

May Measurement Month 2021: an analysis of blood pressure screening results from Ecuador

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KEYWORDS

Hypertension;
Blood pressure;
Screening;
Treatment;
Control;
Ecuador

Arterial hypertension is a growing burden worldwide, leading to over 10.8 million deaths each year. Before the outbreak of the COVID-19 pandemic, cardiovascular diseases were the main cause of death in Ecuador. Hypertension is the main risk factor for the major cause of death, coronary and cerebrovascular disease. The 2021 May Measurement Month Campaign (MMM21) is a global initiative by the International Society of Hypertension aimed at raising awareness of high blood pressure (BP) and to provide a temporary solution for opportunistic screening until more systematic approaches can be established. A cross-sectional survey was carried out in May 2021 across 22 health centres in Ecuador. The average age of participants was 44.7 ± 15.8 years. Blood pressure measurement, the definition of hypertension (mean of the 2nd and 3rd BP measurements $\geq 140/90$ mmHg or on medication for high BP), and statistical analysis followed the standard MMM protocol. In total, 1326 volunteers participated in MMM21. After multiple imputation of missing BP readings, 423 (31.9%) had hypertension. Of those, 70.5% were receiving antihypertensive medication. Of individuals receiving antihypertensive medication, 50.0% had uncontrolled BP. Overall, of 423 participants with hypertension, only 35.2% had their BP controlled

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(<140/90 mmHg). MMM21 demonstrated a high prevalence of hypertension in Ecuador during the COVID-19 pandemic. It was the largest BP screening campaign done in Ecuador thus far. The high percentage of persons untreated or with uncontrolled hypertension while on pharmacologic treatment suggests that appropriate screening can help to identify a significant number of people with elevated BP and those inadequately treated. These data should attract the attention of doctors and health care providers in Ecuador.

Introduction

In Ecuador, there are few epidemiological studies regarding the prevalence of arterial hypertension. In 1999, the results of the PREHTAE¹ study were presented, a survey of 10 000 people that showed a prevalence of 28% in three cities in the country. The National Health Survey (ENSANUT),² a document of the Ministry of Public Health in people between 18 and 59 years, found a prevalence of 9.3%. In 2010, the same researchers presented the SABE³ survey in people between 57 and over 80 years and found a prevalence of 46%. The Institute of Statistics and Census⁴ showed a cardiovascular mortality of 27%, and mortality from ischaemic heart and cerebrovascular disease of 10.1% and 7.0%, respectively.

The May Measurement Month (MMM) campaign is a global campaign initiated in 2017 by the International Society of Hypertension aimed at raising awareness of high blood pressure (BP) and to provide a temporary solution for opportunistic screening until more systematic approaches can be established. Ecuador participated again in 2021. In the MMM 2017 campaign in Ecuador,⁵ of the 6984 people who completed the survey, 28.2% had hypertension and 1522 (77.3%) of these were already taking antihypertensive treatment. Of the people receiving treatment, 74.6% were

controlled (<140/90 mmHg). In MMM18,⁶ 11 922 individuals (53.7% female) were screened, of whom 3261 (71.5%) were on medication. Among those on medication, 2328 (71.4%) were controlled. MMM21 provided another opportunity to review BP levels and control rates during an ongoing pandemic.

Methods

In Ecuador, May Measurement Month (MMM21) was carried out in accordance with the MMM21 Protocol provided by the central MMM team. Screening was carried out from May to September 2021. A team of investigators from various parts of the Ecuador assisted in the selection of the 22 measurement sites. The MMM21 co-ordinator and national leader in Ecuador was Dr Ernesto Peñaherrera Patiño. Verbal informed consent was obtained from responders—in February 2021, several leaders in hypertension met to plan the conduct of the new survey to ensure that the team were properly trained 3 months prior to the start of the programme.

The study involved 50 properly trained volunteers. We had difficulties in registering more measurement sites and more personnel for the objective because in Ecuador, the COVID-19 pandemic in the years 2020-2022 was catastrophic and very few people were prepared to attend the measurement sites. To

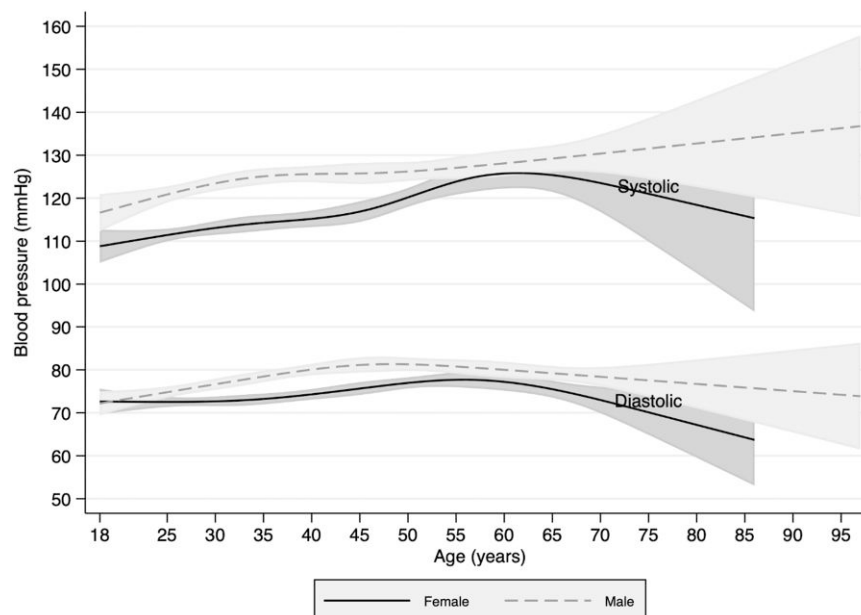


Figure 1 Arterial pressure in Ecuador MMM-21.

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
1326	423 (31.9)	303 (71.7)	298 (70.5)	149 (50.0)	423 (35.2)

advertise the campaign, we used our own resources for training, and we trained students of Medicine, respiratory therapy, nurses, and medical staff in the Municipality of Quito. We also made posters, flyers, and carried out radio interviews on several occasions. The survey and measurement stage lasted 3 months during which the most commonly used device was the validated upper-arm cuff oscillometric monitor OMRON 7120 Healthcare (Kyoto, Japan). After answering the survey, the participants remained seated for 5 min with their feet resting on the floor and their back supported before three measurements were made semi-automatically at intervals of 1 min between measurements. Participants were also asked about their height and weight. Hypertension was identified if the BP of the individual (mean of second and third readings) was ≥ 140 mmHg systolic or ≥ 90 mmHg diastolic, or if the individual was on antihypertensive medication. The original analysis made use of multiple imputations to impute the mean of the second and third BP where this was missing, based on global data. Our results were collected on spreadsheets, and E.P. and Y.C.D. then triple-checked the data before transferring to the central MMM team for statistical analysis (Figure 1).

Results

Measurements were taken from 1326 individuals across 22 sites, the largest proportion of whom were from Quito, Guayaquil, Milagro, Loja, Duran, and Cerecita. The average age of respondents was 44.7 ± 15.8 years, 55.8% were female and 44.1% male; 96% of screenees were of mixed ethnicity, and 86% had received one or more doses of COVID-19 vaccines (Table 1).

Across all participants, the mean BP of the second and third measurements was 124.1/77.5 mmHg, after multiple imputation. Systolic and diastolic BP varied according to participant age (Figure 1). Of all participants, 423 (31.9%) were found to have hypertension, of whom 303 (71.7%) were aware of their diagnosis and 298 (70.5%) were on medication. Of those on medication, 149 (50.0%) were controlled. Of all 423 participants with hypertension, 35.2% had controlled BP. The proportion of people with hypertension of those who did not take medication was 12.1%. Of those taking antihypertensive medication, 65.1% were only taking one class of medication to control their BP. At the time of the survey, 26.3% of participants reported having previously had a positive test for COVID-19.

Discussion

This is the first survey of BP values carried out in Ecuador during the COVID-19 pandemic. Implementing standardized BP measurement following international recommendations including using an appropriately sized cuff, a rest of 5 min prior to measurement, with the

screenee in the correct position, and taking three separate measurements 1 min apart helps to ensure BP measurement accuracy and allow comparability with other MMM studies. A significant increase in participants was notable across the consecutive MMM campaigns: in MMM17, 6984 participants were screened, in MMM18, 11 922, and in MMM19, 15 885. The programme was suspended in 2020 due to the onset of the pandemic. The prevalence of hypertension across those years was somewhat variable with 28.2%, 38.3%, and 41.9%, respectively. This may reflect differential sampling, which was opportunistic and not randomized. Interestingly, in MMM19, 83.8% were women, however, participation in 2021 the distribution between the sexes was more balanced with 55.8% of the screenees being female. There was very little participation of people of African American ethnicity, who account for 7.0% of the entire population of Ecuador. Rates of hypertensive individuals with uncontrolled BP despite receiving medication was 50%, and the number of hypertensive participants who were not on medication continued to be high with averages in MMM21 of 29.5% compared to MMM17 with 28.6%, MMM18 with 38.3%, and MMM19 with 35.8%, respectively. Of the 423 participants with hypertension in MMM21, 35.2% had controlled BP values, while 50% of participants with treated high BP had uncontrolled BP.

These results should draw attention to the medical community, to set medication treatment goals available to citizens and implement intensive and urgent programmes to educate doctors, paramedics, and citizens in the correct measurement and proper treatment of this condition that has a very high prevalence in Ecuador. Greater population studies are needed to corroborate these data and include several ethnic groups that were not well represented in this survey and more employees in more cities in the country.

Acknowledgements

We are grateful to Omron for the donations of BP devices. Thanks to the researchers and collaborators who participated in MMM19: España Yermania, Cabezas Javier, Narvaez Stephania, Davila Esteban, Carvajal Catalina, Amaguana Tatiana, Alarcon Mercedes, Quilcana, Perez Andrea, Castillo Cristian, Maldonado Angela, Ordoñez Anahy, Romero Marlon, Romero Alejandra, Caiche Evelyn, Calero Andrea, Padilla Ginger, Frerres Dagma, Naranjo Carlos, Navrrete Catherine, Vera Jhonny, Naranjo Carlos, Caicedo Ana, Macias Bella, Benalcazar Maria, Aguiar Dina, Gabriela Valencia, Raul Torres and Servier Laboratories collaborators, Rotary Club de Guayaquil Moderno members, and 130 more people, whose names it was not possible to obtain, to whom we send our sincere thanks.

Funding

None declared.

Conflict of interest: The author and co-authors declare that they have no conflicts of interest for the present study.

Data availability

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

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