European Heart Journal Supplements (2021) **23** (Supplement B), B82–B85
The Heart of the Matter
doi:10.1093/eurheartj/suab036

May Measurement Month 2019: an analysis of blood pressure screening results from Jamaica

Magdalene Nwokocha[1], Thomas Beaney[2], Cheryl Holder[3], Karen Thaxter Nesbeth[4], Natalie Whylie[5], Joan Leitch[6], Trevor Ferguson[7], Mark Hosang[7], Vincent Riley[7], Adedamola Soyibo[7], Daniel Oshi[8], Paul Brown[4], Tomlin Paul[8], Rainford Wilks[7], Neil R. Poulter[2], and Chukwuemeka Nwokocha[4]*

[1]*Department of Pathology, The University of the West Indies, Mona, Jamaica*
[2]*Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK*
[3]*Department of Medicine, Family Medicine and Community Health, Herbert Wertheim College of Medicine, Florida International University, Miami, FL, USA*
[4]*Department of Basic Medical Sciences, The University of the West Indies, Mona, Jamaica*
[5]*Kingston Public Hospital, Kingston, Jamaica*
[6]*Mona Information Technology, The University of the West Indies, Mona,Jamaica*
[7]*Department of Medicine, The University of the West Indies, Mona Campus, Jamaica; and*
[8]*Department of Community Health and Psychiatry, University of the West Indies, Mona, Jamaica*

KEYWORDS
Hypertension;
Blood pressure;
Screening;
Treatment;
Control;
Jamaica

There is evidence of an elevated risk of hypertension in populations that are primarily of African origin. Hypertension is predominantly asymptomatic, necessitating increased awareness. May Measurement Month was a descriptive, population-based, cross-sectional study of blood pressure (BP) screening and awareness campaign conducted in 2019 in a sample of 2550 participants ($\geq$18 years) in Jamaica. In total, 1791 (70.2%) of the participants were female, 756 (29.6%) were male, with an average age of 49.3 years, and a body mass index (kg/m^2) of 28.5 (6.2). Of all participants, 2289 (89.8%) were black and 154 (6.0%) were of mixed races. Twenty-two (0.9%) had never had their BP measured, whereas 354 (13.9%) had their measurements more than a year ago, and 2129 (83.5%) had measured within the year. Of all 2550 participants, 1055 (41.4%) had hypertension, 69.9% of our subjects with hypertension were aware, whereas only 62.5% were on antihypertensive medication and 27.8% had controlled BP (systolic $<$140 mmHg and diastolic BP $<$90 mmHg). Of 660 participants on antihypertensive medication, 44.4% had controlled BP. Two hundred and seventy-six (15.4%) of women reported hypertension in a previous pregnancy. Hypertension with previous pregnancy was positively correlated with current elevation. These results suggest a high rate of raised BP among community dwellers whose hypertension had not been previously diagnosed by a health professional and warrant proactive approaches that promote community-based awareness, and regular measurements.

Introduction

Hypertension is the most significant global risk factor for death from a non-communicable disease, with evidence of

*Corresponding author. Tel: +18765895445, Email: Chukwuemeka.nwokocha@uwimona.edu.jm

an elevated risk in populations that are primarily of African origin.[1] Approximately 90% of Jamaicans are of African descent, and the prevalence of hypertension in Jamaica is estimated at 25%. Among the Caribbean nations, ~50% of those aged 60 years and older are reportedly hypertensive.[2] 11.82% of total deaths in Jamaica were attributed to coronary heart diseases, with a reported 30% prevalence of pre-hypertension, which correlated with other CVD risk factors and mortality.[3] Forty-seven per cent of the persons screened during the May Measurement Month (MMM) 2017 Jamaica campaign had a diagnosis of hypertension, 35% of these volunteers were not aware of their hypertensive status.[4]

The Lancet Commission on Hypertension endorsed the need to improve knowledge of the blood pressure (BP) status of each individual, regardless of nationality,[5] which will reduce the health burden. This underpins the MMM Campaign,[4,6–9] an international project to raise awareness and reduce BP worldwide.

Methods

Ethical approval was obtained from the FMS/UWI and Ministry of Health and Wellness Jamaica Ethics Committees. Three hundred and ninety-eight (15.6%) of the BP measurements were taken in Hospital/clinic, 34 (1.3%) Pharmacy, 654 (25.6%) Public area (outdoors), 606 (23.8%) Public area (indoors), 453 (17.8%) Workplace in the parishes of Kingston, St. Andrew, St Catherine, and St James. There was a mix of social strata, of rural and urban settings, however, lower socioeconomic backgrounds dominated.

Automated sphygmomanometers (Omron HEM 7121-E) were used for BP measurement following standardized BP measurement techniques. Weight was taken with a digital scale, and height with a calibrated tape, both used to calculate body mass index (kg/m^2). Hypertension was defined as systolic BP $\geq$140 mmHg and/or diastolic BP $\geq$90 mmHg or on treatment for hypertension.

Demographic data were collected for each volunteer using a standardized survey Excel spreadsheet designed by the International Society of Hypertension (ISH).[8,9] Variables obtained included age, sex, ethnicity, medications, previous diagnosis of hypertension, diabetes, myocardial infarction (MI), or stroke. Data were analysed centrally by the MMM project team and multiple imputations performed to impute the mean of readings two and three where all three readings were not available using global level data and using the approach described previously.[8]

Results

In total, 2550 volunteers participated in the study. Eighty-eight (3.5%) had previously participated in MMM in either 2017 or 2018. The mean age (standard deviation) of the participants was 49.3 (17.1) years. The main ethnic backgrounds were 2289 Black (89.8%), 8 White (0.3%), 10 Asian (0.4%), and 154 Mixed (6.0%). Six hundred and sixty (25.9%) participants were on antihypertensive medication. Twenty-two (0.9%) never had their BPs measured, 354 (13.9%) had their measurements more than a year ago, 2129 (83.5%) had their measurements within the year. Antihypertensive medication included: 344 (13.5%) on one, 211 (8.3%) on two, 75 (2.9%) three, 10 (0.4%) four, 10 (0.4%) five, whereas 58 (2.3%) did not know (*Figure 1*). One hundred and eighty-nine (7.4%) were on Aspirin, 171 (6.7%) on Statins. Eight hundred and forty-one (33.0%) reported being aware of a previous diagnosis of hypertension. Two hundred and fifty-one (9.8%) were diabetic, 38 (1.5%) reported previous MI, 59 (2.3%) previous incidence of stroke. Twenty-eight (1.6%) were pregnant, whereas 276 (15.4%) reported hypertension in a previous pregnancy (*Figure 2*). Four hundred and sixty-one (18.1%) were fasting, 197 (7.7%) current smokers, 224 (8.8%) reported alcohol intake once or more per week. Of all 2550 participants, 1055 (41.4%) had hypertension, 69.9% of our subjects with hypertension were aware, whereas only 62.5% were on antihypertensive medication and 27.8% had controlled BP (see *Table 1*).

Discussion

In this study, we report the proportion of participants with hypertension as 41.4%, with 69.9% awareness of diagnosis. Of hypertensive participants, 62.5% were on antihypertensive medication and 27.8% had controlled BP. Fewer than half receiving the various classes of antihypertensive medication had their BP under control. Barbosa *et al.*[9] had reported 40.4% hypertension in Latin America in the MMM 2017 campaign, while the MMM 2017 Jamaican data reported 47.3%.[4] Rates in Jamaica were higher than the international rates of 34.9% in 2017, 33.4% in 2018, and 33.4% in 2019. The high prevalence may in part be attributed to environmental, genetic, and health disparities

Table 1 Total participants and proportions with hypertension, awareness, on medication and with controlled blood pressure

Total participants	Number (%) with hypertension	Number (%) of hypertensives aware	Number (%) of hypertensives on medication	Number (%) of those on medication with controlled BP	Number (%) of all hypertensives with controlled BP
2550	1055 (41.4)	737 (69.9)	660 (62.5)	293 (44.4)	293 (27.8)

BP, blood pressure.

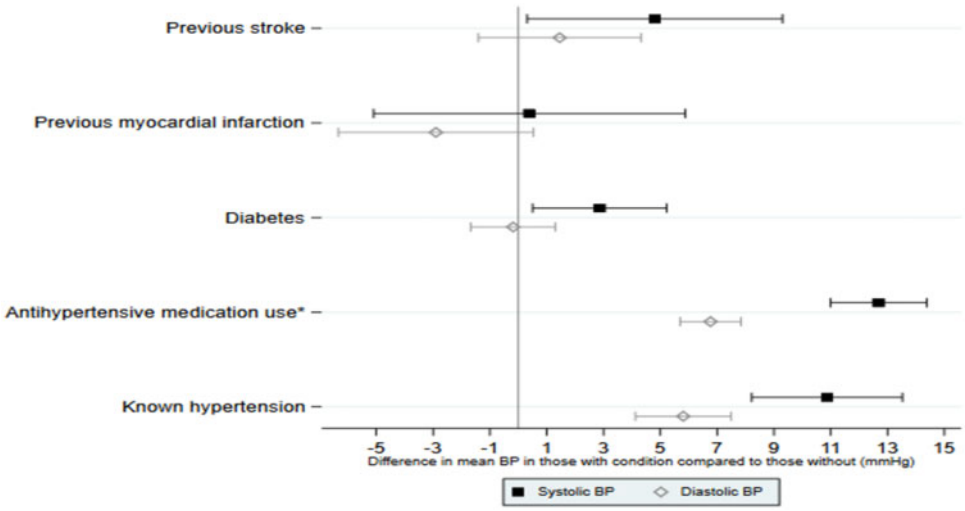

Figure 1 Difference in mean blood pressure in those with each comorbidity compared with those without from linear regression models adjusted for age, sex, and antihypertensive medication (antihypertensive medication adjusted for age and sex alone).

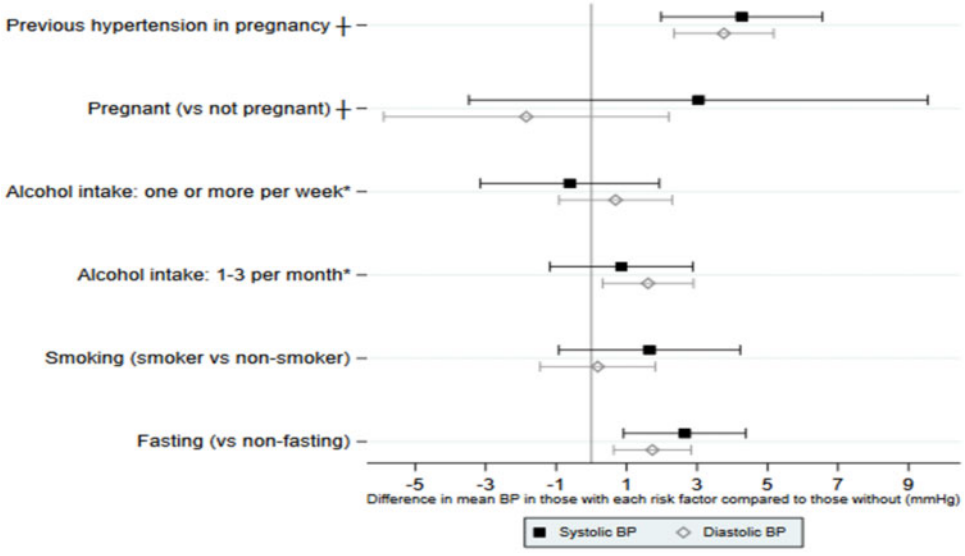

Figure 2 Difference in mean blood pressure in those with each risk factor compared with those without from linear regression models adjusted for age, sex, and antihypertensive medication (pregnancy adjusted for age and antihypertensive medication alone) (*Compared with 'never/rarely' as baseline, +Pregnancy adjusted for age and antihypertensive medication alone).

amongst participants, which need to be addressed with good policies and focused implementation. Two hundred and seventy-six (15.4%) of women reported hypertension in pregnancy, and hypertension with previous pregnancy was associated with a raised systolic and diastolic BP, and data agree with a correlation study between obesity, diabetes, and pregnancy outcomes as well as maternal deaths.[10]

The MMM campaigns in Jamaica are by design not randomly sampled or nationally representative. However, although based on an opportunistic sample, it gives real-life insight into the awareness of hypertension, undiagnosed hypertension as well as the status of BP control in treated hypertensives.[6-9] If followed by appropriate policies, and effective therapy, these findings could lead to cost-effective protection against cardiovascular disease burden.

Supplementary material

Supplementary material is available at *European Heart Journal Supplements* online.

Acknowledgements

We thank the students and volunteers. OMRON for BP devices. Special thanks to Servier Jamaica for technical assistance.

Conflict of interest: N.P. has received support through consultancy fees but holds no stocks and shares from Servier, Servier supported this work through donations of BP apparatus. All other authors have nothing to declare.

References

1. Nwokocha CR, Bafor EE, Ajayi OI, Ebeigbe AB. The malaria-high blood pressure hypothesis: revisited. *AM J Hypertens* 2020;**33**: 695–702.
2. Bidulescu A, Francis DK, Ferguson TS, Bennett NR, Hennis AJ, Wilks R, Harris EN, MacLeish M, Sullivan LW, on behalf of the U.S. Caribbean Alliance for Health Disparities Research Group (USCAHDR). Disparities in hypertension among black Caribbean populations: a scoping review by the US Caribbean Alliance for Health Disparities Research Group (USCAHDR). *Int J Equity Health* 2015;**14**:125.
3. Ferguson TS, Younger NO, Tulloch-Reid MK, Wright MB, Ward EM, Ashley DE, Wilks RJ. Prevalence of prehypertension and its relationship to risk factors for cardiovascular disease in Jamaica: analysis from a cross-sectional survey. *BMC Cardiovasc Disord* 2008;**8**:20.
4. Nwokocha M, Romero CA, Holder C, Whylie N, Wong H, Lietch J, Wilks R, Hosang M, Francis S, Brown PD, Paul T, Abel W, Barton E, Wilks R, Nwokocha CR. Blood pressure screening campaign in Jamaica: May Measurement Month 2017. *Am J Hypertens* 2019;**32**:1186–1191.
5. Olsen MH, Angell SY, Asma S, Boutouyrie P, Burger D, Chirinos JA, Damasceno A, Delles C, Gimenez-Roqueplo A-P, Hering D, López-Jaramillo P, Martinez F, Perkovic V, Rietzschel ER, Schillaci G, Schutte AE, Scuteri A, Sharman JE, Wachtell K, Wang JG. A call to action and a lifecourse strategy to address the global burden of raised blood pressure on current and future generations: the Lancet Commission on hypertension. *Lancet* 2016;**388**:2665–2712.
6. Beaney T, Burrell LM, Castillo RR, Charchar FJ, Cro S, Damasceno A, Kruger R, Nilsson PM, Prabhakaran D, Ramirez AJ, Schlaich MP, Schutte AE, Tomaszewski M, Touyz R, Wang J-G, Weber MA, Poulter NR; the MMM Investigators. May Measurement Month 2018: a pragmatic global screening campaign to raise awareness of blood pressure by the International Society of Hypertension. *Eur Heart J* 2019; **40**:2006–2017.
7. Beaney T, Schutte AE, Tomaszewski M, Ariti C, Burrell LM, Castillo RR, Charchar FJ, Damasceno A, Kruger R, Lackland DT, Nilsson PM, Prabhakaran D, Ramirez AJ, Schlaich MP, Wang J, Weber MA, Poulter NR, MMM Investigators. May Measurement Month 2017: an analysis of blood pressure screening results worldwide. *Lancet Glob Health* 2018;**6**:e736–e743.
8. Beaney T, Schutte AE, Stergiou GS, Borghi C, Burger D, Charchar F, Cro S, Diaz A, Damasceno A, Espeche W, Jose AP, Khan N, Kokubo Y, Maheshwari A, Marin MJ, More A, Neupane D, Nilsson P, Patil M, Prabhakaran D, Ramirez A, Rodriguez P, Schlaich M, Steckelings UM, Tomaszewski M, Unger T, Wainford R, Wang J, Williams B, Poulter NR, on behalf of MMM Investigators. May Measurement Month 2019: the global blood pressure screening campaign of the International Society of Hypertension. *Hypertension* 2020;**76**:333–341.
9. Barbosa ECD, Ramirez A, Beaney T, Kobeissi E, Lopez-Jaramillo P, Hernánez-Hernández R, Eibel B, Lanas F, Penaherrera E, Marin M, Boggia J, Ortellado J, Gomez E, Sánchez E, Bryce A, Valdez O, Beistline H, Nwokocha C, Connell K, Barrientos A, Wyss F, Kenerson J, Poulter NR. May **M**easurement **M**onth 2017: Latin America. *J Hypertens* 2020;**38**:1183–1188.
10. Kanguru L, McCaw-Binns A, Bell J, Yonger-Coleman N, Wilks R, Hussein J. The burden of obesity in women of reproductive age and in pregnancy in a middle-income setting: a population based study from Jamaica. *PLoS One* 2017;**12**:e0188677.