65 ± 0.15). The diagnosis of LEAD was defined as ABI ≤ 0.9. Patients were divided into two groups: mild LEAD (ABI from 0.9 to 0.71) and advanced LEAD (ABI ≤ 0.7). Local stiffness β index, one-point pulse wave velocity (PWV-β), elastic modulus (Ep), arterial compliance (AC), augmentation index (AI) and IMT were measured on common carotid artery by high-resolution ultrasonography and Echo-tracking technology. Patients with severe renal impairment and those with moderate and severe heart valve disease or reduced left ventricular ejection fraction (< 40%) were excluded from this study.

**Results:** Out of 120 patients, 39 had mild LEAD (mean ABI 0.81 ± 0.07) and 81 had advanced LEAD (mean ABI 0.57 ± 0.11). Symptomatic LEAD was significantly more frequent in patients with advanced LEAD (59% vs. 93.8%, p < 0.001). No significant differences were found in demographic and laboratory findings (age, gender, body mass index, history of diabetes, smoking, hypertension and hyperlipidemia, fasting blood glucose, serum creatinine, total cholesterol, triglycerides, HDL and LDL cholesterol). Three arterial stiffness parameters: β index, PWV-β and Ep, were significantly higher in advanced forms of LEAD (β index median: 8.1, interquartile range (IQR) [6.7-10.0] vs. 9.4 [7.9-11.1], p = 0.008; PWV-β median: 6.4, IQR [5.9-7.2] vs. 6.9 [6.3-7.5] m/s, p = 0.031; Ep median: 112, IQR [89-139] vs. 127 [107-154] kPa, p = 0.025). Augmentation index, arterial compliance and IMT did not significantly differ between groups (p = 0.862, p = 0.434 and p = 0.060, respectively).

**Conclusion:** In comparison with mild LEAD, patients with advanced forms of LEAD have higher carotid stiffness parameters (β index, PWV-β and Ep). Further studies are needed to assess the clinical importance of arterial stiffness in LEAD, targeting AS for potential therapies in order to improve management of LEAD.

**RECEIVED:**  
September 24, 2017

**ACCEPTED:**  
September 26, 2017



### LITERATURE

- Husmann M, Jacomella V, Thalhammer C, Amann-Vesti BR. Markers of arterial stiffness in peripheral arterial disease. *Vasa.* 2015 Sep;44(5):341-8. <https://doi.org/10.1024/0301-1526/a000452>
- Claridge MW, Bate GR, Hoskins PR, Adam DJ, Bradbury AW, Wilmink AB. Measurement of arterial stiffness in subjects with vascular disease: Are vessel wall changes more sensitive than increase in intima-media thickness? *Atherosclerosis.* 2009 Aug;205(2):477-80. <https://doi.org/10.1016/j.atherosclerosis.2008.12.030>
- Husmann M, Dörrfler-Melly J, Kalka C, Diehm N, Baumgartner J, Silvestro A. Successful lower extremity angioplasty improves brachial artery flow-mediated dilation in patients with peripheral arterial disease. *J Vasc Surg.* 2008 Nov;48(5):1211-6. <https://doi.org/10.1016/j.jvs.2008.06.039>