

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

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To bolster the awareness of high blood pressure (BP) and to monitor the trend of hypertension control rate. Similar to May Measurement Month (MMM) 2017 and 2018 campaigns, we conducted the MMM 2019 campaign in 643 community pharmacies across Taiwan, and recruited adults aged 20 years or over in May and June of 2019. After filling in an anonymous questionnaire regarding medical history and lifestyle habits and having 10-min sitting rest, pharmacists took triplicate upper-arm BP readings on participants using an automated oscillometric sphygmomanometer. The means of the second and third BP readings were used as the screening BP estimates. Hypertension was defined if one of the followings was met: use of antihypertensive medications, systolic BP ≥ 140 mmHg, or diastolic BP ≥ 90 mmHg. Controlled BP was defined as BP of $< 140/90$ mmHg. Of the 24 851 participants enrolled (mean age, 55.8 ± 15.2 years), 12 427 (50.0%) were women. Among 12 351 (49.7%) participants with hypertension, 10 463 (84.7%) were aware of their high BP, and 10 142 (82.1%) received antihypertensive medications. While 59.2% of all hypertensive participants had controlled BP, the BP control rate was 72.0% in treated hypertensive participants. MMM campaigns offer a feasible way to monitor the trends in both awareness and control of hypertension. This nationwide annual BP screening campaign, from 2017 to 2019, demonstrated continued improvement in hypertension control in Taiwan.

Introduction

Raising awareness and strengthening control of hypertension is a pressing issue for public health and clinical care in order to improve the prognosis of hypertension. According to the 2013–2016 report of Nutrition and Health Survey in Taiwan (NAHSIT), the prevalence of hypertension in the general population aged 19 years or above was 24.5% and

was higher in men than in women (28.3% vs. 20.9%).¹ Compared with the statistics in 2018, cardiovascular mortality in 2019 in Taiwan increased by 0.4 per 100 000 persons, consisting of increases in mortalities attributed to hypertension and heart diseases by 0.8 and 0.9 per 100 000 persons, respectively; and a decrease in mortality attributed to cerebrovascular disease by 1.3 per 100 000 persons.²

Since 2017, the Taiwan Hypertension Society (THS) has joined the annual May Measurement Month (MMM) campaign initiated by the International Society of

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Table 1 Total participants and proportions with hypertension, awareness, on medication, and with controlled BP

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
24 851	12 351 (49.7)	10 463 (84.7)	10 142 (82.1)	7306 (72.0)	7306 (59.2)

Hypertension, with the aim of raising awareness and surveying the management status of hypertension in the general population. According to results from the Taiwan MMM 2017 and MMM 2018 campaigns, hypertension control rates increased from 64.3% in 2017 to 67.7% in 2018 in treated hypertensive participants, and from 52.5% in 2017 to 55.0% in 2018 in all hypertensive participants.^{3,4} To bolster the awareness of high blood pressure (BP) and to monitor trends in hypertension control rate in Taiwan, we continued the MMM BP screening campaign in 2019 (MMM 2019).

Methods

The THS conducted MMM 2019, along with the Taiwan Health Promotion Administration and the Taiwan Pharmacist Association (TPA). Similar to MMM 2017 and MMM 2018 campaigns, we recruited adults aged ≥ 20 years between 1 May and 30 June 2019, in 643 community pharmacies across Taiwan. The campaign protocol was approved by the Research Ethical Committee of the National Taiwan University Hospital. After giving informed consent, participants completed an anonymous questionnaire regarding medical history and lifestyle habits whilst sitting at rest for 10 min. Then, the pharmacist used an automated oscillometric sphygmomanometer to measure the participants upper-arm BP three consecutive times, spacing each 1 min apart. The data from the questionnaire and BP readings were collected using either a hard-copy or online form. The mean of the second and third BP readings was used as the screening BP estimate in analysis. Hypertension was defined if one of the followings was met: use of antihypertensive medication, systolic BP ≥ 40 mmHg, or diastolic BP ≥ 90 mmHg. Hypertension was considered controlled if the screening BP estimates were $< 140/90$ mmHg. Associations with BP were estimated after adjusting for age, sex (with an interaction), and use of antihypertensive medications, where feasible. Data were analysed centrally by the MMM project team, and the means of the second and third BP readings were imputed if they were missing based on the global data.⁵

Results

Of the 24 851 enrolled participants with a mean age of 55.8 ± 15.2 years, 12 427 (50.0%) were women, 100% were of Chinese ethnicity, and 4857 (19.5%) had joined MMM 2017 or MMM 2018 campaigns. Of all participants, 4679 (18.8%) had not had a BP measurement in the past year. Among the 12 351 (49.7%) participants with hypertension

(Table 1), 10 463 (84.7%) were aware of their high BP, and 10 142 (82.1%) received antihypertensive medications. The rate of controlled BP was 72.0% among treated hypertensive participants, of whom, 56.1% and 10.8% received one and three or more classes of antihypertensive medications, respectively. Of total hypertensive participants, 59.2% had controlled BP. Among the 14 709 participants not on antihypertensive medications, 2209 (15.0%) were identified as having hypertension. Of total participants, 3003 (12.1%) took aspirin, while 5301 (21.3%) took statins.

Participants with cardiovascular diseases (except for previous myocardial infarction) or risk factors were more likely to have higher BP than those without corresponding diseases or risk factors. Participants treated with antihypertensive medications or with the presence of either known hypertension, previous stroke, or diabetes were more likely to have higher systolic BP [6.0 (95% confidence interval, 5.6-6.5); 7.8 (6.7-8.8); 2.0 (0.6-3.3); 1.6 (1.0-2.1), respectively], as compared with the absence of the corresponding conditions. Similarly, smokers had 3.7 (3.2-4.3) mmHg higher systolic BP than non-smokers, while individuals consuming alcohol had 4.0 (3.1-4.9) mmHg higher systolic BP for those drinking more than once per week, and 2.2 (1.4-2.9) mmHg higher for those drinking one to three times per month, compared to those never/rarely consuming alcohol.

Discussion

In Taiwan, of 24 851 participants recruited, 49.7% were hypertensive. Among participants with hypertension, the awareness of their high BP was 84.7%, and the rate of medical treatment for hypertension was 82.1%. The rates of controlled BP were 72.0% and 59.2% in participants treated with antihypertensive medications, and in all hypertensive participants, respectively. Compared with the global results of MMM 2019,⁵ participants from Taiwan had higher awareness and control rates of hypertension. The finding that participants with previous stroke had higher systolic and diastolic BP than those without stroke might indicate that control of BP in patients with stroke deserves more attention in Taiwan.

Annual MMM BP screening campaigns provide information on the trends of awareness, and treatment and control rates of hypertension in general population.^{3,4,6} Between 2017 and 2019, the Taiwan MMM results revealed that the awareness of hypertension rose from 83.7% in 2018 to 84.7% in 2019,⁴ while the rates of controlled hypertension rose from 64.3% in 2017 to 72.0% in

2019 among treated hypertensive participants, and from 52.5% in 2017 to 59.2% in 2019 for all hypertensive participants.³ In addition, triplicate BP measurements for each participants of MMM campaigns enable us to assess the intra-individual discrepancy of BP estimates. Our analysis of Taiwan MMM 2017 and MMM 2018 data demonstrated that the differences in BP estimation protocols of current hypertension guidelines could lead to considerable intra-individual discrepancies in BP estimates and classifications. We proposed that average of the lowest two systolic BP readings and the corresponding diastolic BP from triplicate BP measurements could serve as a prudent recommendation for BP estimation.⁷

Though inherently confounded by self-referral bias and so may not represent underlying population prevalence, MMM campaigns offer a feasible way to monitor the trends in awareness and control of hypertension. Whether the nationwide annual BP screening campaign would improve the management of hypertension in the long run awaits verification.

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Data availability

We described that data presented herein were "analysed centrally by the MMM project team." We regard this as the data availability statement.

Conflict of interest: none declared.

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