

# May Measurement Month 2019: an analysis of blood pressure screening results from Saudi Arabia

Ghadeer S. Aljuraiban<sup>1\*</sup>, Fatima Younis Al Slail<sup>2</sup>, Shatha Khalid Aldhwailea<sup>2</sup>, Ann Adnan Badawi<sup>2</sup>, Thomas Beaney<sup>3,4</sup>, Jonathan Clarke<sup>5</sup>, and Neil R. Poulter<sup>3</sup>

<sup>1</sup>Department of Community Health Sciences, College of Applied Medical Sciences, King Saud University, Riyadh 11451, Kingdom of Saudi Arabia;

<sup>2</sup>Cardiovascular Prevention and Control Program, Ministry of Health, Riyadh 11176, Kingdom of Saudi Arabia;

<sup>3</sup>Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK;

<sup>4</sup>Department of Primary Care and Public Health, Imperial College London, St Dunstan's Road, London W6 8RP, UK;

<sup>5</sup>Department of Mathematics, Huxley Building, South Kensington Campus, Imperial College London, London SW7 2AZ, UK

## KEYWORDS

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High blood pressure (BP) is a major risk factor for cardiovascular diseases and was identified as the most significant single preventable cause of mortality. The prevalence of hypertension in Saudi Arabia is high. To raise awareness and identify undiagnosed hypertension, the Saudi Ministry of Health participated in the May Measurement Month (MMM) 2019 global screening initiative of the International Society of Hypertension. Ninety-two primary care centres across the Kingdom recruited respondents aged  $\geq 18$  years through opportunistic sampling, from 1 May to 30 August of 2019. Data collection included sociodemographic, lifestyle habits, environmental, and anthropometric indicators. Blood pressure was measured twice using automated BP devices. A total of 25 023 adults were screened with a mean age of 42.4 (16.7) years and a mean body mass index of 27.5 (6.0) kg/m<sup>2</sup>. In total, 43.6% of participants were females and 56.4% were males. Of all the participants with hypertension, 60.8% were aware, 60.8% were on antihypertensive medication, and 39.3% had controlled BP (systolic BP <140 mmHg and diastolic BP <90 mmHg). Moreover, out of 4440 participants on antihypertensive medication, only 64.6% had controlled BP. The high numbers of individuals with hypertension and with undiagnosed hypertension highlight the importance of BP screening campaigns to increase awareness, detection, and target treatment on a national level. Findings from this study can form a baseline by which to measure progress in future iterations of MMM.

## Introduction

Hypertension is a leading risk factor for cardiovascular morbidity and mortality and a major cause of preventable death worldwide. Saudi Arabia is no exception, with cardiovascular disease listed as the leading cause of disability-adjusted life years for the past three decades<sup>1</sup> and estimated by the World Health Organization to account for 37%

of deaths.<sup>2</sup> Specifically, the incidence of stroke in Saudi Arabia has been estimated to be between about 30 and 58 cases per 100 000 person-years,<sup>3,4</sup> and the prevalence of coronary heart disease was reported to be 5.5%.<sup>5</sup> Furthermore, a recent modelling study projected that the prevalence of strokes and ischaemic heart disease is going to increase to 150% and 186%, respectively, in Saudi Nationals by 2035 while tripling the related economic burden.<sup>6</sup>

Unfortunately, many people living with hypertension are unaware and are therefore not seeking treatment that

\* Corresponding author. Tel: +96 650 301 2345, Email: galjuraiban@ksu.edu.sa

could be lifesaving. Estimates of hypertension prevalence in Saudi Arabia vary. A national survey conducted in 2013 found hypertension affected 15.2% and borderline hypertension affected 40.6% of the population,<sup>7</sup> while other studies from around the same time have found the rates of hypertension in Saudi Arabian populations to be much higher, at over 30%.<sup>8,9</sup> Regrettably, the national survey also revealed that almost 60% of Saudi Arabians with hypertension were undiagnosed.<sup>7</sup>

May Measurement Month (MMM) is a worldwide awareness campaign that began in 2017 by the International Society of Hypertension, with the aim of increasing access to hypertension screening. In light of the high rates of hypertension and the limited awareness of high blood pressure (BP), Saudi Arabia participated in the MMM in 2019 for the first time. The aim of the campaign was to increase awareness regarding hypertension screening among Saudis and detect undiagnosed cases.

## Methods

The screening of BP was led by Dr Ghadeer S. Aljuraiban, the MMM 2019 country coordinator and in collaboration with the Saudi Ministry of Health, represented by the director of Cardiovascular Prevention and Control Program, Dr Fatima Al Slail. The screening was conducted at 92 primary care centres across the country through opportunistic sampling, funded by the Saudi Ministry of Health, from 1 May to 30 August. A total of 160 site co-coordinators were briefed on the screening purpose and the use of the standardized protocol. Individuals aged 18 years or more were invited to participate through primary care centres at their regular appointments.

A standardized health history questionnaire was used to collect sociodemographic, lifestyle, and environmental data. Anthropometric indicators, including weight, height, and waist circumference, were measured. BP was measured twice, using automated BP devices (Microlife-BP-A2 Basic, Omron) after participants were seated in a quiet room for 5 min and had emptied their bladder.

A systolic BP of  $\geq 140$  mmHg or diastolic BP of  $\geq 90$  mmHg or on hypertension treatment was defined as hypertension. All data were manually entered into Excel by site coordinators, and the MMM 2019 country coordinator reviewed the data for possible errors and missing data. Data analyses were conducted centrally by the MMM 2019 campaign team. To remain consistent with and provide comparable readings for other countries involved in MMM, where three BP readings were recommended, multiple imputation using

chained equations was used to estimate the mean of the second and third BP readings based on global data.<sup>10</sup> Institutional ethics clearance was granted by the Saudi Ministry of Health Review Board (IRB 19-150E).

## Results

The total number of participants who had their BP measured in the MMM 2019 in Saudi Arabia was 25 023 adults with 43.6% females and 56.4% males. About 90.5% of the total participants were Arabic, and the rest were South Asian. The mean age for all participants was 42.4 (SD: 16.7) years, and the mean body mass index was 27.5 (SD: 6.0) kg/m<sup>2</sup>. A total of 7300 (29.2%) had hypertension (Table 1). Out of 7300 participants with hypertension, 60.8% were aware and were on antihypertensive medication and 39.3% had controlled BP (systolic BP <140 mmHg and diastolic BP <90 mmHg). Moreover, out of 4440 participants on antihypertensive medication, only 64.6% had controlled BP. After adjusting for age and sex, systolic, and diastolic BPs were significantly higher in individuals taking antihypertensive drugs and those with known hypertension, independent of antihypertensive medication use, compared to those not taking these drugs and without a hypertension history, respectively. Those overweight and obese had significantly higher systolic and diastolic BPs compared to healthy weight participants, while underweight participants had significantly lower systolic and diastolic BPs compared to those of healthy weight.

## Discussion

MMM 2019 was the first year that Saudi Arabia participated in this global awareness campaign. In total, 25 023 people participated and 29.2% of them had hypertension. These rates are similar to other research that has looked at Saudi Arabian subpopulations. For instance, the Prospective Urban Rural Epidemiology (PURE)-Saudi study found a 30.3% prevalence of hypertension among 2047 adults with a mean age of 46.5 (SD: 9.1) years.<sup>8</sup> Further, an analysis of the Africa Middle East Cardiovascular Epidemiological (ACE) study found that among Saudi Arabians 46 (SD: 14) years of age, hypertension rates were around 40%.<sup>9</sup> On the other hand, this study's findings are much higher than the results of a 2013 national survey, which identified hypertension rates at 15.2% among Saudi Arabians aged 15 years and older.<sup>7</sup> It is plausible that the variation in rates is due to the age of the participants, with a younger cohort in the national survey than in MMM19 and other studies on

**Table 1** Total participants and proportions with hypertension, awareness, on medication, and with controlled blood pressure

Total participants	Proportion (%) with hypertension	Proportion (%) of hypertensives aware	Proportion (%) of hypertensives on medication	Proportion (%) of those on medication with controlled BP	Proportion (%) of all hypertensives with controlled BP
25 023	29.2%	60.8%	60.8%	64.6%	39.3%

hypertension, increases over time, different locations of sampling, or differences in measurement tools and techniques.

This study reported that almost 40% of participants with hypertension were not aware of it. This figure, although lower than estimates from 2013,<sup>7</sup> is still startlingly high. Such results demonstrate the need for continued screening and awareness-raising. In that regard, MMM 2019 in Saudi Arabia successfully identified cases of hypertension that may have otherwise gone undiscovered. Almost 3000 cases of hypertension were identified among participants who were previously unaware. These participants can now begin treatment to help lessen their risk of cardiovascular disease morbidity and mortality.

Of the nearly one-third with hypertension, 60.8% were on antihypertensive medications. Just over two-thirds (64.6%) of people on antihypertensive medications had controlled BP. This is much higher than reported previously in a national survey, with 45% of participants on hypertension medication having controlled BP.<sup>7</sup> However, this study results demonstrate that hypertension remains a major problem, even after diagnoses, with only 39.3% of people with hypertension, overall, having controlled BP.

Limitations of this study include a sample that is not representative of the whole population. For instance, it did not include recruitment from remote areas. Additionally, participants were not randomly sampled, and some data were self-reported (e.g. family history of cardiovascular disease, types of medication). Despite this, the sample size was large, with over 25 000 participants, making this one of the larger studies investigating hypertension in Saudi Arabia.

## Conclusion

This study identified a high proportion of individuals with hypertension in Saudi Arabia, many of them living with untreated or uncontrolled BP. Hypertension is a leading risk factor for cardiovascular disease, which is the main cause of death in the country. It is, therefore, essential to screen for hypertension to increase awareness and to treat BP to target more aggressively. Participation in the MMM 2019 helped in both these regards as well as to identify almost 3000 cases of previously undiagnosed hypertension. Results can also form a baseline by which to measure progress in future iterations of MMM.

## Data availability

The data that support the findings of this study are available on request from the corresponding author, [GA]. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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