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# Cardiovascular protective effect of Indonesian herbal medicine in spontaneously hypertensive rats

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Background: Recently, abundant evidence demonstrate that the use of complementary and alternative medicine (CAM) in the treatment of various health conditions included hypertension, cardiovascular diseases (CVDs), dyslipidemias, and diabetes mellitus is reaching tremendously achievement in the USA and worldwide. Medicinal plants Centella asiatica leaves and Justicia gendarussa leaves and Imperata cylindrica (CJI) root are known as an Indonesian traditional medicine to treat hypertension. In addition, we found that the decoction of these plants (CJID) improved vascular structure by reducing media thickening in spontaneously hypertensive rats (SHRs). Therefore, in this study, we explored whether CJID prevents hypertension-induced left ventricular hypertrophy (H-LVH) and vascular remodeling (VR) through the NOXs-induced oxidative stress inhibition pathway in SHRs. Method and Results: SHRs and normotensive-WKY rats were both randomly divided into 2 groups: CJID and control. After 5 weeks treatment, systolic blood pressure (SBP), heart rates (HR), LV function, and performance were measured. We found that in CJID-treated group of SHRs, SBP and HR were significantly decreased; morphometry and function of LV improved; media thickness, collagen and elastic accumulation attenuated in the thoracic aorta; LDH and MDA decreased in the serum, but SOD and NO increased; the tissue levels of MDA were reduced, but SOD contents raised; superoxide and H2O2 generation were decreased both in LV and thoracic aorta. CJID caused the expressions of NOX1, NOX2, NOX4 in LV and thoracic aorta to be suppressed. Furthermore, iNOS, ratio of p-I$\kappa$B$\alpha$-I$\kappa$B$\alpha$ and NF-$\kappa$B-p65 expressions were decreased in the thoracic aorta. Conclusions: CJID prevents H-LVH and VR by reducing ROS production via the NOXs-dependent pathway. These findings reveal that CJI protects CVDs in hypertension.