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COMMENTARY

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# Ambulatory blood pressure threshold for black Africans: more questions than answers

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Racial differences in blood pressure (BP) levels are well documented.[1] In the United States, several European countries and South Africa, blacks have more hypertension than whites and have poorer hypertension-related morbidity and mortality.[2–4] Attempts in previous studies to explain the pathogenetic mechanisms behind this disparity in BP levels and the response to BP-lowering drugs remain inconclusive. Despite seemingly similar genetic background, similarities in the epidemiology of hypertension between African Americans and black Africans is uncertain.[5] Yet, incidences of worse cardiovascular outcomes such as stroke, heart failure, and kidney failure are increasing among African Americans.[6]

Out-of-office BP measurements (ambulatory or home BP monitoring) are better predictors of cardiovascular events than office/clinic BP measurement. While the relationship between BP and cardiovascular risk events is continuous and there is no cutoff for risk predictions, defining thresholds for diagnosis of hypertension is necessary for the management of hypertension.[7] Several guidelines, scientific statements, and position papers have proposed BP thresholds for identifying ambulatory hypertension for Europeans, Japanese, and recently African Americans.[8] Efforts by Ravenell and colleagues[9] to define the threshold for ambulatory BP (ABP) levels in African Americans is commendable considering the implication on African Americans specifically and the likelihood of providing a better proximate utility for African blacks who share similar ancestry. It is also important because of the higher burden of hypertension in African Americans, earlier onset of the disease, and greater proportion of worse cardiovascular outcomes compared with whites.[10,11] Healthcare providers in sub-Saharan Africa, in light of a paucity of similar criteria among black Africans, may be tempted to utilize previous criteria, which may underestimate or overestimate the burden as well as underdiagnose or overdiagnose cases of hypertension.[12]

In this regard, we evaluated various published ABP thresholds on data from black Africans in the Ibadan Ambulatory Blood Pressure Registry in Nigeria. Data from this registry, which comprises data from 433 adults (mean age 55.02 ± 14.9 years, 54.3% women, and 63.3% with hypertension [Table 1]) with complete ABP monitoring readings, were analyzed for definition of ambulatory hypertension using thresholds from the Jackson Heart Study, IDACO (International Database on Ambulatory Blood Pressure Monitoring in Relation to Cardiovascular Outcomes), and European Society of Cardiology (ESC) guidelines[13] (Table 2). As shown in Table 3, deducing from the Jackson Heart Study, the prevalence of nocturnal and isolated nocturnal hypertension were lower compared with IDACO and ESC guidelines, while the white-coat effect was higher for the Jackson Heart Study thresholds.

  

**TABLE 1** Participant characteristics

| Variables | Normotension (n = 159) | Hypertension (n = 274) | *P* value |
|---|---|---|---|
| Age | 50.84 ± 14.1 | 57.43 ± 14.8 | <.0001 |
| Sex (men/women) | 61/98 | 137/137 | .019 |
| Body mass index | 26.32 ± 5.1 | 26.43 ± 5.4 | .878 |
| Hip circumference | 88.6 ± 19.2 | 87.28 ± 17.5 | .537 |
| Waist circumference | 82.44 ± 15.7 | 83.83 ± 14.7 | .431 |
| Clinic systolic blood pressure | 120.69 ± 12.1 | 157.48 ± 20.3 | <.0001 |
| Clinic diastolic blood pressure | 74.50 ± 8.9 | 92.51 ± 14.1 | <.0001 |

events among black Africans. Early risk stratification for prompt intervention is the bedrock of prevention of major cardiovascular events. Whether using Jackson Heart Study thresholds in black Africans will result in underestimation of cardiovascular risk is unknown. Nocturnal "masked" hypertension may be overdiagnosed if ESC guidelines or IDACO thresholds are used. What is clear is the fact that lower prevalence of daytime and nocturnal hypertension in our study findings confirmed one of the conclusions of the Jackson Heart Study. However, a large-scale prospective study is required among black Africans to validate the predictive values of the ABP thresholds from the Jackson Heart Study. If the same finding is confirmed in black Africans, revision of guidelines based on race may be warranted.

**TABLE 2** Ambulatory blood pressure thresholds proposed for hypertension diagnosis

| Criteria | Jackson Heart Study | IDACO | ESC guideline |
|---|---|---|---|
| 24-h Hypertension | ≥135/80 mm Hg | ≥130/80 mm Hg | ≥130/80 mm Hg |
| Daytime hypertension | ≥140/85 mm Hg | ≥140/85 mm Hg | ≥135/85 mm Hg |
| Nighttime hypertension | ≥130/75 mm Hg | ≥120/70 mm Hg | ≥120/70 mm Hg |

ESC, European Society of Cardiology; IDACO, International Database on Ambulatory Blood Pressure Monitoring in Relation to Cardiovascular Outcomes.

**TABLE 3** Prevalence of hypertension by various ambulatory blood pressure thresholds[a]

| | Jackson Heart Study, No. (%) | | IDACO, No. (%) | | ESC guideline, No. (%) | |
|---|---|---|---|---|---|---|
| Variables | Normotension | Hypertension | Normotension | Hypertension | Normotension | Hypertension |
| 24-h Hypertension | 31 (19.5) | 147 (53.6) | 33 (20.8) | 159 (58.0) | 33 (20.8) | 159 (58.0) |
| Daytime hypertension | 22 (13.8) | 118 (43.1) | 22 (13.8) | 118 (43.1) | 22 (13.8) | 129 (47.1) |
| Nocturnal hypertension | 28 (18.5) | 144 (54.3) | 57 (37.7) | 193 (72.8) | 57 (37.7) | 193 (72.8) |
| Isolated nocturnal hypertension | 13 (46.4) | 45 (31.3) | 39 (68.4) | 86 (44.6) | 39 (68.4) | 76 (39.4) |
| White-coat hypertension | 0 (0.00) | 189 (69.0) | 0 (0.00) | 189 (69.0) | 0 (0.00) | 167 (60.9) |
| Masked daytime hypertension | 22 (13.8) | 0 (0.00) | 22 (13.8) | 0 (0.00) | 22 (13.8) | 0 (0.00) |

ESC, European Society of Cardiology; IDACO, International Database on Ambulatory Blood Pressure Monitoring in Relation to Cardiovascular Outcomes.

[a]Normotension and hypertension are significantly different ($P < .001$) under each threshold for every variable except for isolated nocturnal hypertension under the Jackson Heart Study threshold.

Interestingly, 13.8% of our study population had masked daytime hypertension, which was similar across the three thresholds, but masked nocturnal hypertension was higher by IDACO and ESC guidelines. Thus, findings from our evaluation of various published ABP thresholds on data from African blacks in the Ibadan Ambulatory Blood Pressure Registry leave us with more questions than answers and hence emphasize the need for large prospective studies in sub-Saharan Africa, such as the Jackson Heart Study, to determine which ABP threshold predicts cardiovascular events in black Africans.

While the incorporation of routine ABP measurement into standard practice in Africa is desirable, the definition of ABP phenotypes remains a challenge. Currently there is a dearth of data on which of the published thresholds predicts cardiovascular

## CONFLICT OF INTEREST

None.

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