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RAPID COMMUNICATIONS
Arterial hypertension

Discrepancies between office and home blood pressure targets in patients with hypertension according to the 2024 European Society of Cardiology Hypertension Guidelines

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Hypertension is a major modifiable cardiovascular risk factor,[1] but most of hypertension-associated risk still arises from the failure of achieving target blood pressure (BP) levels.[2] The 2024 European Society of Cardiology (ESC) Guidelines for the management of elevated BP and hypertension (2024-ESC) have recommended office BP (OBP) targets between 120 and 129/70 and 79 mmHg for patients treated with anti-hypertensive (AH) medications, with similar goals for out-of-office BP measurements, using ambulatory or home BP monitoring (HBPM).[3] These guidelines favour out-of-office BP monitoring[3] due to its stronger association with prognosis compared with OBP.[4] However, HBPM values are generally lower than OBP values,[5–7] which may lead to inconsistencies in BP management. Therefore, assessing the alignment of OBP and HBPM targets in real-world settings is essential to gauge the potential need for adjustments. This study evaluated the concordance between 2024-ESC BP categories measured by OBP and HBPM in a large AH-treated patient sample.

We conducted a cross-sectional analysis of 51 194 consecutive patients with hypertension using AH medications, aged ≥18 years, from 1045 Brazilian centres, who had undergone both OBP and HBPM between 2017 and 2022, using an online platform (www.telemrpa.com). The Oswaldo Cruz University Hospital/PROCAPE Ethics Committee approved the study and waived informed consent (CAAE: 39276920.9.0000.5192).

Data on age, sex, body mass index (BMI), use of AH and antidiabetic medications, OBP, and HBPM were collected from participants. All BP measurements were performed with participants seated, using appropriately sized arm cuffs. Office blood pressure and HBPM followed a

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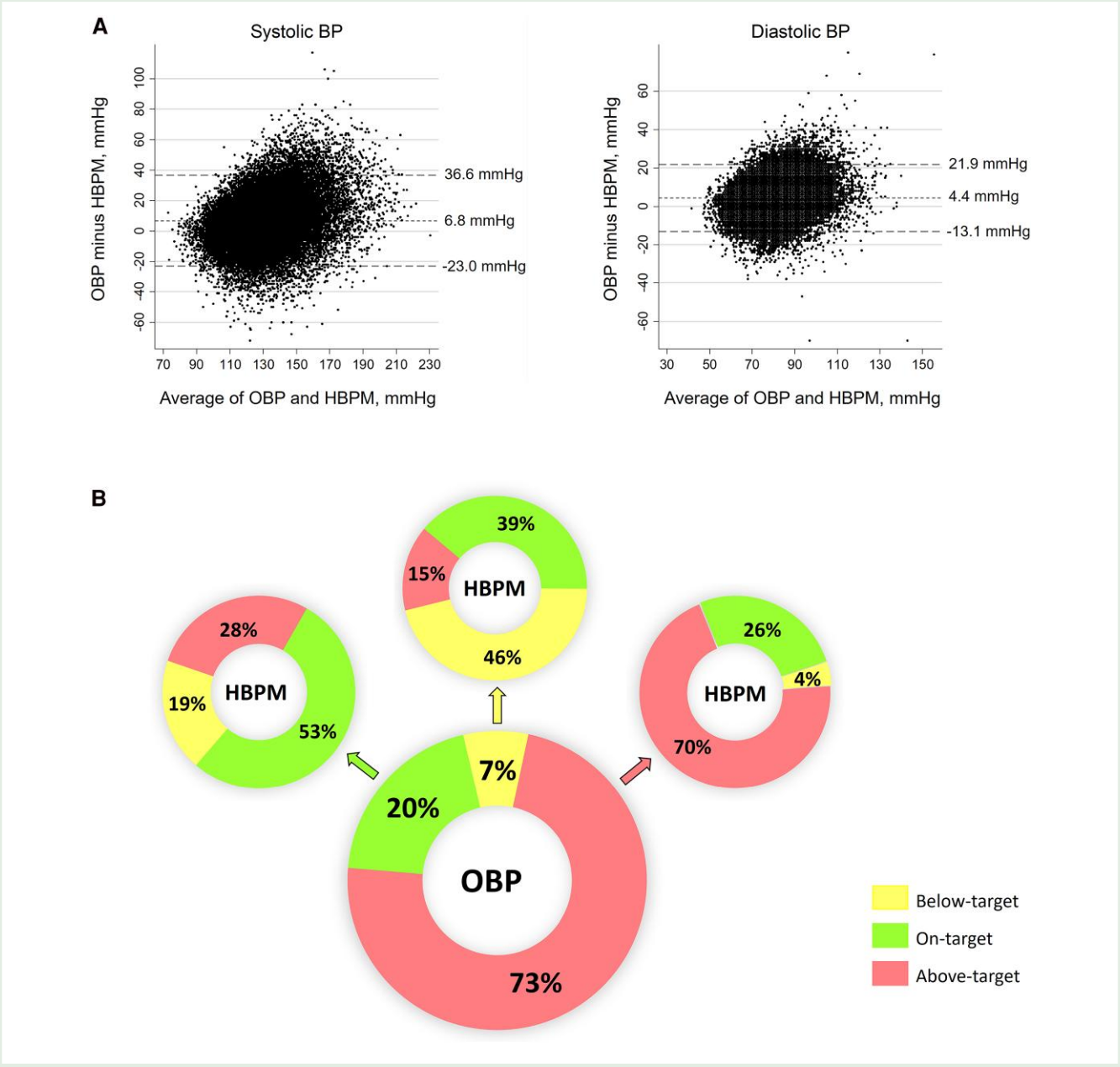

Figure 1 Office and home blood pressure in patients on anti-hypertensive treatment. (*A*) Bland–Altman plots for office blood pressure and home blood pressure monitoring measurements. Short dashed lines represent the means of the differences for blood pressure measurements, while long dashed lines represent ±2 standard deviation for this range. (*B*) Concordance between office blood pressure and home blood pressure monitoring categories. Below-target: blood pressure < 120/70 mmHg; on-target: blood pressure = 120–129/70–79 mmHg; above-target: blood pressure ≥ 130/80 mmHg.

standardized protocol[8–10] using the same device. Office blood pressure was calculated as the mean of two readings taken at the office after a 3 min rest. Home blood pressure monitoring began the next day, with 3 measurements in the morning and evening over 4 days, averaging at least 14 readings per participant. Trained staff instructed participants on proper BP measurement. Patients were classified into six categories: below-target (BP < 120/70 mmHg) OBP or HBPM, on-target (BP = 120–129/70–79 mmHg) OBP or HBPM, and above-target (BP ≥ 130/80 mmHg) OBP or HBPM.[3] Descriptive data are presented as mean ± standard deviation or proportions. Comparisons were made using one-way analysis of variance and χ^2 test. Bland–Altman plots were used to assess OBP and HBPM differences. *P*-values of <0.05 were considered significant. Statistical analysis was performed using Stata Version 14.2.

The sample had 36.6% men, age = 60.7 ± 14.5 years, BMI = 29.0 ± 5.3 kg/m^2, and 6.1% with diabetes. The average OBP was 133.5 ± 20.7/83.5 ± 12.2 mmHg, while the average HBPM was 126.7 ± 16.4/79.1 ± 10.0 mmHg. Data on AH classes were available in 81% of the sample and showed that 14.2, 55.0, 29.1, 23.6, and 24.3% were using angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, diuretics, calcium channel blockers, and beta-blockers, respectively.

The mean OBP-HBPM difference was 6.8 ± 14.9/4.4 ± 8.7 mmHg, with OBP tending to be greater than HBPM at higher BP levels, while opposite trends were observed at low BP levels (*Figure 1A*).

In the studied population, 7, 20, and 73% had below-target, on-target, and above-target OBP, while 10, 32, and 58% had below-target, on-target, and above-target HBPM, respectively. Patients with below-target, on-target, and above-target OBP had 32.7, 32.6, and 38% men ($P < 0.001$); age of 65.6 ± 14.1, 60.7 ± 14.1, and 60.2 ± 14.6 years ($P < 0.001$); BMI of 27.9 ± 5.0, 28.7 ± 5.2, and 29.2 ± 5.4 kg/m^2 ($P < 0.001$); and 7.9, 5.9, and 5.9% with diabetes ($P < 0.001$), respectively. Patients with below-target, on-target, and above-target HBPM had 28.1, 33.6, and 39.7% men ($P < 0.001$); age of 64.1 ± 14.2, 59.8 ± 14.1, and 60.6 ± 14.7 years ($P < 0.001$); BMI of 27.8 ± 5.1, 28.9 ± 5.2, and 29.2 ± 5.4 kg/m^2 ($P < 0.001$); and 6.9, 5.7, and 6.1% with diabetes ($P = 0.004$), respectively.

The agreement between on-target OBP and HBPM was of 69.5% [kappa coefficient = 0.21 (fair agreement level); $P < 0.001$]. For patients with below-target OBP, 46, 39, and 15% had below-target, on-target, and above-target HBPM, whereas for those with on-target OBP, 19, 53, and 28% had below-target, on-target, and above-target HBPM, respectively. Last, patients with above-target OBP had 4%, 26, and 70% below-target, on-target, and above-target HBPM, respectively (*Figure 1B*).

The current analysis of a large sample of patients with treated hypertension revealed discrepancies when assessing the agreement between OBP and HBPM targets defined by the 2024-ESC. We found that, among patients with on-target or below-target OBP, there is approximately a ≈50% likelihood that such OBP classification differs from the corresponding HBPM classification. Of note, 28% of patients with on-target OBP and 15% with below-target OBP showed above-target HBPM. Since out-of-office BP evaluations are usually not recommended for all patients with below-target OBP and on-target OBP,[3] these findings indicate that a significant number of patients with out-of-office uncontrolled hypertension may not be unveiled. Conversely, we also observed that among patients with above-target OBP, 30% did not have above-target HBPM, suggesting that they might be at risk of being over-treated and experiencing adverse effects. These findings suggest that the use of identical OBP and out-of-office BP targets, as recommended by the 2024-ESC, may lead to inconsistencies in treatment decisions for a significant proportion of patients, particularly when relying solely on OBP measurements.

In our analysis, the mean OBP-HBPM difference was similar to that reported in alternative cohorts.[5,6] Furthermore, we confirmed that greater BP values were coupled with higher OBP-HBPM difference, while masked hypertension phenotypes were common at low BP values,[5,6] reinforcing the validity of our findings.

This study has some limitations. First, the OBP and HBPM measurement protocols slightly differed from those recommended by 2024-ESC.[3] While our OBP protocol averaged two readings, the 2024-ESC recommends three, averaging the last two readings. For HBPM, we used three measurements twice daily for 4 days, whereas the 2024-ESC suggests two measurements twice daily for 3–7 days.[3] Second, potential BP confounders (e.g. smoking, alcohol, heart failure, stress, physical activity, and socioeconomic factors) were unavailable. Third, selection bias may have occurred, as only patients performing both OBP and HBPM were included, likely representing a more engaged group with better healthcare access, limiting generalizability to less adherent or underserved patients.

In conclusion, this study reveals clinically significant discrepancies between OBP and HBPM targets suggested by the 2024-ESC, emphasizing the risk of over-treatment or under-treatment when relying solely on OBP measurements. These findings reinforce the need for routine out-of-office BP monitoring in AH-treated patients, particularly among those with below-target OBP and on-target OBP defined by the 2024-ESC.

Author contribution

R.B., A.D.M.F., and W.N. contributed to the conception and design of the work. R.B., A.D.M.F., W.N., V.S.G.-N., A.P.S.-F., M.A.M.-G., A.M.G.P., W.S.B., R.D.M., E.C.D.B., A.A.B., R.H.M.F., L.F.D., and A.C.S. contributed to the acquisition, analysis, or interpretation of data for the work. R.B. and W.N. drafted the manuscript. A.D.M.F., V.S.G.-N., A.P.S.-F, M.A.M.-G., A.M.G.P., W.S.B., R.D.M., E.C.D.B., A.A.B., R.H.M.F., L.F.D., A.C.S., A.C., and K.K. critically revised the manuscript. All gave final approval and agreed to be accountable for all aspects of work ensuring integrity and accuracy.

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Data availability

Data available under reasonable request.

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