

May Measurement Month 2017-2019: an analysis of blood pressure screening results from Dominican Republic

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KEYWORDS

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Arterial hypertension is the main risk factor that contributes to cardiovascular disease and represents a leading cause of morbidity and mortality globally. May Measurement Month (MMM) is a global screening campaign with the aim of improving awareness of hypertension at the individual and population level, an initiative that has been supported in the Dominican Republic (DR) since 2017. Adults (≥ 18 years) were recruited by sampling in different places in the DR, three blood pressure (BP) readings were performed per participant, and data on risk factors and comorbidities were collected. Hypertension was defined as systolic BP ≥ 140 mm Hg, diastolic BP ≥ 90 mm Hg (mean of second and third readings), and/or taking antihypertensive medication. Multiple imputation was used to estimate participants' mean BP when three readings were not available. Of 3693 participants, 2134 (57.8%) had hypertension, of whom 1646 (77.1%) were taking medication, but only 38.6% of those on treatment had their BP under control ($< 140/90$ mmHg). The remaining 61.4% of the participants received inadequate treatment. A total of 66% of treated patients were taking a single antihypertensive drug. MMM provides an important platform for the standardized compilation of BP data and the creation of awareness of hypertension in the DR and other nations of the world. The data generated from the 2017-2019 MMM campaigns highlight the importance of adequate detection, knowledge, and control of BP.

Introduction

Arterial hypertension is a serious medical condition that significantly increases the risk of cardiovascular disease (CVD), consequently greatly impacting global morbidity and mortality, with CVD being the main cause of death

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

Total participants	Proportion (%) with hypertension	Proportion (%) of hypertensives aware	Proportion (%) of hypertensives on medication	Proportion (%) of those on medication with controlled BP	Proportion (%) of all hypertensives with controlled BP
3693	57.8	73.7 ^a	77.1	38.6	29.8

^aAwareness estimates calculated for 2018 and 2019 surveys only.

worldwide. An estimated 1.28 billion adults aged 30 to 79 years worldwide have hypertension, with two thirds living in low- and middle-income countries.¹ In the Dominican Republic (DR), mortality from CVD increased from 211 to 267 deaths per 100 000 inhabitants between 2000 and 2017, and according to data from 2018 compiled by the World Health Organization, the main cause of death in the DR is cardiovascular disease, with a predominance of coronary heart disease and stroke.² A study on Cardiovascular Risk Factors, Obesity and Metabolic Syndrome in DR in 2012 (EFRICARD II) of 4976 participants reported that 34.7% of the population had hypertension, 52% of whom were on treatment, while 39% were unaware and 11% were aware but were not taking any medication.³ The impact that early detection, increased awareness, and adherence to medication can have on the population has been one of the reasons for the launching of the May Measurement Month (MMM) campaign. The MMM campaign was initiated by the International Society of Hypertension, and the DR has participated yearly ever since, to help reduce the negative impact of this health problem, which affects the world population.⁴

Methods

The MMM campaign in DR was directed by the Central American and Caribbean Society of Arterial Hypertension, Dominican Society of Hypertension, with support from the Autonomous University of Santo Domingo. As it is an observational study, the national research policy does not require informed consent. More than 40 voluntary collaborators participated in this study, including medical students, nurses, social workers, general practitioners, and cardiologists in different parts of the country, who previously underwent a training process by the principal investigators. MMM screening camps were held in parks, supermarkets, plazas, educational institutions and hospitals. Screening was carried out throughout the month of May in the years 2017, 2018, and 2019. An excel form was used to record information on demographics, risk factors, history of cardiovascular disease, weight, height, and body mass index. Blood pressure (BP) was measured in a sitting position using OMRON upper-arm cuff devices (Model: HEM7201) that have been validated.⁵ The devices were donated by OMRON Healthcare (Caribbean Region). Appropriate cuff sizes were used based on the arm circumference of each individual. Three readings were taken at 1 min intervals, with the patient in the sitting position.

Hypertension was defined as a systolic BP of ≥ 140 mmHg and/or a diastolic BP of ≥ 90 mmHg (based on the mean of the second and third readings) and/or if a participant was taking antihypertensive medication.⁶ This information was entered into an electronic form via the MMM app and manually into a spreadsheet when the app was not available. The data were centrally analysed by the MMM team, and multiple imputation was performed to estimate the mean BP where any reading was missing, based on the global data.⁴ Linear regression was used to estimate the association between systolic/diastolic BP and different risk factors.

Results

A total of 3693 participants were included in the MMM Dominican Republic campaigns (2017 [896], 2018 [987], and 2019 [1810]), 53.1% of whom were women and 46.8% of whom were men (0.1% missing), with a mean (SD) age of 43.3 (17.7) years. In relation to the weight of the participants, there was a predominance (33.8%) of participants classified as underweight based on body mass index (BMI < 18.5 kg/m²). With regard to ethnicity, the majority of the participants were of mixed ethnic backgrounds (43.5%), followed by black ethnic backgrounds (39.6%) and White (9.2%). A total of 10.2% of participants had diabetes, 2.9% had a previous myocardial infarction, 2.5% had a previous stroke, and 6.0% were current smokers. A total of 8.0% were taking aspirin and 4.4% were on a statin. It is important to highlight that 29.6% of the participants had not had their BP taken within the last 12 months. After imputing missing values in our data set, of all 3693 participants, 2134 (57.8%) had hypertension, 77.1% of whom were taking antihypertensive medication, and of whom 38.6% had controlled BP ($< 140/90$ mmHg). Of all 2134 participants with hypertension, 29.8% had controlled BP. Of all 1302 hypertensives in 2018 and 2019 when data on awareness were collected, 73.7% were aware of their diagnosis (*Table 1*).

After adjustments for age and sex, significantly higher mean systolic and diastolic BPs were observed in subjects receiving rather than not receiving antihypertensive drug treatment and those with rather than without known hypertension ($P < 0.001$). Systolic BP in participants with previous stroke, myocardial infarction, and self-reported diabetes was higher than those without these conditions (*Figure 1*; see [Supplementary material online, Figure S1](#)). Women with a history of hypertension during pregnancy had higher diastolic BP than women

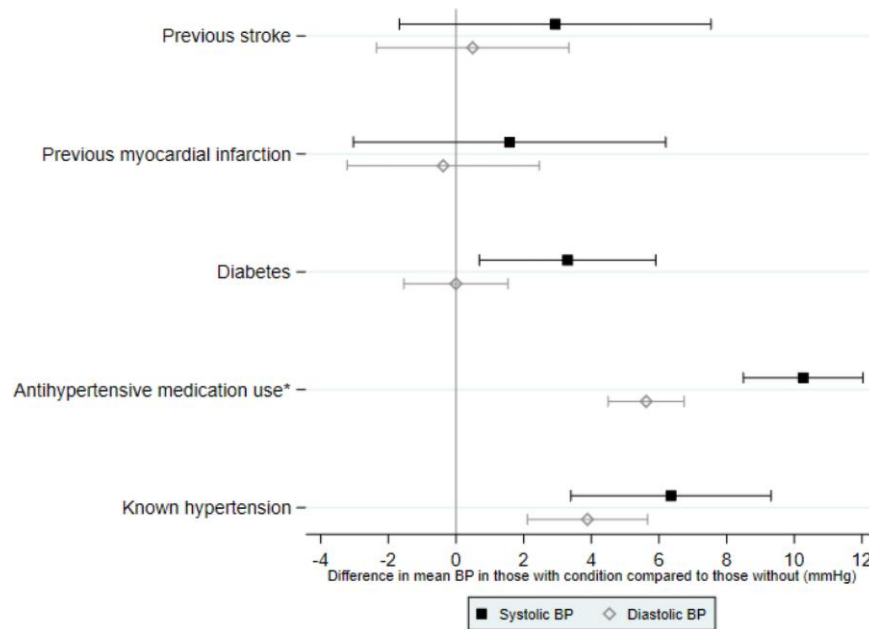


Figure 1 Blood pressure in relation to different clinical conditions in hypertensive patients.

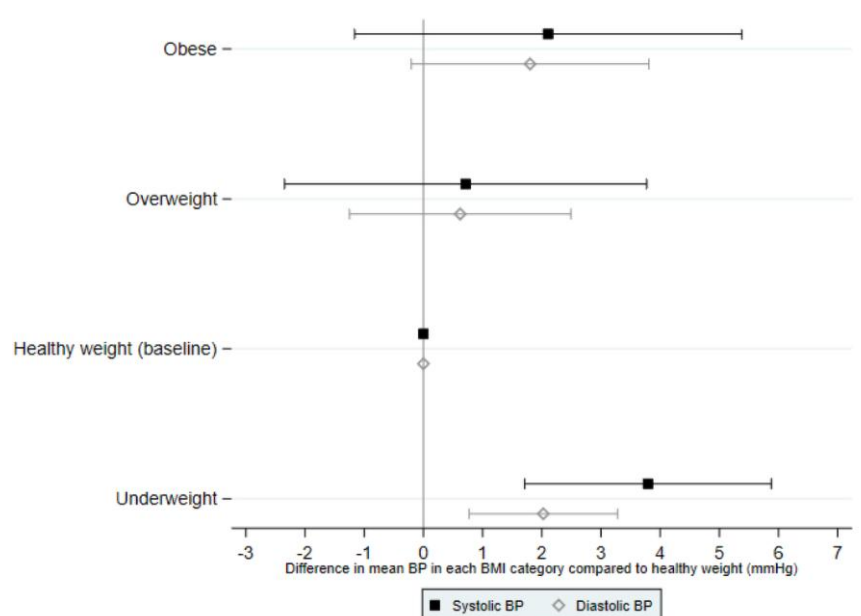


Figure 2 Blood pressure in relation to body weight.

without such a history (3.12 mmHg, $P=0.005$). After adjusting for age, gender, and antihypertensive medication, people who were underweight had significantly higher systolic BP levels (Figure 2).

Discussion

The combined results of the 2017, 2018, and 2019 MMM campaigns in the DR population show over half of

participants had hypertension (57.8%), with over one quarter unaware of their diagnosis, and just under one quarter not receiving antihypertensive treatment. Of all hypertensives, only three in ten were controlled. This differs from other Latin American countries, participants of the MMM that report a prevalence of 41.2% of hypertensive people, with a higher proportion of the total number of controlled hypertensives (42.6%), despite the fact that awareness (73.7%) and the percentage of treated (69.7%), was very similar.⁷ This difference could

be explained by various socioeconomic factors, including cultural level, accessibility to better medical care, and greater accessibility to quality medication.⁸ One element to highlight is that the antihypertensive treatment model in our country continues to be monotherapy, and around 35% are unaware of their BP levels.

The percentage of diabetes is 10.2%, higher than the MMM 2019 global data, which was 9%.⁷ However, sampling in MMM differs from our previous registries (EFRICARD), as it is not a representative sample of the national population, not randomized, and not stratified according to age groups and socioeconomic status.³ Nevertheless, we believe that MMM has been of great importance, by allowing a much better understanding of the reality of arterial hypertension in the DR, defining and establishing plans to achieve greater awareness of the disease in the population and treatment models, with better physician care and incorporation of non-medical personnel, as has been shown in clinical studies.⁹

Supplementary material

[Supplementary material](#) is available at *European Heart Journal* online.

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Data availability

All research data is available through the corresponding author and can be used for future research.

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