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May Measurement Month 2017 in Chile—Americas

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Elevated blood pressure (BP) is a growing burden worldwide, leading to over 10 million deaths each year. May Measurement Month (MMM) is a global initiative aimed at raising awareness of high BP and to act as a temporary solution to the lack of screening programmes worldwide. National Health Surveys, PURE and CESCAS Chilean cohorts have shown a high prevalence of hypertension, with a significant proportion of people unaware of being hypertensive or under treatment but with uncontrolled BP. An opportunistic cross-sectional survey of volunteers aged $\geq$18 was carried out in May 2017. BP measurement, the definition of hypertension and statistical analysis followed the MMM protocol. Sixty-seven sites participated. Most screening sites were National Heath Public System outpatient clinics, mainly in the 9th region of the country. In addition, clinical research sites and private clinics participated. Overall, 4754 individuals were screened during MMM17. After multiple imputations, 1153 (24.2%) had hypertension. Of individuals not receiving anti-hypertensive medication, 653 (15.3%) were hypertensive. Of the 500 individuals receiving anti-hypertensive medication, 162 (32.5%) had uncontrolled BP. MMM17 was one of the largest BP screening campaigns performed in Chile. It demonstrated a high proportion of hypertension among screenees with a low proportion the individuals with controlled hypertension in the community. The high percentage of persons untreated or with uncontrolled hypertension whilst on pharmacologic treatment suggests that systematic screening programmes may be a useful tool to improve hypertension control in Chile.

Background

Cardiovascular diseases are the lead cause of death in Chile, representing a 27.1% of the total mortality in 2016. Even though myocardial infarction[1] is the first cause of specific death in Latin America, in Chile, stroke leads the list.[2] In 2016 stroke and myocardial infarction mortality rate was 46.4 and 44.8 per 100 000 inhabitants, respectively, with a significant predominance in the male population for stroke 55.1 vs. 34.8 per 100 000 inhabitants.[2]

Hypertension is a major determinant of the main cardiovascular causes of death: myocardial infarction, stroke, and heart failure. The hypertensive disease death rate is 32.5 per 100 000 inhabitants, predominant in female population, 37.5 vs. 27.3 per 100 000 inhabitants in men.[2] Myocardial infarction incidence was 74.4 per 100 000 inhabitants in the period 2001–2007[3] and stroke incidence was 140.1 per 100 000 between 2000 and 2002.[4] Hypertension is highly prevalent in Chile. The National Health Survey 2016–2017 in a random sample of 6233 individuals older than 14 years reported a 27.6% prevalence of hypertension, with similar prevalence in men and in women. This prevalence increases to 73.3% in those older

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than 64 years. The prevalence of hypertension is highly influenced by the educational level: 57% vs. 15% in those with less than 8 years compared with those with more than 12 years of education, respectively.[5]

PURE and CESCAS cohort studies were conducted in the 9th Region of Chile, by the University of La Frontera, both used a stratified random sample of the population between 35 and 74 years old in CESCAS and from 35 to 70 years old in PURE. The analysis of the CESCAS cohort baseline demonstrated a 39.7% prevalence of hypertension, with a 68.7% of awareness, 52.7% under treatment, and 25.3% with controlled hypertension.[6] On the other hand, in the PURE study hypertension prevalence was 46.6% and treatment to reduce blood pressure (BP) was 23.6%.[7]

The country was involved in May Measurement Month 2017 (MMM17) as the first author of this paper (F.L.) is a member of the International Society of Hypertension and was Elected-President of the Chilean Society of Hypertension in 2017. Regional and national authorities of the National Health Ministry strongly supported the initiative.

Methods

This cross-sectional survey included adults ($\geq$18 years) who ideally had not had their BPs measured in the past year. The first author of the paper co-ordinated MMM17 in Chile. Sixty-seven sites participated, with an average number of 71 participants and a range from 1 to 554. Most of the sites were primary care outpatient clinics of the public health sector in the 9th region of the country. In addition, clinical research sites and private clinics participated. Measurements were done mainly during working days, during all the month of May. Radio, newspaper, and internet media was used to promote the participation of individuals in the 9th region. Personnel involved in the measurements had formal training, as paramedics or nurses, and received study-training material about how to fill in the registration forms and BP measurement using standard procedures.

Although target participants were volunteer adults ($\geq$18 years) who ideally had not had their BPs measured in the previous year, all persons interested in participating were allowed. Each participant had their BP measured three times, in a seated position, mainly with automatic OMRON devices. They also received a questionnaire about demographic, lifestyle, environmental factors, and estimated weight and height. BP was calculated from the mean of the 2nd and 3rd readings. Mean BPs were standardized for age and sex according to the WHO world age-standard population along with an assumed sex ratio of 1:1. Hypertension was defined as systolic BP $\geq$140 mmHg, diastolic BP $\geq$90 mmHg (or both), or based on receiving anti-hypertensive medication. Among those on treatment, controlled BP was defined as a BP of less than 140/90 mmHg.

BP automatic equipment was donated by Omron-Chile and distributed in the participant sites, as no other funding was available. Data were recorded mainly on paper forms, and later transferred to excel spreadsheets. It was cleaned locally by the paper's author and centrally. Data were analysed by the MMM project team. Multiple imputations were used to estimate the mean of the 2nd and 3rd BP readings when they were not recorded and analysed according to the standard plan.[8]

Results

The number of participants was 4754, with predominantly female participation, 3163 women (66.5%) and 1591 males (33.5%), with a mean age of 44.6 years old (SD 15.9). Overall, 4302 participants had the three measurements of BP recorded. Crude mean systolic and diastolic BPs were 123.1 and 76.2 mmHg, respectively. After age and sex standardization, they were 123.4 and 76.1 mmHg. The average BP between the 1st and the 2nd measurement had minor differences: 1.6 mmHg in systolic BP and 0.6 mmHg in diastolic BP and between 1st and 3rd measurement: 2.5 and 1.0 mmHg, respectively.

About 1153 (24.2%) of the 4754 total participants were hypertensive. Six hundred and fifty-three (15.3%) out of the 4254 participants who were not receiving treatment had systolic and/or diastolic BP equal or higher than 140 or 90 mmHg, respectively, and were considered potential hypertensives. They were referred to their health provider and received an educational leaflet with recommendations about diet and lifestyle changes to lower BP. Five hundred individuals were receiving pharmacologic treatment for hypertension. In those patients, the mean systolic and diastolic BP was 128.4 and 78.9 mmHg, respectively, 162 of those receiving anti-hypertensive medication had uncontrolled BP and represented 32.5% of those on treatment.

Subgroup analysis of BP adjusted for age, sex, and use of anti-hypertensive medication demonstrated differences with baseline average BP. History of stroke and alcohol consumption were associated with higher systolic and diastolic BP. History of diabetes and smoking associated with higher systolic BP (see Supplementary material online, *Table S1*). Systolic and diastolic BP, adjusted with linear regression, increased significantly in each category of body mass index (see Supplementary material online, *Figure S1*).

Discussion

MMM17 in Chile demonstrated that 24.2% of those screened were hypertensive. Among the hypertensive participants, 43% were receiving medication to control BP, only 67.5% of those receiving medication had controlled BP.

The impact of MMM17 was restricted mainly to the 9th region of Chile, where the University of La Frontera is located and the author is an advisor of the Provincial Health Service. The media campaign was done in local media and the recruiting sites were in the limits of the region. However, it was a learning opportunity that helped to plan and conduct MMM18 with a national coverage and participation of sites along the country that more than doubled the 2017-recruited population. The visibility of the initiative has increased. The Ministry of Health, educational institutions, clinics, medical society had expressed their interest in participating in future campaign.

Given the non-representative selection of the recruiting sites—being all part of health services facilities, it is surprising the high level of concordance observed between these results and the National Health Survey of 2016–2017.[5] The Chilean National Health Survey is a representative household survey with a stratified multistage probability sample of 6233 participants over 14 years old. With the same definition for hypertension as MMM17 the national prevalence was 27.6%, strongly influenced by age and education level and the awareness, treatment, and control rate were 68.7%, 60.0%, and 33.3%, respectively.

The characteristics of our participant sites, mainly health facilities had strengths and weakness. The major strengths include the participation of personnel well-trained in BP measurement, the availability of BP devices and building infrastructure, and most importantly the optimal situation for referring the individuals with elevated BP, with or without treatment to their health provider. The major weakness is that this strategy does not help to identify the presence of possible hypertension in individuals who are not attending health facilities, due to work location or rurality.

Supplementary material

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

Conflict of interest: none declared.

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