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

Mansi Patil[1], Arun Pulikkottil Jose[2], Arun More[3], Anuj Maheshwari[4,5],
Narsingh Verma[5,6], Rohan Shah[7], Amrit Kaur[8], Aprajita Kaushik[9],
Priyanka Sepat[10], Thomas Beaney[11,12], Jonathan Clarke[13], Leena Bagadia[3],
Swati Jadhav[3], Neil R. Poulter[11], and Dorairaj Prabhakaran ⓘ [2,14,15]*

[1]Asha Kiran Jubilee Hope Centre Hospital, Kalbhor Nagar, MIDC, Chinchwad, Pune 411019, Maharashtra, India;
[2]Centre for Chronic Conditions and Injuries, Public Health Foundation of India, Plot 47, Sector 44, Gurugram 122002, Haryana, India;
[3]Rural Health Progress Trust, Murud, 413510 Maharashtra, India;
[4]Department of General Medicine, Babu Banarasi Das University, Lucknow 226028, Uttar Pradesh, India;
[5]Indian Society of Hypertension, King George's Medical University, Shah Mina Rd, Chowk, Lucknow 226001, Uttar Pradesh, India;
[6]Department of Family Medicine, King George's Medical University, Shah Mina Rd, Chowk, Lucknow 226001, Uttar Pradesh, India;
[7]Kind Edward Memorial Hospital and Research Centre, 411011 Pune, India;
[8]Department of Community Based Rehabilitation Physiotherapy, Dr Vasantrao Pawar Medical College and Research Center, Nashik 422003, Maharashtra, India;
[9]Centre for Chronic Disease Control, 110016 New Delhi, India;
[10]Integrated Disease Surveillance Program, National Health Mission, 110 054 New Delhi, India;
[11]Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London, W12 7RH, UK;
[12]Department of Primary Care and Public Health, Imperial College London, St Dunstan's Road, LondonW6 8RP, UK;
[13]Department of Mathematics, Huxley Building, South Kensington Campus, Imperial College London, London SW7 2AZ, UK;
[14]Centre for Chronic Disease Control, C-1/52, 2nd Floor, Safdarjung Development Area, New Delhi 110016, Delhi, India; and
[15]Department of Epidemiology, London School of Hygiene and Tropical Medicine, Keppel St, Bloomsbury WC1E 7HT, London, UK

Aims: May Measurement Month is a global screening campaign to raise awareness regarding elevated blood pressure (BP). With the growing burden of hypertension, it is imperative to regularly assess the disease's prevalence, risk factors, and awareness levels in a country. The current prevalence of hypertension in India as per the National Family Health Survey Data stands at 25.3%. May Measurement Month mobilizes healthcare professionals and sensitizes them to regularly measure BP, and impart lifestyle modification advice to the community. It also complements the deficiency in screening programmes at a national and international level.
Methods and results: May Measurement Month was carried out in May 2019 as an opportunistic screening campaign for adults (≥18 years). It was carried out by over 5000 trained volunteers across approximately 1000 screening sites (hospitals, public places, pharmacies, villages, and malls) in India. A total of 362 708 (57%

*Corresponding author. Tel: +911244781400, Fax: 0124-4781601, Email: dprabhakaran@phfi.org

males and 42.7% females) people were screened, among whom 68.1% had never measured their BP, and 29.4% ($n = 106\ 522$) were found to have hypertension. Of these, only 42.0% were on antihypertensive medication and 23.3% had controlled hypertension.
Conclusion: Almost a third of the screened population had hypertension, and less than half of those with hypertension were aware of it or on treatment for it. Among those on antihypertensive drugs, BP was controlled in only half of them. These results support the need for greater impetus on BP screening initiatives to detect hypertension early in the community and prevent complications due to uncontrolled BP.

Introduction

The last few decades have seen an increase in the prevalence of hypertension in India.[2] Hypertension, often referred to as the 'silent killer', is known to cause various complications such as stroke, retinopathy, ischaemic heart disease, aneurysms, and renal disease. A staggering 57.0% of stroke and 24.0% of coronary artery related deaths have been attributed to hypertension.[1] Over the past five decades, researchers have established hypertension as a consistent and resilient risk factor that doubles the mortality and mortality burden with an increase of systolic blood pressure (BP) level of 20 mmHg.[3] Nearly, 10.8% of all deaths in India and 28.0% of mortality due to cardiovascular diseases are attributed to hypertension.[4]

The May Measurement Month (MMM) initiative, conceptualized by the International Society of Hypertension, is a stride in the right direction towards improving awareness regarding this silent killer. India has been an active participant in this campaign since 2017. In 2017, 31.8% of the total participants (240 376) were found to be hypertensive based on all three BP readings, whereas 14.0% ($n = 122\ 685$) were on antihypertensive treatment. This campaign in 2018 saw a similar prevalence of hypertension at 32.3% ($n = 345\ 234$).[5]

Awareness regarding hypertension, its prevention, and control is low in the community leading to poorly managed BP levels.[6,8] Identifying hypertension in the community, sensitizing the population towards the regular measurement of BP, and improving medication compliance is crucial for managing and controlling hypertension.

Methods

Multiple study coordinators led the MMM campaign in India and were responsible for training the volunteers in BP measurement techniques and disseminating lifestyle guidance. May Measurement Month 2019 India was conducted in over 1000 sites with more than 5000 volunteers [doctors, nurses, dieticians, allied health care professionals, Anganwadi workers (ANM), pharmacists, doctors in training, and students]. The ethical clearances were taken at the local screening sites by the respective site coordinators and informed consent was taken from each respondent. The MMM campaign involved a volunteer drive by various national organizations and associations (Public Health Foundation of India, Indian Society of Hypertension, Indian Association for Parenteral and Enteral Nutrition, and Rural Health Progress Trust), social media campaigns, and educational institutes. The screening was conducted in public places such as malls, metro stations, villages, offices, housing complexes, religious homes (temples, churches, etc.), pharmacies, clinics, and hospitals, using a mercury sphygmomanometer or a digital BP machine. The site coordinators obtained ethical clearance for the screening sites. The screening for BP continued through May (1st May to 31st May 2019) and was extended to 31st July 2019. Data were collected on Microsoft Excel sheets and an app developed by ISH. The MMM project team at ISH collated, cleaned, and analysed the data.

Blood pressure was recorded three times in the seated position by the volunteers, while height and weight were either self-reported or measured at the screening site. Multiple imputations were used to calculate the mean of second and third readings where the measurements were missing, based on the global data.[6] Hypertension was defined as a systolic BP $\geq$ 140 mmHg or a diastolic BP $\geq$ 90 mmHg or on hypertension treatment.[5] May Measurement Month 2019 captured data that were not collected in previous years, including number of antihypertensive drug classes being consumed, location of screening site, use of aspirin or statin, and if the participants were fasting.

Results

Of the total 362 708 participants screened, 92.5% were of South Asian ethnicity. The population had a mean age of 43.4 (SD: ±16.0) years, 57.0% were males, and 2.6% of women were pregnant at the time of screening. The BP screenings took place mostly in public areas (47.6%) and hospitals or clinics. Over two-thirds of the participants (247 057 68.1%) had their BP measured for the first time ever. About one-tenth of the participants (11.3%) were previously diagnosed with diabetes, 6.0% had a history of myocardial infarction and 5.1% of stroke. Aspirin and statin consumption was reported in 5.9% and 7.2% of participants, respectively. A large majority of the participants did not report consuming alcohol (91.4%) or smoking (81.1%), and 6.6% of them were fasting. The mean body mass index of participants was 24.5 (SD: ± 4.9) kg/m^2.

After imputation, 29.4% (106 522) of respondents were hypertensive; of these, 46 646 (43.8%) were aware of being
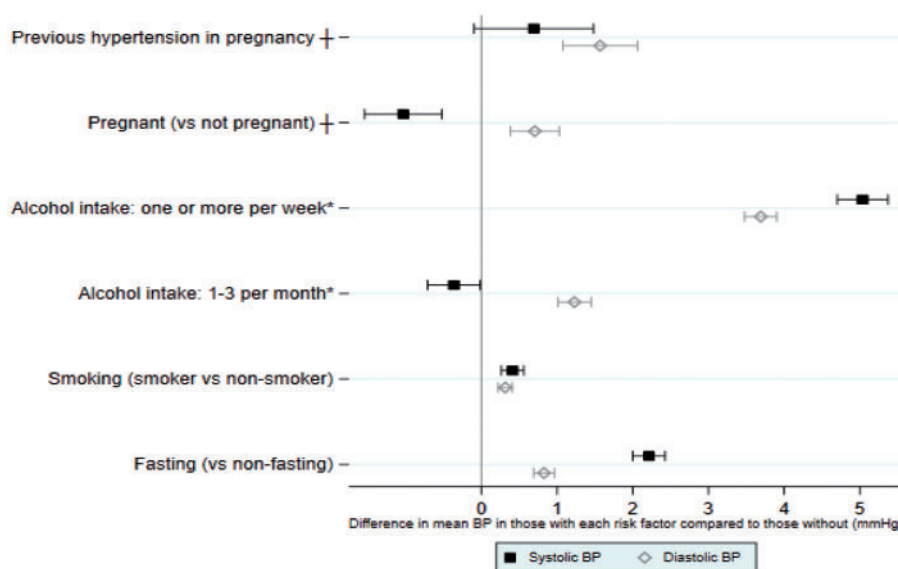
Figure 1 Difference in mean blood pressure in those with each risk factor compared to those without from linear regression models adjusted for age, sex and, antihypertensive medication (pregnancy adjusted for age and antihypertensive medication alone).

hypertensive, and 44 710 (42.0%) were on antihypertensive treatment. A total of 24 795 hypertensive patients (23.3%) of all hypertensive participants had controlled BP (systolic BP <140 mmHg and diastolic BP <90 mmHg), while BP was uncontrolled in 19 915 (44.5%) of those on BP-lowering medications ($n = 44 710$).

For respondents with three BP readings ($n = 295 517$), the mean of second and third readings (126.0/79.1 mmHg) was similar to the mean of all three measurements (126.6/79.4 mmHg). The age and sex standardized mean BP for those on antihypertensive medication was 135.5/82.5 mmHg and 123.9/78.1 mmHg in those not on treatment. Excluding those on treatment, systolic BP was seen rising with age in women while in men it peaked around 65 years of age, followed by a small decline. The diastolic BP showed lesser variability but similar trends as systolic BP. Linear regression models adjusted for age, sex and, use of antihypertensive drugs showed that the mean BP was significantly higher in known cases of diabetes and hypertension, and people on BP-lowering medications (adjusted for age and sex alone), while it was lower for those with previous myocardial infarction and stroke. Compared to readings taken in a hospital or clinic, linear regression models for the difference in mean BP at each screening site type showed significantly lower systolic and diastolic BP levels when taken in indoor public spaces, but systolic BP readings were higher in outdoor public spaces, in workplaces and pharmacies. There is a significant increase in both systolic BP and diastolic BP in those drinking alcohol one or more times per week compared to never drinking (*Figure 1*).

Discussion

With a third of the screened population ($n = 362 708$) being hypertensive and less than half of them aware of being hypertensive, MMM has proven to be an important initiative towards the detection of raised BP. The proportion of hypertension in MMM19 (29.4%) has not been much different than what was reported in MMM17 (31.2%) and MMM18 (32.3%), as well as the global MMM 2017[3] and 2018[4] data (34.9% and 33.4%, respectively). Of the 42% of participants that were on BP-lowering drugs, 45% had uncontrolled BP, which is higher than the 40.1% seen globally.[7] These results point to the need for enhanced BP awareness efforts, establishing standardized BP management strategies, and addressing the burden of risk factors of hypertension, including obesity, alcohol intake, and medication compliance.

May Measurement Month limitations include assessment of BP in a single instance, thus increasing the chances of inaccurate diagnosis. May Measurement Month in India was an opportunistic screening; therefore, the sampling was not random and not representative of India's population. Moreover, the efficacy of lifestyle advice given to the participants could not be evaluated in this study.

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