

May Measurement Month 2021: an analysis of blood pressure screening results from Thailand

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KEYWORDS

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Blood pressure (BP) measurement is the mainstay for diagnosing and treating hypertension. Blood pressure screening in the May Measurement Month (MMM) project is helpful for the early detection of hypertension, which is usually asymptomatic. This study aimed to investigate the epidemiology of hypertension from data in the MMM21 project in Thailand. A cross-sectional study was conducted according to the MMM clinical study protocol for MMM21 in all regions of Thailand from August to November 2021. We included adults aged ≥ 18 years. Baseline characteristics, history of hypertension diagnosis, and treatment were collected through the questionnaires followed by three standardized BP measurements, 1 min apart. We included 10 940 participants with a mean age of 41.3 (SD \pm 13.5) years. Only 6% never had their BP measured before. Of all participants, 30.2% had hypertension, and among this hypertensive population, 50.3% were aware, and 46.2% were taking antihypertensive medications. Of participants with hypertension, 31.6% had controlled BP ($<140/90$ mmHg), and BP control was 68.5% among those taking antihypertensive medication. The proportion of participants who had diabetes, were on aspirin, and were on statin were 6, 7.2, and 11.4%, respectively. Almost all participants (93.7%) had received at least one COVID-19 vaccination, and 8.0% reported a previous COVID-19 positive test. Most of the participants (97.4%) received hypertension care at no cost. Hypertension awareness and overall BP control rate were relatively low, while most subjects had previously had their BP checked. The widespread use of BP measurement may improve the diagnosis and treatment of hypertension to improve the care of those with hypertension in Thailand.

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Introduction

Stroke and coronary artery disease (CAD) have been the leading causes of death in Thailand for decades. Epidemiologic data from 2021 revealed that the mortality rate of stroke and CAD rose to 55.5 and 33.5 per 100 000 persons, respectively.¹ Hypertension is an important risk factor for cardiovascular diseases and a burden to public health worldwide. The fifth and sixth Thai National Health Examination Survey (NHES) showed a small increase in prevalence of hypertension from 24.7% in 2014 to 25.4% in 2019-20, while only a quarter of all hypertensive patients had their blood pressure (BP) well controlled.^{2,3} The May Measurement Month (MMM) project has been conducted annually since its initiation in 2017 by the International Society of Hypertension (ISH) to promote hypertension awareness through a BP screening campaign,⁴ which is the mainstay for diagnosing and treating hypertension. In 2021, the Thai Hypertension Society (THS) collaborated with MMM amid the COVID-19 pandemic. Social distancing strategies not only resulted in a change in people's behaviour but also impacted the processes of diagnosis and treatment of hypertension.⁵ Thus, we aimed to obtain information on hypertension care in Thailand, especially during the COVID-19 pandemic, and to increase self-awareness of hypertension via BP screening.

Methods

We conducted a cross-sectional study for the MMM21 in Thailand from August to November 2021. Our study protocol followed the clinical study protocol for MMM21.⁶ Adult participants aged ≥ 18 years were included. Study sites were set up in 73 provinces. Major sites were from the central and eastern regions. Blood pressure measurements were mainly performed in hospitals and workplaces. All research assistants received training to perform standardized BP measurements before subject enrolment. Appropriately sized arm cuffs and validated automated electronic BP devices (OMRON HBP-1300, HBP-1100, HEM-7130, and Microlife BP A2 Basic) were used. Three BP measurements were recorded at 1-min intervals.

The average BP of the last two readings was included in the analysis. The diagnosis of hypertension had to meet at least one of these criteria: (i) average systolic BP ≥ 140 mmHg, (ii) average diastolic BP (DBP) ≥ 90 mmHg, or (iii) receiving antihypertensive medication(s). The definition of controlled hypertension was BP $< 140/90$ mmHg among patients taking antihypertensive medications. We collected the data, including demographic information, history of COVID-19 infection and vaccination, and BP via Microsoft Excel platform of ISH. All collected data were analysed centrally by

the MMM project team, and multiple imputations were performed to impute the mean of the second and the third readings if missing, based on global data.⁶ Our study was approved by the Siriraj Institutional Review Board (SIRB; COA no. Si 582/2021).

Results

We screened 10 940 participants from all sites in Thailand. The mean age was 41.3 (SD \pm 13.5) years, with 60.3% female and 38.4% male subjects. Almost all of them (99.9%) were reported as East/South East Asian ethnicity. Of 1524 (13.9%) participants taking antihypertensive medications, 84.4% took one or two classes of BP-lowering medications and 65.4% had good medication adherence. Of all participants, 653 (6.0%), 793 (7.2%), and 1250 (11.4%) participants had diabetes, were on aspirin, and were on statin, respectively. Less than 1% of them reported a previous stroke or myocardial infarction. The majority of the volunteers (84.9%) were non-smokers, and 61.8% reported never or rarely drinking alcohol. During the COVID-19 pandemic in 2021, 93.7% of volunteers had received at least one COVID-19 vaccination, and only 8.0% had a previous COVID-19 positive test. Six percent of the subjects had never had their BP measured.

After imputation, 3298 (30.2%) subjects had hypertension. Among all 3298 hypertensive participants, the rates of hypertensive awareness, receiving antihypertensive medications, and achieving controlled BP were 50.3, 46.2, and 31.6%, respectively. Of 1524 participants taking antihypertensive medications, the BP control rate was 68.5% (Table 1). Of 9416 participants who did not take antihypertensive medication, 18.8% had hypertension. The results from linear regression models adjusted for age, sex, and antihypertensive medication use demonstrated that previously diagnosed hypertension and diabetes mellitus were significantly associated with higher systolic BP compared to those without (4.9 and 1.8 mmHg higher, respectively; $P < 0.001$ and $P = 0.016$, respectively). Participants with known hypertension also had significantly higher DBP (2.9 mmHg higher, $P < 0.001$), while those with previous myocardial infarction had significantly lower DBP (3.4 mmHg lower, $P = 0.018$). After adjustment for age and sex, people using antihypertensive medications had significantly higher systolic BP (5.3 mmHg higher, $P < 0.001$) and DBP (1.8 mmHg higher, $P < 0.001$).

Among those on treatment, 85.0% received their medications free of charge. No participants reported that they did not take their treatment due to it being too expensive.

Table 1 Total participants and proportions 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
10 940	3298 (30.2)	1659 (50.3)	1524 (46.2)	1044 (68.5)	1042 (31.6)

Discussion

This survey is the first time Thailand has participated in the MMM campaign. According to this survey, the vast majority of participants had measured their BP previously, while only 6% of the study population in Thailand had never measured their BP, perhaps indicating that being unaware of hypertension is unlikely to be due to inaccessible BP measurement services. Efforts towards improving hypertension care in Thailand should focus on appropriate follow-up of subjects with elevated BP and ensuring correct diagnosis either by repeated office BP or by out-of-office BP measurement to ensure appropriate hypertensive treatment.⁷ Sixty-five per cent of those on treatment reported that they took their BP medication regularly, which is in line with the percentage of subjects who had BP under control. Therefore, patient education and easy access to healthcare services for long-term management of this non-communicable disease could represent a suitable approach to maintaining patients' adherence to ongoing treatment.

Data from the sixth Thai NHES performed during 2019-20 in around 22 000 Thai subjects³ suggested that hypertension prevalence was 25%, 51% were aware of their hypertension, 48% were being treated, and 47% of those treated had BP under control. Almost 90% of the volunteers in this MMM survey were young to middle-aged adults living or working in the urban area of the country, which may be a more stressful environment than that of subjects recruited in the NHES. Subjects were included from all regions of the country using a multi-stage random sampling method in Thai NHES, while we used convenience sampling in the MMM campaign, which was not randomized. Therefore, the information derived from this MMM campaign is not nationally representative. In the sixth NHES, around half of the subjects resided in the urban area but 40% were aged over 60 years. Most volunteers paid nothing for their hypertension care because of the Thai government's universal healthcare coverage policy. Ninety-four per cent of participants had received at least one dose of COVID-19 vaccination, and only 8% had previously had a positive COVID-19 test, pertaining to the strength of healthcare service in Thailand even during COVID-19 pandemic.

There were some limitations in this survey. First, the study could only be performed in areas with suitable infection preventive measures because of the COVID-19 situation. The included participants might have had better access to healthcare services than those not included. Second, hypertension diagnosis based on office BP measurement in only one visit will lead to overdiagnosis due to the inclusion of white-coat hypertension and underdiagnosis due to the exclusion of masked hypertension, which was found in 26 and 7%, respectively, in a Thai population.⁸

In conclusion, in our sample, most people have had their BP checked, while hypertension awareness remains low. Most of the participants in the study were young

to middle aged, and only half of those who were hypertensive were receiving BP-lowering treatment, with most on only one to two medications. Therefore, healthcare providers in Thailand should raise hypertension awareness among the screened population and streamline their hypertension service to augment the percentage of patients getting appropriate long-term treatment to lessen the cardiovascular burden of hypertension in the country.

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Conflict of interest: none declared.

Data availability

Data is available upon request.

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