

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

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## KEYWORD

MMM Brazil

The aim of this study is to describe the results of the May Month Measurement (MMM) campaign implemented in Brazil, in 2019. Questionnaire data were collected and three measures of blood pressure (BP) were performed. The sample consisted of 13 476 individuals, 58.2% were white, 60.8% were women. The average age was 46.3 (18.6) years. Of all 13 476 participants, 6858 (50.9%) had hypertension defined as a systolic BP  $\geq 140$  mmHg or a diastolic BP  $\geq 90$  mmHg or being on anti-hypertensive medication. Of those with hypertension, 68.8% were aware of their diagnosis, 65.3% were on antihypertensive medication, and 36.1% had controlled BP ( $< 140/90$  mmHg). In addition, of 4479 participants on anti-hypertensive medication, 55.2% had controlled BP. The use of anti-hypertensive medication was associated with higher systolic ( $P < 0.001$ ) and diastolic BP ( $P < 0.001$ ) and having diabetes with higher systolic BP ( $P < 0.001$ ). Previous hypertension in pregnancy was associated with higher systolic ( $P = 0.038$ ) and diastolic BP ( $P = 0.003$ ), and smoking was associated with higher systolic BP ( $P < 0.001$ ). Lastly, obese and overweight individuals showed significantly higher systolic ( $P < 0.001$ ) and diastolic ( $P < 0.001$ ) BP. The Brazilian MMM19 data demonstrate that strategies to increase awareness of hypertension and a better control of the risk factors are still needed.

<sup>†</sup>The Collaborators are listed in the [Supplementary material online](#).

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## Introduction

Hypertension is a serious health condition, which is the main cause of premature death in the world. The disease affects ~1.13 billion people in the world, and two-thirds are from low- and middle-income countries, such as Brazil.<sup>1</sup> Hypertension is an independent risk factor for stroke and cardiovascular disease and one of the most important risk factors for kidney disease, increasing the burden of disease dramatically worldwide.<sup>2</sup>

Similarly, this condition is the most important risk factor in the adult Brazilian population. Data from a previous study have described a 40.7% prevalence of hypertension in Brazil, in adults aged 30 years or more.<sup>3</sup> Recently, a São Paulo call to action for the prevention and control of high blood pressure (BP) was published in response to the high prevalence of the disease and its significant impact on health and the economy.<sup>4</sup>

In an attempt to raise awareness of the importance of raising BP as an independent risk factor for the global burden of disease and mortality, the International Society of Hypertension introduced, in 2017, the May Month Measurement (MMM) campaign.<sup>5</sup> The 1st year of this global campaign included more than 1.2 million participants from 80 countries. The campaign was then expanded in 2018 and 2019. Brazil has participated since the 1st year of the campaign.<sup>6,7</sup>

This article describes the results of the MMM campaign implemented in Brazil, in 2019. The primary objective was to raise awareness of BP in the country.

## Methods

The 2019 Brazilian MMM campaign was a cross-sectional opportunistic survey. The initiative included volunteers aged 18 or more and data were collected in several locations around the country: hospital/clinics (59.3%), pharmacy (0.4%), public area—outdoors (12.1%), public area indoors (8.1%), workplace (10.8%), and others (4.8%). Blood pressure measurement, the definition of hypertension and statistical analysis followed the standard MMM protocol.<sup>8</sup> Each participant had three seated BP measurements and the mean of the 2nd and 3rd BP readings was used in defining hypertension, and in all analyses. Blood pressure measurement was obtained by validated devices. Each site used its own devices and cuff size was chosen in accordance with arm circumference. Hypertension was defined as a systolic BP  $\geq 140$  mmHg or diastolic  $\geq 90$  mmHg, or both, or based on anti-hypertensive medication use. Ethical approval was obtained before the inclusion of the 1st participant. Data were collected by the centres in an Excel spreadsheet and were analysed centrally by the MMM19 project team. Multiple imputation was used to estimate the mean of the 2nd and 3rd BP readings where missing, according to a standard analysis plan, previously defined.<sup>8</sup>

## Results

A total of 13 476 participants were included in the Brazilian MMM19 campaign; 60.8% were female participants, and the mean age was 46.3 (18.6) years. Around half of the participants were overweight or obese. Regarding ethnicity, most participants were white (58.2%), followed by mixed (18.4%) and black (11.0%). Diabetes was present in 9.9% of the sample, previous myocardial infarct in 3.5%, previous stroke in 1.2%, and 7.9% were current smokers.

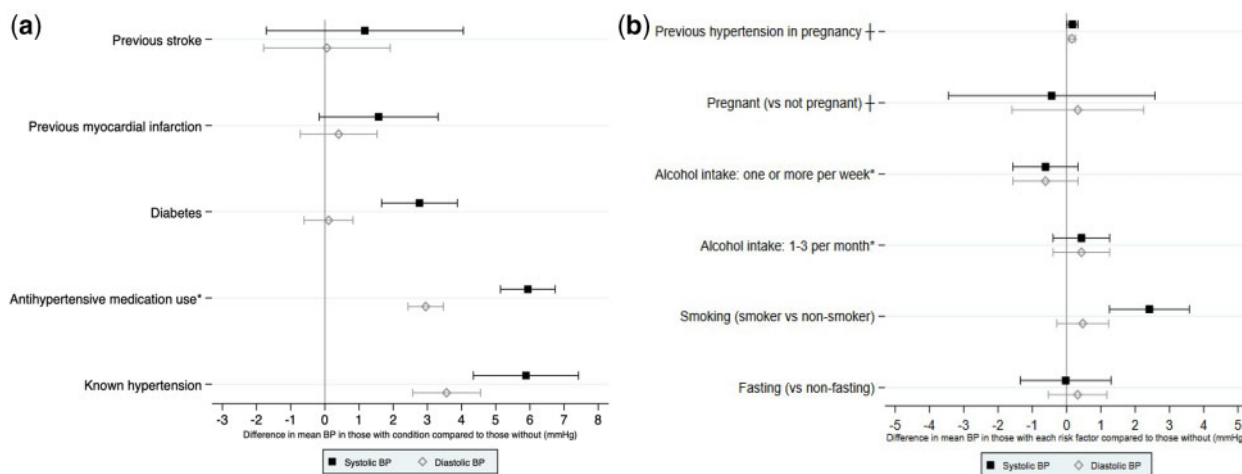
Of all 13 476 participants, 6858 (50.9%) had hypertension. Of those with hypertension, 68.8% were aware of their diagnosis, 65.3% were on antihypertensive medication, and 36.1% had controlled BP. In addition, of 4479 participants on anti-hypertensive medication, 55.2% had controlled BP. The mean of the last two systolic and diastolic BP measurements after imputation, standardized to the age and sex standard WHO population was 127.2 and 80.8 mmHg, respectively.

When analysing the difference in mean BP according to comorbidities, we observed that anti-hypertensive medication use was associated with higher systolic ( $P < 0.001$ ) and diastolic BP ( $P < 0.001$ ), and diabetes with higher systolic BP ( $P < 0.001$ ) (Figure 1A). In relation to the difference in mean BP according to risk factors, previous hypertension in pregnancy was associated with higher systolic ( $P = 0.038$ ) and diastolic BP ( $P = 0.003$ ), and smoking was associated with higher systolic BP ( $P < 0.001$ ) (Figure 1B). Additionally, in the analysis of mean BP according to body mass index, it was demonstrated that obese and overweight individuals showed significantly higher systolic ( $P < 0.001$ ) and diastolic ( $P < 0.001$ ) BP.

## Discussion

During the MMM19 campaign in Brazil, the detected proportion of hypertension amongst screenees (50.9%) was lower than in the Brazilian MMM18 sample (67.9%) but still higher than the 2018 data from the Americas and global data (40.4% and 33.4%, respectively). Additionally, the awareness of the hypertensive condition (68.8%) and the use of antihypertensive (65.3%) were lower than last year's Brazilian and American data (84.4% and 76.7%; 81.7% and 70.6%, respectively), but still higher than worldwide (59.5% and 55.3%, respectively). Furthermore, BP control in hypertensive subjects on medication (55.2%) was lower than the previous data from all three locations (59.7%, 60.9%, and 60.0%, respectively).<sup>5,7</sup> Although not directly comparable between years due to non-randomized sampling, these data indicate, once more, the high prevalence of hypertension and the suboptimal control rates of the disease in Brazil, similarly to the worldwide and previous Brazilian reports.

The difference in BP related to comorbidities—especially smoking, diabetes, overweight/obesity, and history of hypertension during pregnancy in this report—shows the complexity of the management of hypertension, agrees with



**Figure 1** (A and B) Differences in mean blood pressures in those with each comorbidity/risk factor compared with those without from linear regression models adjusted for age, sex, and anti-hypertensive medication (anti-hypertensive medication adjusted). \*Pregnancy adjusted for age and anti-hypertensive medication alone. \*Compared with 'never/rarely' as baseline.

previous reports, and highlights the need for continuous efforts to raise awareness of these conditions and their significance for the health of the general population.

In conclusion, as a continuation and expansion of the largest screening campaigns for hypertension ever done in Brazil, the Brazilian MMM19 shows that strategies to increase awareness of hypertension and better control of the risk factors are still needed.

## Supplementary material

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

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