

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

Feroz S. Memon^{1*}, Wei Wang², Thomas Beaney^{2,3}, Kavita Bai⁴,
Neil R. Poulter², and Muhammad Ishaq⁵

¹University of Modern Sciences, Tando Muhammad Khan, Sindh, Pakistan; ²Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK; ³Department of Primary Care and Public Health, Imperial College London, St Dunstan's Road, London W6 8RP, UK; ⁴Indus Medical College, University of Modern Sciences, Tando Muhammad Khan, Sindh, Pakistan; and ⁵Karachi Institute of Heart Disease, Karachi, Sindh, Pakistan

KEYWORDS

Hypertension;
Blood Pressure;
Screening;
Awareness;
Controlled BP

The May Measurement Month (MMM) screening campaigns comprise an opportunistic assessment of the arterial blood pressure (BP) of Pakistani adults (≥ 18 years old) and evaluate the level of awareness and spectrum of the problem of hypertension and the associated risk factors. The prospective study was carried out in May 2018 in multiple medical screening camps at hospitals, pharmacies, and public areas with the help of local health care workers under ethical guidelines. The volunteers took BP measurements using OMRON digital BP devices, in a seated position, and three successive readings were noted after 5 min rest. The mean values of the second and third readings were attained. Data were analysed centrally by the MMM project management team and multiple imputations were performed, where BP readings were missing. Hypertension was defined as a systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg, or in those taking antihypertensive medication. This study included 25 076 participants, of whom 14 726 (58.7%) were hypertensive. Among all hypertensives, only 11 681 were aware of their hypertension status. After imputation, age and gender standardization, mean systolic and diastolic BP were 129.8 mmHg and 82.9 mmHg, respectively. MMM17 data revealed that 55.2% of those screened were hypertensive in Pakistan, while in 2018 the proportion rose slightly to 58.7%. The prevalence of hypertension among those screened for MMM in Pakistan was high in both years. Although most patients with hypertension were treated, the majority remained uncontrolled. Further efforts to improve awareness and control are needed.

Introduction

Hypertension is a significantly prevalent health issue and the leading risk factor for developing cardiovascular dysfunction, contributing to a high proportion of morbidity and mortality as well as an increased economic burden. Despite advancement in medical sciences, blood pressure (BP) control is still a challenging task to be

accomplished.¹ Shafi *et al.*² reported a 34.3% prevalence of hypertension and poor BP control in rural Punjab, Pakistan. BP control is a major health concern which requires amongst other interventions, awareness programmes related to life style modifications, physical exercise, and BP monitoring.² Gupta *et al.*³ reported low BP control rates and lack of awareness regarding hypertension in South Asians. Cardiovascular diseases are one of the greater health issues in Pakistan, and hypertension is one of the major contributing risk factors.⁴ Uncontrolled hypertension over a prolonged

*Corresponding author. Tel: 923008370937, Email: ferozsmemon@gmail.com

duration may lead to several major adverse cardiovascular events including cardiac failure. If hypertension is prevented in younger age groups, this may decrease the risk of developing many life-threatening cardiovascular conditions in later life.⁵ Lack of awareness regarding BP control, hypertension, and tobacco smoking have been reported as leading risk factors for developing cardiovascular diseases in Pakistan.⁶ May Measurement Month (MMM) is a large-scale BP screening project planned for increasing awareness about high BP and a temporary solution to the dearth of BP screening programmes around the world. According to data arising from MMM 2017 in Pakistan, the percentage of participants with hypertension was 55.2%.⁷ This study examines the 2018 MMM data to track changes in BP management and control.

Methods

This cross-sectional MMM survey was carried out in May 2018. Participants were informed about screening camps through public health messages in pamphlets distributed in public places. After informed consent, trained health care workers took BP measurements of adults ≥ 18 years old at multiple medical screening camps in hospitals, clinics, and public areas throughout Pakistan, using a validated OMRON digital BP device, in the sitting position. Three successive readings were taken at 1 min intervals, and a mean value of the second and third readings was attained. Detailed history including age, gender, self-reported weight, and history of taking antihypertensive medication were taken from the screenees and entered in predesigned data capture forms provided by the MMM team. Hypertension was defined as a systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg, or those taking antihypertensive medication. In those on antihypertensive medication, control was defined as BP $< 140/90$ mmHg. A body mass index (BMI) was stratified as follows: < 18.5 kg/m² (underweight), 18.5–24.9 kg/m² (healthy weight), 25.0–29.9 kg/m² (overweight), and ≥ 30.0 kg/m² (obese).⁷ Data were analysed centrally by the MMM project management team and multiple imputations were performed, where BP readings were missing based on the global MMM data.⁸

Results

A total of 25 076 participants were screened in MMM 2018 of whom 34.2 and 65.8% were females and males, respectively. Their mean age was 44.6 ± 14.6 years. Using the mean of the second and third readings, the average systolic BP was 123.2 mmHg and diastolic BP was 80.1 mmHg in those with all three readings. There were 5423 (21.6%) screenees who previously participated in the MMM 2017 campaign.

Following imputation, 14 726 (58.7%) of participants had hypertension of whom 11 681 (79.3%) were aware and 10 759 (73.1%) were taking antihypertensive medications. Only, 47.3% of those on medication had controlled BP. Overall, among all hypertensives ($n = 14 726$), only 5086 (34.5%) screenees had their BP controlled to $< 140/90$ mmHg (Table 1). The proportion of screenees who had never had their BP checked was 26.3%. The proportion of study participants, who were diabetic, having previous MI or stroke were 29.2, 12.9 and 12.4%, respectively. Participants with reported diabetes had on average a higher systolic BP (1.49 mmHg higher, $P < 0.001$), but those with a history of stroke had lower BPs after adjusting for age, gender, and antihypertensive medication use (systolic BP 1.07 mmHg lower; diastolic BP 1.89 mmHg lower; $P < 0.01$ for both). Similar lower diastolic BP was seen in subjects with previous myocardial infarction. Overweight and obese participants had significantly higher systolic and diastolic BP compared with those of a healthy weight and participants who were underweight had significantly lower mean BPs.

Discussion

During the course of this study, a high percentage (58.7%) of participants were found to have hypertension, and only one third of all hypertensives (34.5%) had a BP controlled to $< 140/90$ mmHg. Higher BP has been noted in overweight, obese, and diabetic patients. MMM 2018 data revealed a slightly higher proportion of participants with hypertension (58.7%) in Pakistan compared with MMM 2017 (55.2%).⁷ This is consistent with a meta-analysis by Shah *et al.*⁹ that included multiple studies conducted on Pakistanis, which documented a higher burden of hypertension among the adult Pakistanis, a trend which is increasing year by year. The MMM 2018 data are similar to those in the STEPS survey¹⁰. STEPS, sponsored by the WHO, used various standardized methods to collect, analyze and disseminate data on key NCD risk factors in many countries. Hypertension was one of the NCDs evaluated in the Pakistan survey¹⁰ carried out in two major provinces of Pakistan and found a similarly high prevalence of hypertension of 53%. Increasing trends of living a sedentary lifestyle and lower levels of physical activity are contributing factors for developing overweight, obesity, diabetes mellitus, and hypertension. The present study revealed that 26.3% individuals had never had their BP checked. Those with undiagnosed and untreated hypertension are at risk of developing cardiovascular complications, but this may be a bigger problem in more remote areas where the inhabitants are less well educated and health care

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

Total participants	Number (%) with hypertension	Number (%) of hypertensives aware	Number (%) of hypertensives on medication	Number (%) of those on medication with controlled BP	Number (%) of all hypertensives with controlled BP
25 076	14 726 (58.7)	11 681 (79.3)	10 759 (73.1)	5086 (47.3)	5086 (34.5)

facilities are more limited. According to Osuala¹¹ educating the people about regular exercise, weight control and regular BP checks may help with BP control. In urban Pakistan Khan *et al.*¹² reported that 18% of hypertensive individuals are in younger age groups and among them only one in eight had their BP controlled. Similarly, Shafi *et al.*² working in multiple screening camps in vicinities of the Punjab, Pakistan, found hypertension to be strongly related to BMI and diabetes mellitus. In addition, Naseem *et al.*¹³ suggested that knowledge and attitudes among the community play an important role in the control of hypertension.

Conclusion

The prevalence of hypertension among those screened for MMM in Pakistan is high. Although most patients with hypertension were treated, the majority remained uncontrolled. Further efforts to improve awareness and control are needed.

Acknowledgements

We thank all the volunteer physicians, MMM staff, and participants across all the screening sites in Pakistan. We are also thankful to Highnoon Laboratories LTD for facilitating by providing equipment and volunteers to various screening sites. Highnoon had no role in study design, data collection, analysis, interpretation, or writing of the manuscript.

Funding

None declared.

Conflict of interest: None declared.

Data availability

No new data were generated or analysed in support of this research.

References

1. Wermelt JA, Schunkert H. Management der arteriellen Hypertonie [management of arterial hypertension]. *Herz* 2017; **42**:515-526.
2. Shafi ST, Shafi T. A survey of hypertension prevalence, awareness, treatment, and control in health screening camps of rural central Punjab, Pakistan. *J Epidemiol Glob Health* 2017; **7**:135-140.
3. Gupta R, Kaur M, Islam S, Mohan V, Mony P, Kumar R, Kuttu VR, Iqbal R, Rahman O, Deepa M, Antony J, Vijaykumar K, Kazmi K, Yusuf R, Mohan I, Panwar RB, Rangarajan S, Yusuf S. Association of household wealth index, educational status, and social capital with hypertension awareness, treatment, and control in South Asia. *Am J Hypertens* 2017; **30**:373-381.
4. Zubair F, Nawaz SK, Nawaz A, Nangyal H, Amjad N, Khan MS. Prevalence of cardiovascular diseases in Punjab, Pakistan: a cross-sectional study. *J Public Health* 2018; **26**:523-529.
5. Messerli FH, Rimoldi SF, Bangalore S. The transition from hypertension to heart failure: contemporary update. *JACC Heart Fail* 2017; **5**:543-551.
6. Barolia R, Sayani AH. Risk factors of cardiovascular disease and its recommendations in Pakistani context. *J Pak Med Assoc* 2017; **67**:1723-1729.
7. Ishaq M, Memon F, Beaney T, Xia X, Kobeissi E, Poulter NR. May Measurement Month 2017: an analysis of the blood pressure screening campaign results in Pakistan—South Asia. *Eur Heart J Suppl* 2019; **21**:D89-D91.
8. Beaney T, Burrell LM, Castillo RR, Charchar FJ, Cro S, Damasceno A, Kruger R, Nilsson PM, Prabhakaran D, Ramirez AJ, Schlaich MP, Schutte AE, Tomaszewski M, Touyz R, Wang J-G, Weber MA, Poulter NR. May Measurement Month 2018: a pragmatic global screening campaign to raise awareness of blood pressure by the International Society of Hypertension. *Eur Heart J* 2019; **40**:2006-2017.
9. Shah N, Shah Q, Shah AJ. The burden and high prevalence of hypertension in Pakistani adolescents: a meta-analysis of the published studies. *Arch Public Health* 2018; **76**:20.
10. Rafique I, Saqib MAN, Munir MA, Qureshi H, Rizwanullah KS, Khan SA, Fouad H. Prevalence of risk factors for noncommunicable diseases in adults: key findings from the Pakistan STEPS survey. *East Mediterr Health J* 2018; **24**:33-41.
11. Osuala EO. Hypertension prevention and control: effects of a community health nurse-led intervention. *J Health Educ Res Dev* 2017; **5**:2.
12. Khan MA, Walley JD, Khan N, Khan MA, Ali S, King R, Khan SE, Sheikh FI, Manzoor F, Khan HJ. Delivering integrated hypertension care at private health facilities in urban Pakistan: a process evaluation. *BJGP open*. 2018; **2**:bjgpopen18X101613.
13. Naseem S, Sarwar MH, Afzal M, Gilani SA. Knowledge attitude and practice towards hypertension among adult population in a rural area of Lahore. Pakistan. *Int J Sci Eng Res* 2018; **9**:1674-1679.