May Measurement Month 2019: an analysis of blood pressure screening results from Botswana

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The May Measurement Month (MMM) 2019 campaign aimed to raise awareness of the health issues surrounding raised blood pressure (BP) among the general public. It also sought to identify and facilitate reduction of BPs of participants who require intervention to lower their BP according to current country treatment guidelines. Participants aged ≥18 years were recruited on site through interactions with the study team, educational fliers, and as voluntary walk-ins in response to the media engagement prior to the campaign. Blood pressures were measured using validated upper-arm cuff electronic devices provided by Omron Healthcare in partnership with International Society of Hypertension. With the participant seated, their back supported and legs resting uncrossed on the ground, three BP and heart rate readings were taken and recorded, 1 min apart. Participants’ basic demographic data were also collected. Hypertension was defined as being on treatment for hypertension, or a systolic BP ≥140 mmHg and/or a diastolic BP ≥90 mmHg (based on the mean of the last two of three readings). Of the 5459 screened participants, 1750 (32.1%) had hypertension, of whom 784 (44.8%) were aware they were hypertensive and 726 (41.5%) were on antihypertensive medication. Among those on antihypertensive treatment, 47.0% had their BP controlled (<140/90 mmHg). Only 19.5% of all those with hypertension had their BP controlled. A total of 1024 (21.6%) of the 4733 participants not on antihypertensive treatment were hypertensive. Intensified preventive and treatment measures to control BP at the health system, individual and population levels remain a critical requirement for Botswana.

Introduction

A 2014 national survey estimated the prevalence of hypertension in Botswana at 30%,1 consistent with findings from the World Health Organisation (WHO) 2014 STEPS survey, which also showed a high prevalence of hypertension in Botswana with only 29.9% of hypertensive participants on treatment and 24.2% of hypertensive participants unaware of their condition.2 Hypertension was ranked the 2nd highest cause of morbidity among all-cause morbidities in...
outpatient services across Botswana with an insidious increase from 0.2% to 0.6% between 2014 and 2018.\textsuperscript{3,4} Health service utilization at outpatient departments due to heart failure, a common complication of hypertension had almost doubled in Botswana, between 2015 and 2018.\textsuperscript{3,4} The WHO has reported an increase in mortality due to hypertension in Botswana from 2.1% in 2017 to 2.24% in 2018.\textsuperscript{4,5} Additionally, deaths associated with stroke increased from 2.1% to 2.5% between 2013 and 2014, respectively.\textsuperscript{6} The May Measurement Month (MMM) campaign of 2018\textsuperscript{7} also demonstrated a high prevalence of hypertension in Botswana (32.8%) but less than a 5th of these (19.1%) were well controlled. Furthermore, there were high levels of unawareness of hypertension (52.9%) among those with hypertension and only 54.4% of those on treatment were optimally controlled.

The prevalence of hypertension in Botswana remains remarkably high with increasing associated morbidity and mortality. Therefore, our participation in the MMM19 was aimed at promoting awareness of hypertension at a community level in addition to estimating the prevalence and control of hypertension in Botswana.

Methods

Following the 2017 and 2018 MMM campaigns, the International Society of Hypertension conducted a 3rd global cross-sectional blood pressure (BP) survey of volunteer adults (aged ≥18 years) who ideally had not had their BPs measured for at least a year before BP screening in 2019. In 2019, the survey was conducted in 92 countries worldwide each incorporating a variable number of screening sites. The Botswana study co-ordinator was Dr Tiny Masupe. Ethical clearance was obtained from the University of Botswana Institutional Review Board and the Health Research Development Committee at the Ministry of Health and Wellness, Botswana.

Four volunteer team leaders who led teams in the 2018 campaign were re-trained to lead teams at one of the four following selected locations: Ramotswa, Otse, Mogoditshane, and Gaborone. The villages were chosen because of proximity to the main study base of Gaborone but also because each team leader hails from the village, giving a familiar face to the campaign. The team leaders were recently graduated nurses with nursing diplomas and were unemployed at the time of the campaign. Teams entered the villages through asking for permission from the tribal leaders and then setting up campaign sites within each village, moving on to new sites each week. Each team therefore covered a minimum of three sites per locality. The District Health Management Teams in Moshupa, Ramotswa, and Thamaga also participated in the campaign by providing additional resources such as manpower and glucose measuring devices. As the campaign was to raise awareness about hypertension, information about the project was shared with various stakeholders through different forums including print, social, and other media avenues to encourage participation. These included our Facebook page, educational fliers, site activations, and a popular morning radio show on Duma FM.

The campaign comprised of daily screenings, throughout the month of May 2019. Participants were aged ≥18 years, recruited on site through interactions with the study team, educational fliers, and as walk-ins in response to the media engagement prior to the campaign. Blood pressure was measured using Omron automated electronic devices donated by OMRON Healthcare. After ensuring the correct size of arm cuff, BP was measured on the upper arm with the cuff placed at heart level and the participant’s arm resting on a table. With the participant seated, their back supported and legs resting uncrossed on the ground, three BP readings, were taken and recorded, 1 min apart. Heart rate readings for each BP measurement were also recorded as provided by the automated BP machine.

Hypertension was defined as being on treatment for hypertension, or a systolic BP ≥140 mmHg and/or a diastolic BP ≥90 mmHg based on the mean of the 2nd and 3rd of three readings. A questionnaire was administered to all participants to collect data on the following variables; ethnicity, age, smoking and alcohol history, past medical history of BP, heart attack, stroke and diabetes, weight, and height. The anonymized data were directly entered from the data collection sheets onto the MMM excel spreadsheet. The records were uploaded to a central database in the UK for analysis by the MMM project team. Multiple imputation was performed to impute the mean of readings two and three where this was missing.\textsuperscript{8}

Results

The mean age of all 5459 participants was 36.0 years (SD 12.9) with 57.4% being female (Table 1). A large majority of participants 5199 (95.2%) were of black ethnicity. There were 1711 (31.3%) of the total participants who had never had their BP measured within the last 12 months.

Of the 5459 screened participants, 1750 (32.1%) had hypertension, of whom 784 (44.8%) were aware they were hypertensive and 726 (41.5%) were on antihypertensive medication. Among those on antihypertensive treatment, 47.0% had their BP controlled (<140/90 mmHg). Only 19.5% of all those with hypertension had their BP controlled. Of the total participants, only 2.6% were on aspirin and 2.1% on statin therapy.

A total of 1024 (21.6%) of the 4733 participants not on antihypertensive treatment were found to be hypertensive. Compared with women without a history of hypertension in pregnancy, those who reported previous hypertension in pregnancy had significantly higher systolic and diastolic BPs [4.2 (CI 2.2–6.2)/2.7 (1.4–4.1) mmHg; both \( P < 0.001 \)] after controlling for age and antihypertensive medication use alone (Supplementary material online, Figure S6).

Discussion

A third (32.1%) of our participants had hypertension but less than half (44.8%) were aware of it. Two-fifths (41.5%) of hypertensives were on treatment but less than half...
(47.0%) of those on treatment had controlled BP. In addition, amongst all those with hypertension, less than a fifth (19.5%) had controlled BP. This is far less than the country’s target of controlling BP in 60% of those with hypertension, as per Botswana non-communicable diseases (NCDs) strategy of 2017-22 (NCD Strategy 17-22). An association between poor BP control and antihypertensive medication errors has been reported in Botswana9 and is a likely contributor to increasing complications such stroke and heart diseases. May Measurement Month campaigns provide important national estimates of hypertension disease burden and can guide programme planning, policy or strategy reviews, amidst the epidemic of poorly controlled and undiagnosed hypertension in low- and middle-income countries. Furthermore, the annual replication of MMM campaigns ensures monitoring of the country’s progress towards attaining BP control targets.

Comparatively, a slightly higher proportion (47.1%) of those with hypertension were aware that they had hypertension in MMM187 than in the current campaign (44.8%). Additionally, there was 6.3% absolute increase in the proportion of those taking antihypertensive medications and 7.4% decline in those on medications having controlled BP in MMM19 compared with MMM18 further underscoring the need for regular BP awareness campaigns and improved BP control strategies in Botswana. The new findings in the current study of an association between previous history of hypertension in pregnancy and an increase in both systolic and diastolic BP compared with women with no such history is supported by other studies that found an association between previous pre-eclampsia and later life onset cardiovascular disease,10 suggesting that women with a history of hypertension disease in pregnancy may benefit from regular and long-term BP monitoring.

Although participants in this study were recruited in a non-random manner, the findings remain credible as they are closely aligned to national hypertension prevalence and related figures from the WHO and MOHw reports.

Conclusion

Rates of uncontrolled and undiagnosed hypertension have remained consistently high in Botswana since MMM surveys started 3 years ago, underscoring the importance of these regular campaigns at the individual and community level. Poor BP control remains a concern that needs expedited attention. Since medication errors are reported to contribute significantly to poor BP control in Botswana, future efforts should be made to address this component of the problem.

Supplementary material

Supplementary material is available at European Heart Journal Supplements online.

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