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Research Article

Clinic and ambulatory blood pressure in a population-based sample of African Americans: the Jackson Heart Study

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Abstract

Blood pressure (BP) can differ substantially when measured in the clinic versus outside of the clinic setting. Few population-based studies with ambulatory blood pressure monitoring (ABPM) include African Americans. We calculated the prevalence of clinic hypertension and ABPM phenotypes among 1016 participants in the population-based Jackson Heart Study, an exclusively African-American cohort. Mean daytime systolic BP was higher than mean clinic systolic BP among participants not taking antihypertensive medication (127.1[standard deviation 12.8] vs. 124.5[15.7] mm Hg, respectively) and taking antihypertensive medication (131.2[13.6] vs. 130.0[15.6] mm Hg, respectively). Mean daytime diastolic BP was higher than clinic diastolic BP among participants not taking antihypertensive medication (78.2[standard deviation 8.9] vs. 74.6[8.4] mm Hg, respectively) and taking antihypertensive medication (77.6[9.4] vs. 74.3[8.5] mm Hg, respectively). The prevalence of daytime hypertension was higher than clinic hypertension for participants not taking antihypertensive medication (31.8% vs. 14.3%) and taking antihypertensive medication (43.0% vs. 23.1%). A high percentage of participants not taking and taking antihypertensive medication had nocturnal hypertension (49.4% and 61.7%, respectively), white-coat hypertension (30.2% and 29.3%, respectively), masked hypertension (25.4% and 34.6%, respectively), and a nondipping BP pattern (62.4% and 69.6%, respectively). In conclusion, these data suggest hypertension may be misdiagnosed among African Americans without using ABPM. J Am Soc Hypertens 2017;■(■):1–9.

Keywords: Ambulatory blood pressure monitoring; masked hypertension; nocturnal hypertension; nondipping.

Supplemental Material can be found at www.ashjournal.com.

Conflict of interest: None.

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Blood pressure (BP) often differs when measured in the clinic and outside of the clinic setting.[1] Ambulatory blood pressure monitoring (ABPM) may provide a better estimate of an individual's BP than measurements taken during a clinic visit by obtaining measurements every 15 to 30 minutes, typically over 24 hours, as well as measuring BP in a more natural environment.[2,3] In addition to obtaining mean BP levels, several measures can be determined from ABPM including daytime, nocturnal, and 24-hour hypertension and a nondipping BP pattern. ABPM can also be used to identify mismatches between clinic and out-of-clinic BP levels including white-coat and masked hypertension.[1–3] Several ABPM phenotypes including masked hypertension, nocturnal hypertension, and a nondipping BP pattern have been associated with an increased risk for target-organ damage and cardiovascular disease (CVD) outcomes, independent of clinic BP levels.[4–6]

Previous population-based studies have reported a high prevalence of ABPM phenotypes in whites and Asians, but few data exist on the prevalence of ABPM phenotypes in the general population of African Americans.[7] The prevalence of hypertension, based on clinic BP measurements, is high among African Americans.[8,9] Additionally, a high prevalence of nocturnal hypertension and nondipping BP has been reported in African Americans.[10–13] However, many of these studies were performed in narrowly defined clinic populations (eg, patients with kidney disease) with relatively small sample sizes. Population-based studies of African Americans are needed to obtain accurate prevalence estimates of ABPM phenotypes. If the prevalence of ABPM phenotypes is high in African Americans, it may support the use of ABPM in this population. Therefore, we determined mean BP levels based on clinic measurements and ABPM and the prevalence of clinic hypertension and ABPM phenotypes in the Jackson Heart Study (JHS), a population-based study comprised exclusively of African Americans.

Methods

Study Population

The JHS is a population-based study designed to investigate CVD in African Americans. Details regarding the design of the JHS have been published elsewhere.[14,15] The JHS enrolled 5306 African Americans, 20–95 years of age, between 2000 and 2004 from urban and rural areas of three counties (Hinds, Madison, and Rankin) that comprise the Jackson, Mississippi metropolitan area. We conducted a cross-sectional analysis using JHS data from the baseline examination among participants who underwent ABPM (n = 1146). We restricted these analyses to 1016 participants with a complete ABPM recording (defined below), clinic BP measurements, and information on self-reported antihypertensive medication use. The protocol for the JHS was approved by the institutional review boards at the participating institutions, including Jackson State University, Tougaloo College, and the University of Mississippi Medical Center. All participants provided written informed consent prior to participation. The analyses of JHS data for the current manuscript were approved by the Institutional Review Board at the University of Alabama at Birmingham.

Data Collection

Baseline data were collected during an in-home interview and a clinic examination. Interviewer-administered questionnaires were used to collect information on age, sex, highest level of education obtained, current smoking, self-reported medication use, and history of CVD. Antihypertensive medication use was determined by self-report, and statin use was defined based on a pill bottle review. During the examination, trained staff measured height, weight, and clinic BP. Body mass index was calculated as weight in kilograms divided by height in meters squared. Current smoking was defined by affirmative responses to the questions "Have you smoked >400 cigarettes in your lifetime?" and "Do you now smoke cigarettes?" Fasting total cholesterol, serum glucose, and hemoglobin A1c (HbA1c) were measured from blood samples obtained during the clinic examination. Diabetes was defined as a fasting glucose ≥126 mg/dL, HbA1c ≥ 6.5% (48 mmol/mol), or use of insulin or other glucose lower medications within 2 weeks prior to the examination. Urinary albumin and creatinine were quantified from a 24-hour urine collection or from a spot urine sample using the nephelometric immunoassay and enzymatic methods, respectively.[15] Albuminuria was defined as a urinary albumin/creatinine ratio ≥30 mg/g. Estimated glomerular filtration rate (eGFR) was calculated using the Chronic Kidney Disease Epidemiology Collaboration equation.[16] Reduced eGFR was defined as <60 mL/min/1.73 m^2. Chronic kidney disease was defined by the presence of albuminuria or reduced eGFR. History of CVD was defined as a history of myocardial infarction per self-report or electrocardiogram, self-reported history of carotid angioplasty, or self-reported history of stroke. Following the clinic examination, a subset of participants completed ABPM.

Clinic BP Measurements

Clinic BP was measured by trained staff using a Hawksley random zero sphygmomanometer and Littman stethoscope following a standardized protocol. Each participant's right arm circumference was measured at the midpoint of the upper arm to determine the appropriate cuff size. Participants rested for 5 minutes prior to their BP measurement. Two BP measurements were taken 1 minute apart, while the participant was seated in an upright position with their feet flat on the floor and back supported. The average of these two measurements was used for the