

May Measurement Month 2017-19: an analysis of blood pressure screening results from Paraguay

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KEYWORDS

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Control

The aim of this study was to highlight the importance of measuring blood pressure (BP) and to identify and reduce the BPs of those people who require intervention to lower their BP according to current guidelines. A total of 7782 individuals aged ≥ 18 years were recruited during the 3 years of the May Measurement Month (MMM) campaign (2017: 1196, 2018: 2285, 2019: 4301). Recruitment was through opportunistic sampling at a variety of screening sites distributed throughout the country. Each participant underwent a pre-specified questionnaire with questions on risk factors concluding with three BP measurements at 1 min intervals and measurement of weight and height. Hypertension was defined as a systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg or those receiving antihypertensive therapy. Of all 7782 participants, 3323 had hypertension (42.7%) of whom 61.8% were aware and 50.4% were not receiving antihypertensive medication. Of those treated (49.6%), 43.8% had controlled BP ($< 140/90$ mmHg). Among all hypertensive patients (with and without medication), 21.7% had controlled BP. In relation to previous surveys carried out in the country, awareness of hypertension increased two-fold, with no change in the proportion of hypertensive patients on treatment and the proportion of hypertensive patients with controlled BP which remained low.

Introduction

In Paraguay, three previous national surveys have been carried out.¹⁻³ All of them were cross-sectional, population-based, and evaluated adults over 18 years of age including representative populations across the country. The first survey was in the year 1995, with 9880 respondents, the second in 2005 with 5781

respondents and the third in 2011 with 2750 respondents¹⁻³ (Table 1).

Official published data from the Ministry of Public Health and Social Welfare (MSPYBS) for the years 2017, 2018, and 2019 indicate an overall annual mortality from cardiovascular diseases (per 100,000 inhabitants) of 113.2, 121.9, and 122.8, respectively. Furthermore, an annual mortality rate for hypertensive disease (per 100,000 inhabitants) of 17.8, 21.4, and 21.8 is reported, and a mortality rate for ischaemic heart disease was 40.2, 42.7, and 45.3. The mortality rate for cerebrovascular

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Table 1 Previous national surveys on hypertension

Risk factor's	1995	2005	2011
Hypertension	40%	35%	45.8%
Known hypertension	30%	31%	32.3%
Treated hypertension	40%	27%	49.7%
Controlled hypertension	3%	37%	N/A
Overweight	N/A	38%	56.7%
Obesity	25.5%	21%	22.8%

disease (per 100 000 inhabitants) was 34.1, 35.9, and 34.9, respectively.⁴⁻⁶

Paraguay became involved in the May Measurement Month (MMM)⁷⁻⁹ project, taking into account the importance of the data on hypertension in the region and in the world, in addition to comparing variables between the different countries with their own characteristics, such as climate, health systems, management, and cultural and socioeconomic level.

As part of the Latin American Society of Hypertension (LASH) and International Society of Hypertension (ISH), the invitation to participate was received and accepted. The National Cardiovascular Prevention Program (PNPC) of the MSPYBS directed the project, since the data obtained would be used for MSPYBS statistics. The participating institutions also received training and blood pressure (BP) measurement materials. Furthermore, Paraguay participated in the presentation of their findings in London, UK in 2018.

Methods

Paraguay participated in the MMM 2017, 2018, and 2019. The study coordinator was Dr José Ortellado.

Ethical authorization was obtained, with approval from the ISH and the MSPYBS ethics committee, and the official informed consent form was used for each respondent. In the PNPC-MSPYBS, a work team was formed for the organization, training, execution, budget management, and coordination of the project.

MMM 2017, 2018, and 2019 involved 65 annual surveys working at 20 sites each year in 17 departments of the country and the capital. The principal researchers were Dr Miriam Ayala, Dr Graciela González, and Dr José Ortellado. To obtain financial resources, public and private agreements were made between the MSPYBS authorities, pharmaceutical companies, and representatives of medical supplies; the ISH also collaborated with the donation of electronic pressure

devices supplied by OMRON Healthcare. The call for training and delivery of materials, such as the protocol form, informed consent, electronic pressure apparatus, had been made by the PNPC and with the collaboration of the different directors of hospitals and Health Regions.

In order to recruit participants, the project was advertised and launched through press conferences using oral, written, and television press and social networks. In the first year, the duration of the sample collection was 1 week, then for the following 2 years, it was 30 days. From the beginning of the campaign and during all 3 years, OMRON electronic equipment was used (donated by OMRON). BP was measured in the seated position with three measurements taken at 1 min intervals as outlined in the protocol.

Hypertension was defined as systolic BP ≥ 140 and/or diastolic BP ≥ 90 mmHg based on the mean of the second and third BP readings or the use of antihypertensive medication. Further variables were added to the survey questionnaire in 2018 and 2019 such as, medications used to control BP, location where the survey was conducted, awareness of a hypertension diagnosis, consumption of aspirin, statins, and history of hypertension in pregnancy. Overweight and obesity were defined as a body mass index (BMI) of 25-29.9 and 30 kg/m² or more, respectively.

The data were analyzed centrally by the MMM project team after multiple imputation performed to impute the mean of the second and third readings when missing, based on the remaining available data as described previously.⁷⁻⁹

Results

Of the 7782 participants, there were 1196 in 2017, 2285 in 2018, and 4301 in 2019.

The mean age was 41.7 years with a median of 40 (range 26-56 years). Of the participants, 41.4% were male and 58.6% were female across 3 years.

The main ethnicity was White with 5217 people (67%), mixed with 2481 (31.9%), other with 58 (0.7%) and Black with 7 (0.1%). In 2019, 14.0% were consuming aspirin and 8.3% were taking statins.

Following imputation, of all 7782 participants, 3323 (42.7%) had hypertension ([Table 2](#)). Of the 2615 participants with hypertension from the data collected in 2018/2019, 61.8% were aware of their diagnosis. Of the 3323 participants with hypertension across all 3 years, 49.6% were taking antihypertensive medication. Of 1649 participants taking antihypertensive medication, 43.8% had controlled BP (<140/90 mmHg). Of all 3323

Table 2 Total participants and percentage 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
7782	42.7	61.8	49.6	43.8	21.7

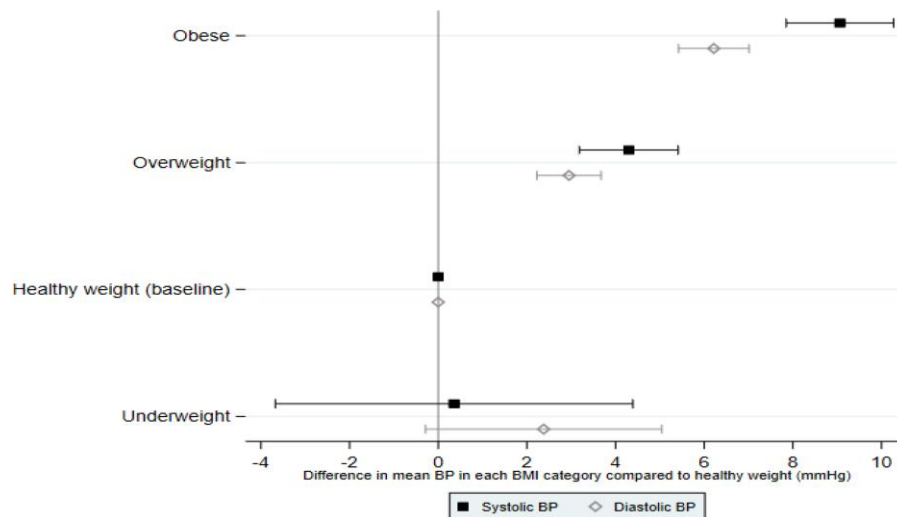


Figure 1 Difference in mean blood pressure in each body mass index category compared with healthy weight.

participants with hypertension (treated and untreated), 21.7% had controlled BP.

Participants with known hypertension status and use of antihypertensive medication had higher systolic and diastolic BP, than those who were unaware of hypertension or not on medication (P for both <0.001). After adjusting for age, gender, and antihypertensive medication, subjects with diabetes and a history of myocardial infarction had significantly higher systolic BPs compared with those without diabetes or a history of myocardial infarction (P for both <0.001).

In the years 2018 and 2019, it was recorded that 9.4% of women had a history of hypertension during pregnancy, had a higher mean systolic BP of 5.4 mmHg ($P < 0.001$), and a higher mean diastolic BP of 2.3 mmHg ($P = 0.005$) compared with women without a history of hypertension during pregnancy.

Both systolic and diastolic BP showed a linear relation with increasing BMI category: people who were obese had on average an increase of 9.1 mmHg for systolic BP and 6.2 mmHg for diastolic BP, and people who were overweight had on average an increase of 4.3 mmHg for systolic BP and 3.0 mmHg for diastolic BP (Figure 1).

Discussion

The proportion of hypertensive patients in our country continues to be high, despite awareness of BP measurement having increased presumably due to awareness campaigns that have been carried out for many years using mass media and social networks. However, only half of hypertensive patients receive at least one antihypertensive medication, and of these, less than half are well controlled.

The impact of MMM in the country improved health networks, provided equipment to detect hypertension, and increased awareness of BP measurement of both the health team and the general population.

The estimated proportion of hypertensive patients in Paraguay in the MMM2017, 2018, 2019 campaigns was 42.7%, a figure higher than the average detected globally, which were 33.4%, 34.9%, and 29.4%, respectively, but with similar figures at the level of the Americas of 41% in 2017 and 40.4% in 2018.

According to the MMM 2017 and 2018 at the level of the Americas 14.4% and 29.4% of hypertensive patients were untreated, 38.6% and 39.1% of treated hypertensive patients presented with uncontrolled hypertension.^{7,8} In Paraguay, these figures were higher: 50.4% of the hypertensive patients were without medication and 55.2% of the treated hypertensive patients had uncontrolled hypertension.

From the findings, the low percentage (21.7%) of those with controlled hypertension in Paraguay is striking. This figure is lower than the average of the MMM 2017 and 2018 global publications, which presented 33.2% and 31% of controlled hypertensive patients, respectively.⁷⁻⁹

The MMM campaign was conducted with greater inclusion of variables with respect to local surveys that allowed us to detect an increase in other cardiovascular risk factors on which to intervene, such as a history of hypertension during pregnancy, use of aspirin and statins, history of stroke and ischaemic heart disease, among others; it also developed positive perspectives by showing an increase in the percentage of known and controlled hypertensive patients.

As the survey was mostly conducted at the hospital level (54.2% in 2018 and 2019 combined), it is unlikely to be nationally representative, with most participants having increased knowledge of hypertension and more likely to have better control rates.

Conclusion

Thanks to the MMM campaign that has been carried out annually since 2017, there is increased knowledge of

the number of new and known hypertensive patients that exist in the country. Fifty per cent of hypertensives were not receiving medication and a low percentage of hypertensives (21.7%) had controlled BP.

There is still a lot of work to do for the detection and control of arterial hypertension in the country.

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Conflict of interest: None of the researchers who participated in the MMM have any conflict of interest.

Data availability

The data underlying this article will be shared upon reasonable request to the corresponding author.

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