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## May Measurement Month 2018: an analysis of blood pressure screening results from Spain

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### KEYWORDS

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Elevated blood pressure (BP) is the single most important contributing risk factor to the global disease burden, leading to over 10 million deaths each year. In Spain, hypertension (HTN) affects around 20% of the adult population and remains the greatest attributable cause of cardiovascular mortality. May Measurement Month (MMM) is a worldwide initiative aimed at increasing awareness of HTN and to improve the lack of screening programmes worldwide. An opportunistic cross-sectional survey of volunteers aged 18 and over was carried out in May 2018. Blood pressure measurement, the definition of HTN and statistical analysis followed the standard MMM protocol. Anthropometric data and responses to questionnaires on demographic, lifestyle, and environmental factors were obtained as additional information. Screening sites mainly in community pharmacies, universities, primary care centres, HTN units, and cardiovascular departments in hospitals were set up across Spain as part of this initiative. In total, 7646 individuals (63.5% female) were screened during MMM18. After multiple imputation, 40.0% had HTN, of whom 74.4% were aware of their diagnosis and 69.6% were taking antihypertensive medication. Of individuals not receiving antihypertensive medication, 16.9% were hypertensive. Of individuals receiving antihypertensive medication, 36.4% had uncontrolled BP. MMM18 almost doubled the number of participants of MMM17 and was the largest BP screening campaign ever undertaken in Spain, showing that in the absence of systematic screening programmes for HTN, MMM can identify a great number of individuals at risk, increasing their awareness and attracting the interest of the healthcare system in Spain.

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**Table 1** Total number of participants and key proportions for subjects with hypertension

Total participants	Number with hypertension	Proportion of all participants with hypertension (%)	Proportion of hypertensives aware (%)	Proportion of hypertensives on medication (%)	Proportion of those on medication with controlled BP (%)	Proportion of all hypertensives controlled (%)
7646	3058	40.0	74.4	69.6	63.6	44.3

BP, blood pressure.

## Introduction

Arterial hypertension (HTN) is the greatest modifiable contributor to cardiovascular diseases (CVDs) and global mortality worldwide, leading to over 10 million deaths each year. In Spain, HTN ranks first among reported chronic diseases, affecting 19.8% of the adult population according to the most recent data of the National Statistical Institute.<sup>1</sup> Furthermore, HTN-related CVD is still the main cause of mortality in Spain, accounting for 29.0% of all deaths (31.8% in women and 26.3% in men). Of all deaths in Spain, 20.1% corresponded to ischaemic heart disease (52.8% in women and 47.2% in men), 6.6% to cerebrovascular disease (57.4% in women and 42.6% in men), and 2.3% to HTN-related arterial diseases (52.4% in women and 47.6% in men).<sup>1</sup> May Measurement Month (MMM) was initiated by the International Society of Hypertension (ISH) in order to address this major public health problem. To improve screening and awareness of HTN in Spain, the Spanish Society of Hypertension decided to join the May Measurement Month 2018 (MMM18).<sup>2</sup>

## Methods

The MMM18 Spain cross-sectional survey was set up between 1 and 31 May 2018. Volunteers were recruited through the Spanish Society of Hypertension (SEH-LELHA) and the Spanish Society of Family and Community Pharmacy (SEFAC). Two groups of volunteers deserve special consideration: firstly, 891 community pharmacists ([Supplementary material online](#), List of investigators, Study Group MMM18-SEFAC) across Spain performed 5785 (76.8%) measurements, compared with 190 pharmacists with 3267 measurements in MMM17<sup>3</sup>. Secondly, 99 students belonging to the University Cardenal Herrera-CEU, Valencia ([Supplementary material online](#), List of investigators, Study Group MMM18-CEU), recruited 1009 (13.2%) subjects in a university setting. Communication and distribution of the protocol, essential training material, videos, and marketing information were shared using the bespoke MMM website. Blood pressure measurements and a questionnaire about demographic, lifestyle, and cardiovascular risk factors, according to the MMM18 protocol, were carried out. Hypertension was defined as systolic BP (SBP)  $\geq 140$  mmHg or diastolic BP (DBP)  $\geq 90$  mmHg, or on reported current use of antihypertensive medication. Blood pressure was measured mostly with automated devices and included three seated recordings taken predominantly on the left arm. Weight and height were largely

estimated according to self-reported data. Participants with BP  $\geq 140$  or  $\geq 90$  mmHg were provided with printed evidence-based dietary and lifestyle suggestions and advice. Submitted data were analysed centrally by the MMM project team using Stata version 14.2. The mean of the 2nd and 3rd BP readings was used for the analyses and multiple imputation was performed to impute the mean of readings 2 and 3 where this was missing using the global data<sup>2</sup>. Ethics approval was obtained centrally through the University Hospital 12 de Octubre in Madrid and further approved locally where required.

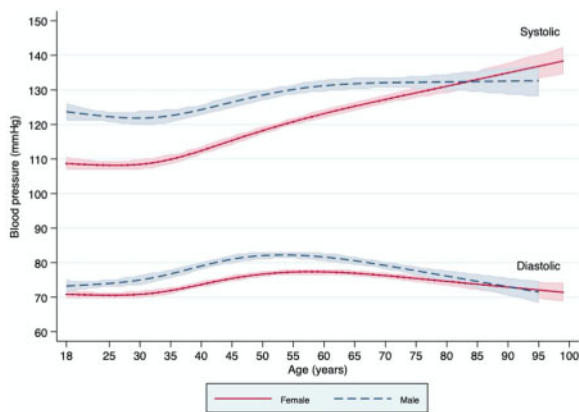
## Results

Data were obtained from 7646 participants. The mean age from the cohort was  $51.8 \pm 19.1$  years, and more women than men were screened; 4852 (63.5%) were female. Ethnicity was mostly white (91.7%). 2128 (27.8%) were on antihypertensive medication. In total, 715 (9.4%) participants reported having diabetes, 325 (4.3%) reported a history of myocardial infarction, and 230 (3.0%) of stroke. 2118 (27.7%) respondents declared alcohol consumption once or more per week, 1546 (20.2%) participants reported smoking, and 100 women (2.1% of female subjects) reported being pregnant. The mean body mass index (BMI) of respondents was  $26.0 \pm 4.6$  kg/m<sup>2</sup>, 3743 respondents (55.0%) had either overweight (37.4%) or were obese (17.6%) ([Supplementary material online](#), [Table S1](#)).

Of 5068 respondents with three BP readings, BP decreased on average by 4.0/2.2 mmHg between the 1st and 3rd readings. The age-standardized and sex-standardized mean BP was 120.4/75.7 mmHg in those not on treatment, and 127.0/80.9 mmHg in those on treatment.

After imputation, of the 7646 individuals for whom a mean of the 2nd and 3rd readings was available, or of those who were on antihypertensive treatment, 3058 (40.0%) participants were hypertensive. Excluding participants taking antihypertensive medication, 930 (16.9%) of 5518 participants with HTN were not receiving treatment ([Table 1](#)).

Based on a linear regression analysis, the association between age and sex with SBP in people who were not receiving antihypertensive treatment showed a linear increase, with the mean BP in women exceeding the mean BP in men at 85-90 years of age. For DBP, the relationship shows an inverted U shape, with highest levels at age 50-55 years in men and a similar but broader peak in women, and with BP in women lower than in men until aged 90 years ([Figure 1](#)).



**Figure 1** Difference in blood pressure with age and sex from linear regression model, excluding individuals receiving treatment.

After adjustment for age and sex (allowing for an interaction), significantly higher SBP and DBP were apparent in people receiving antihypertensive treatment, but only SBP was higher in people with diabetes (Supplementary material online, Figure S1). Adjusting for age, sex, and antihypertensive treatment, SBP and DBP was also significantly higher in those consuming alcohol (one or more per week), in current smokers and in obese and overweight subjects (Supplementary material online, Figures S2 and S3).

## Discussion

Spain ranked 3rd among European countries in MMM18 and contributed with 9.5% of participants to the European sample, representing an almost three-fold increase compared with MMM17 and fulfilling thereby the target of >9%.<sup>2,4</sup> This improvement was based on the engagement of community pharmacists and the additional, committed involvement of university students to the volunteers.

In Spain, MMM18 detected 3058 adults (40.0% of those screened) with HTN, of which 930 (30.4%) were untreated. Of those on medication, 775 (36.4%) were uncontrolled, as a result only 44.3% of all hypertensives were controlled. Compared with worldwide data, the proportion with HTN is higher (40.0% vs. 33.4%), the proportion of hypertensives on medication and controlled are also higher (69.6% vs. 55.3% and 63.6% vs. 60.0%, respectively), as was the proportion of control of all hypertensives (44.2% vs. 33.2%). Although the results might be biased by underreporting, especially concerning alcohol habits, the association of elevated BP with increased BMI and alcohol consumption were

consistent with the global MMM18 data, but contrary to them, our data on smoking status and in subjects with diabetes showed interestingly an opposite association to SBP. Besides, in opposition to the global MMM18 data, measures in the setting of community pharmacies were similar to the hospital records, underlining the appropriateness of community pharmacies to carry out screening programmes, in line with previous experiences in Spain<sup>5</sup>. Measurements in Spain involved predominantly major cities and not rural areas; therefore, results are not likely to be accurate enough to report true prevalence of HTN. In summary, the results of MMM18 confirm that efficient screening programmes are feasible and highlight the need for better control of HTN in Spain.

## Supplementary material

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

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