The official journal of the Japan Atherosclerosis Society and
the Asian Pacific Society of Atherosclerosis and Vascular Diseases

Editorial

J Atheroscler Thromb, 2019; 26: 1043-1044. http://doi.org/10.5551/jat.ED112

The Ankle–Brachial Index and Risk of Chronic Kidney Disease

Toshiaki Nakano

Department of Medicine and Clinical Science, Graduate School of Medical Sciences, Kyushu University, Fukuoka, Japan

See article vol. 26: 1054-1061

Accumulating evidences have indicated that chronic kidney disease (CKD) is associated with increased risk of cardiovascular disease and death[1, 2]. Patients with CKD are frequently associated with the presence of atherosclerotic diseases[2-4]. The underlying diseases of patients with CKD, e.g., hypertension, diabetes, and dyslipidemia, may affect arteriosclerosis and atherosclerosis and reduce kidney function.

Recently, Sonoda *et al.* reported that the ankle–brachial index (ABI) can predict incident CKD[5]. They observed that an ABI value of 0.90–0.99 in a general Japanese population without CKD was associated with an increased risk of incident CKD, independent of the traditional cardiovascular risk factors. Previous studies have also demonstrated that an ABI value of <0.90 predicted decline in kidney function in the general Western population[6]. Further, autopsy studies have revealed that asymptomatic plaques in the common iliac arteries were associated with generalized atherosclerosis and renal failure[7]. Additionally, Kasiske *et al.* suggested that internal vascular disease and glomerulosclerosis that occurred in aging individuals were linked to generalized atherosclerosis[8]. Based on these evidences, lower ABI, suggesting generalized atherosclerosis, is associated with glomerulosclerosis and arteriosclerosis in the renal interstitium and can predict decline in kidney function.

A previous study showed that elderly individuals with CKD were also at increased risk of severe coronary artery disease[2]. El Nahas concepted that CKD in elderly is a manifestation of an age-related diffuse vascular damage affecting a number of organs, including the kidneys, heart, brain, and eyes[9]. Based on this concept, a large part of CKD is related to traditional and age-related vascular risk factors, which cause generalized atherosclerosis, suggesting a strong association between kidney function and atherosclerotic diseases, e.g., coronary artery disease and peripheral artery disease (Fig. 1).

Furthermore, Sonoda *et al.* suggested that higher ABI values are associated with a relatively increased risk of CKD. Although not statistically significant, ABI is elevated in the presence of medial artery calcification and incompressible vessels[10]. Medial artery calcification, i.e., Mönchеberg's arteriosclerosis, is the calcification of the tunica media of medium-sized vessels, and it affects patients with end-stage kidney disease or diabetes. In this study, individuals with higher ABI values possibly contained vessels with calcification. Further studies are needed to clarify whether higher ABI values predict the incidence of CKD.

The study conducted by Sonoda *et al.*[5] is the first report about the relationship between ABI and the incidence of CKD in the Japanese population, and it provides substantial information for clinical practice. Further clinical studies are warranted to accumulate evidence associated with ABI and incidence of CKD.

Conflicts of Interest

None.

References

1) Tonelli, M, Karumanchi, SA and Thadhani, R: Epidemiology and Mechanisms of Uremia-Related Cardiovascular Disease. Circulation, 2016; 133: 518-536
2) Drueke, TB and Massy, ZA, Atherosclerosis in CKD: differences from the general population. Nat Rev Nephrol, 2010; 6: 723-735
3) Ito, R, Kumada, Y, Ishii, H, Kamoi, D, Sakakibara, T, Umemoto, N, Takahashi, H and Murihara, T: Clinical Outcomes after Isolated Infrapopliteal Revascularization

Address for correspondence: Toshiaki Nakano, Department of Medicine and Clinical Science, Graduate School of Medical Sciences, Kyushu University, Fukuoka, Japan E-mail: toshink@med.kyushu-u.ac.jp

Received: April 3, 2019 Accepted for publication: May 20, 2019

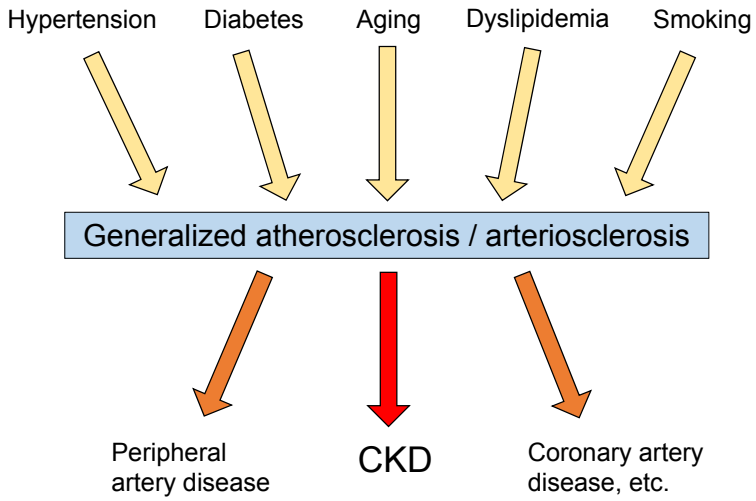

Fig 1. Generalized atherosclerosis causes CKD and vascular diseases

in Hemodialysis Patients with Critical Limb Ischemia: Endovascular Therapy versus Bypass Surgery. J Atheroscler Thromb, 2018; 25: 799-807
4) Watanabe, I, Tatebe, J, Fujii, T, Noike, R, Saito, D, Koike, H, Yabe, T, Okubo, R, Nakanishi, R, Amano, H, Toda, M, Ikeda, T and Morita, T: Prognostic Utility of Indoxyl Sulfate for Patients with Acute Coronary Syndrome. J Atheroscler Thromb, 2019; 26: 64-71
5) Sonoda, H, Nakamura, K and Tamakoshi, A: Ankle-brachial index is a predictor of future incident chronic kidney disease in a general Japanese polulation. J Atheroscler Thromb, 2019; 26: 1054-1061
6) O'Hare, AM, Rodriguez, RA and Bacchetti, P: Low ankle-brachial index associated with rise in creatinine level over time: results from the atherosclerosis risk in communities study. Arch Intern Med, 2005; 165: 1481-1485
7) Nakamura, E, Sato, Y, Iwakiri, T, Yamashita, A, Moriguchi-Goto, S, Maekawa, K, Gi, T and Asada, Y: Asymptomatic Plaques of Lower Peripheral Arteries and Their Association with Cardiovascular Disease: An Autopsy Study. J Atheroscler Thromb, 2017; 24: 921-927
8) Kasiske, BL: Relationship between vascular disease and age-associated changes in the human kidney. Kidney Int, 1987; 31: 1153-1159
9) El Nahas, M: Cardio-Kidney-Damage: a unifying concept. Kidney Int, 2010; 78: 14-18
10) Breznik, S, Ekart, R, Hren, M, Rupreht, M and Balon, BP: Radiographic assessment of vascular calcification, aortic pulse wave velocity, ankle-brachial index and fibroblast growth factor-23 in chronic hemodialysis patients. Ther Apher Dial, 2013; 17: 378-383