Association of Blood Pressure Variability and Intima-Media Thickness with White Matter Hyperintensities in Hypertensive Patients

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Abstract

Background White matter hyperintensities (WMH) is a manifestation of cerebral small vessel disease, its extensive lesions are related to the risk of many diseases. It has been identified more prevalent in people with hypertension, so timely prediction the WMH burden of hypertensive patients in primary care is important. Parameters of ambulatory blood pressure variability (ABPV), ambulatory blood pressure (ABP) and carotid intima-media thickness (IMT) are closely associated with WMH burden, but few studies have focused on establishing effective models based on ABP, ABPV and IMT to predict the WMH burden.

Objective We aimed to investigate the association of ABP, ABPV and IMT with the WMH burden in hypertensive individuals, and to evaluate the value of predictive model based on ABP, ABPV and IMT.

Methods We retrospectively enrolled 150 hypertensive inpatients for physical examinations in our hospital between February, 2018 to January, 2019. We collected basic clinical information on all subjects, as well as measuring the Fazekas scale (quantifies the amount of white matter T2 hyperintense lesions) and measurements for ABP, ABPV and IMT. We classified patients into heavy burden of WMH group when their Fazekas scale grade was ≥ 2. We analyzed the association between all measurements and the WMH burden. Multivariate analysis was performed to assess whether ABP, ABPV and IMT were independently associated with WMH and we used receiver operating characteristic(ROC) to evaluate the value of predictive model based on metrics of ABP, ABPV and IMT.

Results Higher WMH grade was associated with increasing age, diabetes mellitus, higher CH, higher LDL, higher IMT, higher 24-hSBP, higher daytime SBP, higher nocturnal SBP, and higher 24-hSBP-SD; 24-hSBP (AUC:0.688, 95%CI:0.594-0.783, P:0.020), 24-hSBP-SD (AUC:0.742, 95%CI:0.653-0.830, P:0.001) and IMT (AUC:0.711,95%CI:0.622-0.819, P:0.001) were independently related to the burden of WMH even after adjusting for the clinical variables. A comprehensive ROC model with a higher predictive capacity using these three parameters was created to assess the WMH burden in patients with hypertension.

Conclusions Establishing a model based on 24-hSBP, 24-hSBP-SD, and IMT might provide a new approach for enhancing the accuracy of diagnosis of WMH using metrics in 24-hABPM and carotid ultrasound.