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May Measurement Month 2017: an analysis of blood pressure screening in Angola—Sub-Saharan Africa

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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. There is increasing prevalence of hypertension in developing countries leading to increased risk of adverse outcomes. An opportunistic cross-sectional survey of volunteers aged ≥ 18 was carried out in May 2017. Blood pressure measurement, the definition of hypertension and statistical analysis followed the standard MMM protocol. In Angola, 17 481 individuals were screened in six provinces with an average BP of 126/78 mmHg. After multiple imputation, 6022 (34.5%) had hypertension. Of individuals not receiving antihypertensive medication, 4080 (26.3%) were hypertensive. Of those receiving antihypertensive medication, 1159 (59.7%) had uncontrolled BP. MMM17 was the largest BP screening campaign undertaken in Angola. These results suggest that there is still a significant percentage of patients who are not medicated and possibly require medication, and more than half of the hypertensive patients do not have controlled BP demonstrating the need for a more targeted and comprehensive screening of BP and more effective treatment.

Introduction

Hypertension continues to be the major contributor to the global burden of disease,¹ and to global mortality, leading to 10.5 million deaths each year.^{1,2} This situation is expected to worsen in spite of great advances in the pharmaceutical area [regarding drugs able to control high blood

pressure (BP)] because of the ageing of the population and because only a small minority of patients with hypertension have their BP's controlled (<140 mmHg systolic BP and <90 mmHg diastolic BP).³⁻⁷

The World Heart Federation³ and the Lancet Commission on Hypertension⁴ highlighted the importance of improving awareness of increased BP as a crucial action needed to address the associated health burden. Blood pressure measurement is a cheap, simple, non-invasive technique, and assuming effective therapy is provided, leads to highly cost-effective protection against death and disability.⁵

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In developing countries, evidence suggests that the impact of hypertension today is very large and is exacerbated in people of African black descent mainly due to lower levels of awareness and control of hypertension, a younger age at onset, and a potentially more aggressive disease course.^{6,7} Meanwhile, with more than one-third of adults in Africa being hypertensive⁸ urgent action is required. As a pragmatic and rapid approach to addressing the problem of insufficient awareness of hypertension, the World Hypertension Day was expanded to become May Measurement Month (MMM).⁹ Angola was invited by the International Society of Hypertension (ISH) to be a part of this investigation. Angola is a sub-Saharan country that has 18 provinces and a population of 28 359 634 of which 13 187 230 (46.5%) are 18 years old or more (National Statistical Institute).

Methods

The MMM cross-sectional survey was set up between October 2016 and April 2017 (MMM17). A protocol was developed by the ISH and distributed to all participating countries. In Angola, there was no need for ethical clearance.

In total, 25 sites were set up in pharmacies, places of worship, shopping malls, schools, and clinics in primary and secondary care facilities. Fifty volunteers were trained to measure BP via video recordings housed on the MMM website.

Omron Healthcare donated 250 BP devices to Angola, which were distributed among the screening sites. We also had financial support from local companies and banking.

Target participants were volunteer adults (≥ 18 years) who ideally had not had their BP measured in the previous year. The campaign was promoted internationally by the ISH and locally by government endorsements, television and radio, and through the media and social media.

The screening took place between May 1st and June 15th.

Recommendations for standard methods included three seated recordings taken on the left arm (preferably) with 1 min intervals between readings when the pulse rate was recorded. A paper form questionnaire was used to collect a limited amount of data from each participant, and there were no additional measurements outside the protocol. Later, these data were transferred to excel spreadsheets.

Blood pressure was calculated from the mean of the second and third readings, and hypertension was defined as a systolic BP of at least 140 mmHg or a diastolic BP of at least 90 mmHg (or both). Participants receiving antihypertensive treatment were also assumed to have hypertension. Among those on treatment, controlled BP was defined as a BP of less than 140/90 mmHg. Participants found to have BP's in the hypertensive range were provided with printed evidence-based dietary and lifestyle advice designed to lower BP.

Submitted data from Angola were collated and analysed centrally by the MMM team using Stata version 14.2.

Results

A total of 17 481 individuals were screened, with a mean age of 37.2 years (± 13.5 years), 59.6% being women. Of the total, 11.1% (1942) were on antihypertensive therapy, 2.2% (386) were diabetic, 0.9% (165) of the sample had acute myocardial infarction, 1.1% (189) stroke, 8.9% (923) of the women were pregnant, 4.4% (762) were smokers, and 13.2% (2299) reported an alcohol consumption of once or more per week.

Of 16 848 respondents with three BP readings, BP decreased on average by 4.5/2.5 mmHg between the first and third readings. After imputation, of the 17 479 individuals for whom a mean of the second and third readings was available, 6022 (34.5%) participants were hypertensive. Excluding participants taking antihypertensive medication, 4080 (26.3%) participants of 15 537 were hypertensive. Among 1942 participants who were receiving treatment for hypertension, 763 (40.3%) had controlled BP and 1159 (59.7%) had uncontrolled BP.

The mean BP was 126/78 mmHg and with standardization for age and sex was 129/79 mmHg. The mean BP with standardization for age and sex in patients who were not on antihypertensive treatment was 128/79 mmHg and in patients on antihypertensive treatment was 140/85 mmHg.

Based on a linear regression model, the global association between age and sex with BP 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 43 years of age (Supplementary material online, *Figure S1*).

After adjustment for age and sex (allowing for an interaction), significantly higher systolic and diastolic BP were apparent in people receiving antihypertensive treatment. Adjusting for age, sex, and antihypertensive treatment, systolic and diastolic BP were significantly higher in those with a previous history of stroke, in those who consume alcohol once or more a week and in those with an increasing body mass. Systolic BP was significantly higher in current smokers and diastolic BP was significantly higher in those with a history of myocardial infarction. In contrast, BP readings in pregnant women were significantly lower (Supplementary material online, *Figures S2 and S3*).

Discussion

MMM17 is the largest synchronized, standardized multinational screening campaign of any cardiovascular risk factor ever done in Angola. This study provides important nationally representative estimates of the extent of hypertension in Angola, being the first large study in the area.

The mean BP level was 126/78 mmHg and the standardized mean was 129/79 mmHg, both within normal limits. The standardized mean of screenees who did not receive antihypertensive treatment was 128/79 mmHg, that is, very similar to the general average. The mean BP of the screenees under treatment was 140/85 mmHg, which reflects a large number of uncontrolled individuals.

About one-third of the screenees were hypertensive. The WHO Africa Region is reported to have the highest prevalence of hypertension (46% opposed to the proportion of 34.5% from our study)¹⁰ and a previous systematic review and meta-analysis estimated a high prevalence for sub-Saharan Africa (30%).¹¹

From those that were not using any medication, 26% were hypertensive. (This indicates the importance of understanding why: if for lack of knowledge or because they decided not to take the medication.) Out of those on medication, 59.7% had uncontrolled BP.

We can also verify that the three BP measurements suffer a reduction of about 4.5/2.5 mmHg from the first measurement to the third demonstrating the importance of making more than one measurement when evaluating the BP.

Like other studies conducted in similar settings we found that the BP was higher among men than women until a certain age.^{12,13} Also for both sexes, the systolic BP graphic curve has a growing pattern with age and the diastolic BP curve a flattened one, showing that age has a greater association with increased systolic BP.

Arterial BP values were higher in patients on anti-hypertensive medication, who were overweight/obese,^{14,15} and who consumed alcohol,¹⁶ and those who had suffered from stroke, which emphasizes the need for more aggressive treatment in such high-risk patients. A positive association was also present between the diastolic BP and the occurrence of myocardial infarction. We confirmed lower BP's in pregnant women.¹⁷

The new epidemic of hypertension is an important public health problem causing an urgent need to develop current hypertension control programmes based on strategies to prevent, detect, treat, and control hypertension.

Supplementary material

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

Conflict of interest: none declared.

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